MASTER OF TECHNOLOGY
ENGINEERING DESIGN

CHOICE BASED CREDIT SYSTEM

ACADEMIC REGULATIONS, COURSE STRUCTURE AND SYLLABI FOR
M.TECH. –ENGINEERING DESIGN
UNDER AUTONOMOUS STATUS
FOR THE BATCHES ADMITTED FROM THE ACADEMIC YEAR 2015 - 2016

Note: The regulations hereunder are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already undergoing the program) as may be decided by the Academic Council.
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” the 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.


- “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, B3201: Principles of Machine Modeling Analysis, B3601: Microcontrollers for Embedded System Design, etc.

Table 1: Course Code Description

<table>
<thead>
<tr>
<th>First Digit</th>
<th>Second Digit</th>
<th>Third Digit</th>
<th>Fourth and Fifth Digits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicates Program</td>
<td>Indicates Regulation</td>
<td>Indicates Department</td>
<td>Indicates Course Number</td>
</tr>
<tr>
<td>A: B. Tech.</td>
<td>1: R11</td>
<td>1: WMC</td>
<td>01</td>
</tr>
<tr>
<td>B: M. Tech.</td>
<td>2: R14</td>
<td>2: CSE</td>
<td>02</td>
</tr>
<tr>
<td>C: MBA</td>
<td>3: R15</td>
<td>3: PEED</td>
<td>..</td>
</tr>
</tbody>
</table>

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

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

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 Boards of Studies are constituted with 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 prolonged and detailed interaction with several expertise solicited from academics, industry and research, in accordance with the vision and mission of the college to order to produce a quality engineering graduate to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications needed are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The 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
VISION OF THE COLLEGE:
To aim at inculcating the spirit of high ambitions, healthy attitudes, discipline and multidimensional excellence in the students and strive to mould them to scale new heights and get their mental horizons enlarged through value-based technical education and congenial study environment.

MISSION OF THE COLLEGE:
To sharpen the inherent professional skills of our students to enable them compete in the complex world through our newly evolved quality management system and dedicated staff. The practical oriented education and the research tie-up with industries we provide, tend to promote the intellectual pursuits of the students.

QUALITY POLICY:
Vardhaman College of Engineering strives to establish a system of quality assurance to continuously address, monitor and evaluate the quality of education offered to students, thus promoting effective teaching processes for the benefit of students and making the College a Centre of Excellence for Engineering and Technological studies.

GOALS:
1. To initiate strategic planning process to review its present plans and goals in identifying thrust areas.
2. To tie up with national and international premier organizations for the purpose of exchange of research and innovation through the students and faculty of the Institution.
3. To develop consultancy in all disciplines through alliances with research organizations, government establishments, industries and alumni.
4. To attain status as the provider of quality education and independent research center.
5. To evolve as a Deemed University offering programs of relevance in emerging areas of technology.
6. To achieve 100% placement for students
VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Affiliated to JNTUH, Approved by AICTE, Accredited by NAAC and ISO 9001:2008 Certified

ACADEMIC REGULATIONS

M.Tech. Regular Two Year Post Graduate Programme
(For the batches admitted from the Academic Year 2015–2016)

For pursuing Two year PG program of study in Master of Technology (M.Tech.) offered by Vardhaman College of Engineering under Autonomous status and herein after 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 2015-2016 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.

<table>
<thead>
<tr>
<th>S. No</th>
<th>M.Tech Courses</th>
<th>Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Computer Science and Engineering</td>
<td>18</td>
</tr>
<tr>
<td>2</td>
<td>Digital Electronics and Communication Systems</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>Embedded Systems</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>Power Electronics and Electrical Drives</td>
<td>18</td>
</tr>
<tr>
<td>5</td>
<td>Engineering Design</td>
<td>18</td>
</tr>
</tbody>
</table>

4. **ADMISSION**

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

   4.1.1. **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 TSCHC, Government of Telangana.

   Admissions shall be made based on the rank secured in PGCET examination conducted by
Telangana State Council for Higher Education (or) GATE examination for allotment of a seat by the Convener, PGCET 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, PGCET.
(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 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. The academic calendar is shown in Table 1 is declared at the start of the semester. The duration for each semester shall be a minimum of 16 weeks of instruction.

Table 1: Academic Calendar

<table>
<thead>
<tr>
<th>Semester</th>
<th>Instruction Period</th>
<th>Mid Semester Tests</th>
<th>Preparation &amp; Practical Examinations</th>
<th>External Examinations</th>
<th>Semester Break</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>FIRST SEMESTER (21 weeks)</td>
<td>:16 weeks</td>
<td>:2 weeks</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SECOND SEMESTER (21 weeks)</td>
<td>:16 weeks</td>
<td>:2 weeks</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<tr>
<td>SUMMER VACATION</td>
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<td></td>
<td>4</td>
</tr>
</tbody>
</table>

The medium of instruction and examination is English for all the courses.
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 5 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 three (or more) period hours of practical
- 2 credits for technical seminar
- 4 credits for comprehensive viva examination
- 18 credits for project work phase – I
- 22 credits for project work phase – II

8.2. The two year curriculum of any M.Tech programme of study shall have total of 88 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.

8.3. For courses like technical seminar / comprehensive viva / Project Work Phases – I and II, where formal contact hours are not specified, credits are assigned based on the complexity of the work to be carried out.

9. METHOD OF EVALUATION

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

9.1. Theory
For all lecture based theory courses, the evaluation shall be for 30 marks through internal evaluation and 70 marks through external end semester examination of three hours duration.

9.1.1 Internal evaluation
For theory subjects, during the semester there shall be 2 midterm examinations. Each midterm examination consists of subjective test. The subjective test is for 30 marks, with duration of 2 hours.

First midterm examination shall be conducted for I – IV units of syllabus and second midterm examination shall be conducted for the remaining portion.

The internal marks shall be computed as the average of the two internal evaluations, of two subjective tests.

9.1.2 External Evaluation
The question paper shall be set externally and valued both internally and externally. The external end semester examination question paper in theory subjects will be for a maximum of 70 marks to be answered in three hours duration. For End-Semester examination, the candidate has to answer any five out of eight questions. Each question carries 14 marks. Each theory course shall consist of eight units of syllabus.

The question paper shall be set externally and evaluated both internally and externally. If the difference between the first and second valuation is less than 15 marks, the average of
the two valuations shall be awarded, and if the difference between the first and second valuation is more than or equal to 15 marks, third evaluation will be conducted and the average marks given by all three examiners shall be awarded as final marks.

9.2. Practical

Practical shall be evaluated for 100 marks, out of which 70 marks are for external examination and 30 marks are for internal evaluation. The 30 internal marks are distributed as 20 marks for day-to-day work and 10 marks for internal examination. The external end-examination shall be conducted by the teacher concerned and an external examiner from outside the college.

9.3. Technical Seminar

The seminar shall have two components, one chosen by the student from the course-work without repetition and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work. A hard copy of the information on seminar topic in the form of a report is to be submitted for evaluation along with presentation. The presentation of the seminar topics shall be made before an internal evaluation committee comprising the Head of the Department or his nominee, seminar supervisor and a senior faculty of the department. The two components of the seminar are distributed between two halves of the semester and are evaluated for 100 marks each. The average of the two components shall be taken as the final score. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

9.4. Comprehensive Viva

The comprehensive Viva will be conducted by a committee comprising Head of the Department or his nominee, two senior faculty of the respective department and an external examiner from outside the college. This is aimed at assessing the student’s understanding of various subjects studied during the entire program. The comprehensive viva shall be evaluated for 100 marks at the end of III semester. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

9.5. Project Work

The project work shall be evaluated for 300 marks out of which 100 marks for phase – I internal evaluation, 60 marks for phase – II internal evaluation and 140 marks for end semester evaluation. A minimum of 50% of marks on the aggregate in the internal evaluation and external end-evaluation taken together shall be obtained to earn the corresponding credits.

Every candidate is required to submit dissertation after taking up a topic approved by the Departmental Committee. The project work shall be spread over in III semester and in IV semester. The project work shall be somewhat innovative in nature, exploring the research bent of mind of the student.

The Departmental Committee (DC) consists of HOD, Supervisor and two senior experts in the department. The committee monitors the progress of Project Work. The DC is constituted by the Principal on the recommendations of the department Head.

Student shall register for the Project work with the approval of Department Committee in the III Semester and continue the work in the IV Semester too. The Departmental Committee (DC) shall monitor the progress of the project work. In III Semester, Phase – I of the Project Work is to be completed. A Student has to identify the topic of work, collect relevant Literature, preliminary data, implementation tools / methodologies etc., and perform a critical study and analysis of the problem identified. He shall submit status report in two different phases in addition to oral presentation before the Departmental Committee for evaluation and award of 100 internal marks at the end of Phase – I.
A candidate shall continue the Project Work in IV Semester (Phase – II) and submit a Project report at the end of Phase – II after approval of the Departmental Committee. During Phase – II, the student shall submit status report in two different phases, in addition to oral presentation before the DC. The DC shall evaluate the project for 60 internal marks based on the progress, presentations and quality of work.

A candidate shall be allowed to submit the dissertation only after passing all the courses of I and II semesters with the approval of Departmental Committee not earlier than 40 weeks from the date of registration of the project work and then take viva-voce examination. The viva-voce examination may be conducted once in three months for all the eligible candidates.

Three copies of the dissertation certified in the prescribed form by the supervisor and HOD shall be presented to the Department and one copy is to be submitted to the Controller of Examinations, VCE and one copy to be sent to the examiner.

The department shall submit a panel of three experts for a maximum of 5 students at a time. However, the examiners for conducting viva-voce examination shall be nominated by the Controller of Examinations, VCE. If the report of the examiner is favorable, viva-voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the dissertation. The board shall jointly evaluate the project work for 140 marks. The candidates who fail in viva-voce examinations shall have to re-appear the viva-voce examination after three months. If he fails again in the second viva-voce examination, the candidate has to re-register for the Project Work.

If a candidate desires to change the topic of the project already chosen during Phase – I, he has to re-register for Project work with the approval of the DC and repeat Phases – I and II. Marks already earned in Phase – I stand cancelled.

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

10.1. 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.

10.2. Condonation of shortage of attendance in aggregate upto 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

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

10.4. 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.

10.5. 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.

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

10.7. 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.

11. 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 50% 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 technical seminar and comprehensive viva 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-examination taken together.

iv. A student shall register for all the 88 credits and earn all the 88 credits. Grades obtained in all the 88 credits shall be considered for the award of the class based on aggregate of grades (CGPA).

v. A student who fails to earn 88 credits as indicated in the course structure within FOUR academic years from the year of their admission shall forfeit their seat in M.Tech. programme and their admission stands cancelled.

vi. 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.

12. EVALUATION

Following procedure governs the evaluation.

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

12.2. Performance in all the courses is tabulated course-wise and will be scrutinized by the Examination Committee and moderation is applied if needed, based on the recommendations of moderation committee and course-wise marks lists are finalized.

12.3. Student-wise tabulation is done and student-wise memorandum of marks is generated which is issued to the student.

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.

14. RE-REGISTRATION FOR IMPROVEMENT OF INTERNAL

Following are the conditions to avail the benefit of improvement of internal marks.

14.1. The candidate should have completed the course work and obtained examinations results for I& II semesters.

14.2. 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.
14.3. 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.

14.4. In the event of availing the Improvement of Internal evaluation marks, the internal evaluation marks as well as the End Examinations marks secured in the previous attempt(s) for the re-registered subjects stand cancelled.

15. RE-EVALUATION

Students shall be permitted for re-evaluation after the declaration of end semester examination results within a stipulated period by paying prescribed fee.

16. 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.

17. 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.

18. AWARD OF DEGREE

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

18.1. Eligibility

A student shall be eligible for the award of M.Tech. Degree, if he fulfills 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.

18.2. 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 4:
Table 4: Declaration of Class is based on CGPA (Cumulative Grade Point Average)

<table>
<thead>
<tr>
<th>Class Awarded</th>
<th>Grades to be Secured</th>
<th>From the aggregate marks secured from 88 Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>≥ 7.75.0 CGPA</td>
<td></td>
</tr>
<tr>
<td>First Class</td>
<td>6.75 to &lt;7.75 CGPA</td>
<td></td>
</tr>
<tr>
<td>Pass Class</td>
<td>6.0 to &lt;6.75 CGPA</td>
<td></td>
</tr>
<tr>
<td>Fail</td>
<td>Below 5.0 CGPA</td>
<td></td>
</tr>
</tbody>
</table>

18.3. Letter Grade and Grade Point

It is necessary to provide equivalence of percentages and/or Class awarded with GradePoint Average (GPA). This shall be done by prescribing certain specific thresholds in averages for Distinction, First Class and Second Class, as mentioned in Table 5.

Table 5: Percentage Equivalence of Grade Points (For a 10-Point Scale)

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Points (GP)</th>
<th>Percentage of Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>O (Outstanding)</td>
<td>10</td>
<td>≥ 80 and above</td>
</tr>
<tr>
<td>A+ (Excellent)</td>
<td>9</td>
<td>≥ 70 and &lt; 80</td>
</tr>
<tr>
<td>A (Very Good)</td>
<td>8</td>
<td>≥ 60 and &lt;70</td>
</tr>
<tr>
<td>B+ (Good)</td>
<td>7</td>
<td>≥ 55 and &lt;60</td>
</tr>
<tr>
<td>B (Above Average)</td>
<td>6</td>
<td>≥ 50 and &lt;55</td>
</tr>
<tr>
<td>F (Fail)</td>
<td>0</td>
<td>Below 50</td>
</tr>
<tr>
<td>AB (Absent)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

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.

\[
SGPA (S_i) = \frac{\sum (C_i \times G_i)}{\sum C_i}
\]

Where \( C_i \) is the number of credits of the \( i^{th} \) course and \( G_i \) is the grade point scored by student in the \( i^{th} \) 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.

\[
CGPA = \frac{\sum (C_i \times S_i)}{\sum C_i}
\]

Where \( S_i \) is the SGPA of the \( i^{th} \) semester and \( C_i \) is the total number of credits in that semester.

19. 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.
20. **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.

21. **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.

22. **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.

23. **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.

24. **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.

25. 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.

26. 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.

27. 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.

28. AWARD OF A RANK UNDER AUTONOMOUS SCHEME

28.1. 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.

28.2. 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.

28.3. 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.

29. CONDUCT AND DISCIPLINE

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

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

29.3. 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.

29.4. 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.
29.5. **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.**

29.6. 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.

29.7. 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.

29.8. 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.

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

30. **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.

31. **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.*
COURSE STRUCTURE
# M. TECH – ENGINEERING DESIGN

## REGULATIONS: VCE--R15

### I SEMESTER

<table>
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<td>Theory of Plates</td>
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**OPEN ELECTIVES**

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SYLLABI
UNIT - I
SHEAR CENTER: Bending Axis and Shear Center- Shear Center for Axis-Symmetric and Unsymmetrical Sections.

UNIT - II
UNSYMMETRICAL BENDING: Bending Stresses in Beams Subjected to Nonsymmetrical Bending; Deflection of Straight Beams due to Nonsymmetrical Bending.

UNIT - III
CURVED BEAM THEORY: Winkler Bach Formula for Circumferential Stress, Limitations, Correction Factors, Radial Stress in Curved Beams, Closed Ring Subjected to Concentrated and Uniform Loads Stresses in Chain Links.

UNIT - IV
TORSION: Linear Elastic Solution; Prandtl Elastic Membrane (Soap-Film) Analogy; Narrow Rectangular Cross Section; Hollow Thin wall Torsion Members, Multiply connected Cross Section.

UNIT - V
TWO DIMENSIONAL ELASTICITY PROBLEMS - I: Plane Stress and Plain Strain-Problems in Rectangular Coordinates, Bending of Cantilever Loaded at the End, Bending of a Beam by Uniform Load.

UNIT - VI
TWO DIMENSIONAL ELASTICITY PROBLEMS - II: Plane Stress and Plain Strain-Problems in Polar Coordinates, General Equations in Polar Coordinates, Stress Distribution Symmetrical about an Axis, Pure Bending of Curved bars, Displacements for Symmetrical Stress Distributions, Rotating discs.

UNIT - VII
BEAMS ON ELASTIC FOUNDATION: General theory - Infinite Beam Subjected to Concentrated Load: Boundary conditions - Infinite Beam Subjected to a Distributed Load Segment - Semi-infinite Beam Subjected to loads of its End - Semi-infinite Beam with Concentrated load near its End - Short Beams.

UNIT - VIII
CONTACT STRESSES: Introduction; Problem of Determining contact stresses; Assumptions on which a solution for contact stresses is based; Expressions for principal stresses; Method of computing contact stresses; Deflection of bodies in point contact; Stresses for two bodies in contact over narrow rectangular area (Line contact), Loads normal to area; Stresses for two bodies in line contact, Normal and Tangent to contact area.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT - I
INTRODUCTION: Elements of Mechanisms; Mobility Criterion for Planar Mechanisms and Manipulators; Mobility Criterion for Spatial Mechanisms and Manipulators. Spherical Mechanisms, Spherical Trigonometry, four bar linkage and six bar chains, analysis versus synthesis.

UNIT - II
ADVANCED KINEMATICS OF PLANE MOTION - I: The Inflection circle ; Euler - Savary Equation; Analytical and Graphical Determination of Diameter; Bobillier Construction; Collineation Axis ; Hartmann Construction; Inflection Circle for the Relative Motion of Two Moving Planes; Application of the Inflection circle to Kinematic Analysis.

UNIT – III
ADVANCED KINEMATICS OF PLANE MOTION – II: Polode Curvature; Hall Equation; Polode Curvature in the Fourbar mechanism; Coupler Motion; Relative Motion of the Output and Input Links; Determination of the output Angular acceleration and its Rate of change; Freudenstein’s collineation – axis theorem; Carter–Hall circle; The Circling – Point curve for the Coupler of a Four bar mechanism.

UNIT - IV
KINAMATIC SYNTHESIS- GRAPHICAL METHOD-I: number synthesis, dimensional synthesis, guiding a point through twodistinct positions, through three distinct positions, Burmester curve.

UNIT - V
KINAMATIC SYNTHESIS- GRAPHICAL METHOD-II:

UNIT - VI
KINAMATIC SYNTHESIS - ANALYTICAL METHODS: Function Generation: Freudenstien’s equation, Precision point approximation, Precision – derivative approximation; Path Generation: Synthesis of Four-bar Mechanisms for specified instantaneous condition; Method of components; Synthesis of Four-bar Mechanisms for prescribed extreme values of the angular velocity of driven link; Method of components.

UNIT –VII

UNIT - VIII
FLIXIBLE MECHANISMS: Introduction, flexible links, flexible joints, kinematic and dynamics modeling of flexible link, control of flexible link., examples

TEXT BOOKS:

REFERENCE BOOKS:
UNIT - I

UNIT - II
ONE-DIMENSIONAL FINITE ELEMENT METHODS: Bar elements, temperature effects. Element matrices, Assembling of global stiffness matrix, Application of boundary conditions, Elimination and penalty approaches, solution for displacements, reaction, stresses, temperature effects, Quadratic Element, Heat transfer problems: One-dimensional, conduction and convection problems. Examples: one dimensional fin.

UNIT - III
TRUSSES: Element matrices, assembling of global stiffness matrix, solution for displacements, reaction, stresses, temperature effects.

UNIT - IV
BEAMS AND FRAMES: Element matrices, assembling of global stiffness matrix, solution for displacements, reaction, stresses.

UNIT - V

UNIT - VI

UNIT - VII
FINITE ELEMENTS IN STRUCTURAL ANALYSIS: Static and Dynamic analysis, Eigen value problems, and their solution methods, simple problems.

UNIT - VIII
CONVERGENCE: Requirements for Convergence, H-refinement and P-refinement, complete and incomplete interpolation functions, Pascal’s triangle.

TEXT BOOKS:

REFERENCE BOOKS:
4. Chennakesava R. Alavala(2009), Finite Element Methods, 1st edition second Print, Prentice-Hall publishers, New Delhi, India
M. Tech. ED I SEMESTER

MECHATRONICS SYSTEM DESIGN
(Professional Elective - I)

Course Code: B3704

UNIT - I


UNIT - II

STUDY OF SENSORS AND TRANSDUCERS: Pneumatic and Hydraulic Systems, Mechanical Actuation System, Electrical Actual Systems, Real time interfacing and Hardware components for Mechatronics.

UNIT - III

ELECTRICAL ACTUATION SYSTEMS: Electrical systems, Mechanical switches, Solid state switches, solenoids, DC & AC motors, Stepper motors.

UNIT - IV

SYSTEM MODELS: Mathematical models: Mechanical system building blocks, Electrical system building blocks, Thermal system building blocks, electromechanical systems, Hydro-mechanical systems, Pneumatic systems.

UNIT - V

SIGNAL CONDITIONING: Signal conditioning, the operational amplifier, Protection, Filtering, Wheatstone Bridge, Digital signals, Multiplexers, Data Acquisition, Introduction to digital system processing, pulse-modulation.

UNIT - VI


UNIT - VII

DATA PRESENTATION SYSTEMS: Basic System Models, System Models, Dynamic Responses of System.

UNIT - VIII


TEXT BOOKS:


REFERENCE BOOKS:

M. Tech. ED I SEMESTER

FRACTURE, FATIGUE AND CREEP DEFORMATION
(Professional Elective - I)

Course Code: B3705

UNIT - I

INTRODUCTION: Prediction of mechanical failure. Macroscopic failure modes; brittle and ductile behavior. Fracture in brittle and ductile materials – characteristics of fracture surfaces; intergranular and intragranular failure, cleavage and micro-ductility, growth of fatigue cracks, the ductile/brittle fracture transition temperature for notched and unnotched components. Fracture at elevated temperature.

UNIT - II

GRIFFITHS ANALYSIS: Concept of energy release rate, G, and fracture energy, R. Modification for ductile materials, loading conditions. Concept of R curves.

UNIT - III

LINEAR ELASTIC FRACTURE MECHANICS (LEFM) - I: Three loading modes and the state of stress ahead of the crack tip, stress concentration factor, stress intensity factor and the material parameter the critical stress intensity factor.

UNIT - IV

LINEAR ELASTIC FRACTURE MECHANICS (LEFM) - II: The effect of Constraint, definition of plane stress and plane strain and the effect of component thickness. The plasticity at the crack tip and the principles behind the approximate derivation of plastic zone shape and size. Limits on the applicability of LEFM.

UNIT - V

ELASTIC-PLASTIC FRACTURE MECHANICS (EPFM) - I: The definition of alternative failure prediction parameters, Crack Tip Opening Displacement, and the J integral. Measurement of parameters and examples of use.

UNIT - VI

ELASTIC-PLASTIC FRACTURE MECHANICS (EPFM) - II: The effect of Microstructure on fracture mechanism and path, cleavage and ductile failure, factors improving toughness.

UNIT - VII

FATIGUE: Definition of terms used to describe fatigue cycles, High Cycle Fatigue, Low Cycle Fatigue, mean stress, R ratio, strain and load control. S-N curves. Goodmans rule and Miners rule. Micro mechanisms of fatigue damage, fatigue limits and initiation and propagation control, leading to a consideration of factors enhancing fatigue resistance. Total life and damage tolerant approaches to life prediction.

UNIT - VIII


TEXT BOOKS:

REFERENCE BOOKS:
UNIT - I

UNIT - II

UNIT - III

UNIT - IV
JOURNAL BEARINGS: Introduction to idealized full journal bearings. Load carrying capacity of idealized full journal bearings, Sommerfeld number and its significance. Comparison between lightly loaded and heavily loaded bearings, Numerical problems.

UNIT - V

UNIT - VI

UNIT - VIII

UNIT - VIII
MAGNETIC BEARINGS: Introduction to magnetic bearings, Active magnetic bearings. Different equations used in magnetic bearings and working principal. Advantages and disadvantages of magnetic bearings, Electrical analogy, Magneto-hydrodynamic bearings.

TEXT BOOKS:

REFERENCE BOOKS:
1. Susheel Kumar Srivasthava (2004), Tribology In Industry, 1st Edition, S. Chand Publisher, New Delhi, India.
UNIT – I:
INTRODUCTION TO T.Q.M: Introduction to Quality; Evolution of and basic approach to Total Quality Management; Leadership concepts; The Seven habits of highly effective people; Role of TQM Leaders; Implementation of TQM; Quality council, core values and concepts, quality statements; strategic planning and communications.

UNIT-II:
CUSTOMER SATISFACTION: Types of Customers-Internal and External; Customer perception of quality; Feedback & brief discussion on Information Collecting Tools.

UNIT - III:
EMPLOYEE INVOLVEMENT: Maslow’s hierarchy of needs; Employee Empowerment; Types of Teams, Stages of team development, Common barriers to team progress, Training; Recognition & Reward; Performance Appraisal; Benefits of Employee Involvement.

UNIT - IV:
CONTINUOUS PROCESS IMPROVEMENT: Introduction; Juron trilogy; Improvement strategies; P-D-S-A cycle & Problem solving method; Basic concepts of Kaizen and Six sigma quality control, Taguchi methods, Quality circles

UNIT - V:
Supplier Partnership: Introduction, Partnering, Sourcing, Supplier Selection, Supplier Rating, Relationship Development.
Tools & Techniques of TQM: Pareto diagram, Cause & Effect diagram.

UNIT - VI

UNIT - VII:

UNIT - VIII:
SYSTEM RELIABILITY: Systems with components- in Series, and in Parallel; Non-Series- Parallel systems. Redundancy Techniques: Introduction, Component & Unit Redundancy, Weakest link technique.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT - I

EFFECT OF MATERIALS AND MANUFACTURING PROCESS ON DESIGN: Major phases of design. Effect of material properties on design effect of manufacturing processes on design. Material selection process- cost per unit property, weighted properties and limits on properties methods.

UNIT - II


UNIT - III

SELECTIVE ASSEMBLY: Interchangeable part manufacture and selective assembly, Deciding the number of groups - Model-1: Group tolerance of mating parts equal, Model total and group tolerances of shaft equal. Control of axial play-Introducing secondary machining operations, laminated shims, examples.

UNIT - IV


UNIT - V


UNIT - VI

COMPONENT DESIGN: Component design with machining considerations link design for turning components- milling, Drilling and other related processes including finish- machining operations.

UNIT - VII


UNIT - VIII

DESIGN OF GAUGES: Design of gauges for checking components in assemble with emphasis on various types of limit gauges for both hole and shaft.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT - I

UNIT - II
INTRODUCTION TO STRAIN: Deformation, Strain Displacement relations, Strain components, The state of strain at a point, Principal strain, Strain transformation, Compatibility equations, Cubical dilatation.

UNIT - III

UNIT - IV
TWO DIMENSIONAL PROBLEMS IN CARTESIAN CO-ORDINATES: Airy's stress function, investigation for simple beam problems. Bending of a narrow cantilever beam under end load, simply supported beam with uniform load, Use of Fourier series to solve two dimensional problems.

UNIT - V
TWO DIMENSIONAL PROBLEMS IN POLAR CO-ORDINATES: General equations, stress distribution symmetrical about an axis, Pure bending of curved bar, Strain components in polar co-ordinates, Rotating disk and cylinder, Concentrated force on semi-infinite plane, Stress concentration around a circular hole in an infinite plate.

UNIT - VI

UNIT - VII
TORSION OF PRISMATIC BARS: Torsion of Circular and elliptical cross section bars, Soap film analogy, Membrane analogy, Torsion of thin walled open and closed tubes.

UNIT - VIII
ELASTIC STABILITY: Axial compression of prismatic bars, Elastic stability, buckling load for column with constant cross section.

TEXT BOOKS:

REFERENCE BOOKS:
LIST OF EXPERIMENTS:

I. MODELING
   1. Surface modeling
   2. Solid modeling
   3. Drafting
   4. Assembling

II. STRUCTURAL ANALYSIS USING ANY FEA PACKAGE for different structures that can be discretized with 1-D, 2-D & 3-D elements
   1. Static Analysis
   2. Modal Analysis
   3. Harmonic Analysis
   4. Spectrum Analysis
   5. Buckling Analysis
   6. Analysis of Composites
   7. Fracture mechanics

III. THERMAL ANALYSIS USING ANY FEA PACKAGE for different structures that can be discretized with 1-D, 2-D & 3-D elements
   1. Steady state thermal analysis
   2. Transient thermal analysis

IV. TRANSIENT ANALYSIS USING ANY FEA PACKAGE for different structures that can be discretized with 1-D, 2-D, 3-D elements
   1. Linear
   2. Non-Linear (Geometrical Non-linearity)

Any two Software Packages from the following:
CATIA /PRO-E/ANSYS/ OCTAVE/ELMER

Note: Minimum 12 of the above experiments are to be conducted
M. Tech. ED I SEMESTER

TECHNICAL SEMINAR

Course Code: B3711

1. OBJECTIVE:
Seminar is an important component of learning in an Engineering College, where the student gets acquainted with preparing a report & presentation on a topic.

2. PERIODICITY / FREQUENCY OF EVALUATION:
Twice

3. PARAMETERS OF EVALUATION:

i. The seminar shall have two components, one chosen by the student from the course-work without repetition and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work.

ii. The two components of the seminar are distributed between two halves of the semester and are evaluated for 100 marks each. The average of the two components shall be taken as the final score.

iii. The students shall be required to submit the rough drafts of the seminar outputs within one week of the commencement of the class work.

iv. Supervisor shall make suggestions for modification in the rough draft. The final draft shall be presented by the student within a week thereafter.

v. Presentation schedules will be prepared by different Departments in line with the academic calendar.

The Seminars shall be evaluated in two stages as follows:

A. Rough Draft

In this stage, the student should collect information from various sources on the topic and collate them in a systematic manner. He / She may take the help of the concerned supervisor.

The report should be typed in “MS-Word” file with “calibri” font, with font size of 16 for main heading, 14 for sub-headings and 11 for the body text. The contents should also be arranged in Power Point Presentation with relevant diagrams, pictures and illustrations. It should normally contain 18 to 25 slides, consisting of the followings:

<p>| | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>1.</td>
<td>Topic, name of the student &amp; guide</td>
</tr>
<tr>
<td>2.</td>
<td>List of contents</td>
</tr>
<tr>
<td>3.</td>
<td>Introduction</td>
</tr>
<tr>
<td>4.</td>
<td>Descriptions of the topic (point-wise)</td>
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<tr>
<td>5.</td>
<td>Images, circuits etc.</td>
</tr>
<tr>
<td>6.</td>
<td>Conclusion</td>
</tr>
<tr>
<td>7.</td>
<td>References/Bibliography</td>
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</table>

The soft copy of the rough draft of the seminar presentation in MS Power Point format along with the draft Report should be submitted to the concerned supervisor, with a copy to the concerned HOD within 30 days of the commencement of class work.
The evaluation of the Rough draft shall generally be based upon the following.

<table>
<thead>
<tr>
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<th>Description</th>
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<tr>
<td>1</td>
<td>Punctuality in submission of rough draft and discussion</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Resources from which the seminar have been based</td>
<td>4</td>
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<tr>
<td>3</td>
<td>Report</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Lay out, and content of Presentation</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>Depth of the students knowledge in the subject</td>
<td>10</td>
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<td><strong>Total</strong></td>
<td><strong>30</strong></td>
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</table>

After evaluation of the first draft the supervisor shall suggest further reading, additional work and fine tuning, to improve the quality of the seminar work.

Within 7 days of the submission of the rough draft, the students are to submit the final draft incorporating the suggestions made by the supervisor.

**B. Presentation:**

After finalization of the final draft, the students shall be allotted dates for presentation (in the designated seminar classes) and they shall then present it in presence students, supervisor, faculties of the department and at least one faculty from some department / other department.

The student shall submit 3 copies of the Report neatly bound along with 2 soft copies of the PPT in DVD medium. The students shall also distribute the title and abstract of the seminar in hard copy to the audience. The final presentation has to be delivered with 18-25 slides.

The evaluation of the Presentation shall generally be based upon the following.

<table>
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<tr>
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<th>Description</th>
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<tr>
<td>1</td>
<td>Contents</td>
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<td>2</td>
<td>Delivery</td>
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<td>3</td>
<td>Relevance and interest the topic creates</td>
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<td>4</td>
<td>Ability to involve the spectators</td>
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<tr>
<td>5</td>
<td>Question answer session</td>
<td>10</td>
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<td><strong>Total</strong></td>
<td><strong>70</strong></td>
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</table>

**4. WHO WILL EVALUATE?**

The presentation of the seminar topics shall be made before an internal evaluation committee comprising the Head of the Department or his/her nominee, seminar supervisor and a senior faculty of the department / other department.
SYLLABI FOR II SEMESTER
M. Tech. ED II SEMESTER

ROBOTICS

Course Code: B3712

UNIT - I

UNIT - II
KINEMATICS OF MANIPULATORS: Degrees of freedom of a manipulator, Loop constraint equations. Direct kinematics of 2R and 3R manipulator, Planar four bar mechanism. Inverse kinematics of 2R and 3R manipulator, Inverse kinematics of planar four bar mechanisms.

UNIT - III

UNIT - IV

UNIT - V
TRAJECTORY PLANNING: Joint space schemes, Cubic trajectory, Joint space schemes with via points, Cubic trajectory with a via point, Third order polynomial trajectory planning, Cartesian space schemes, Cartesian straight line and circular motion planning.

UNIT - VI
CONTROL: Feedback control of a single link manipulator, First order and Second order systems, PID control, PD control of multi link manipulator, Cartesian control of manipulators, Force control of manipulators-Force control of single mass.

UNIT - VII

UNIT - VIII
SENSORS: Sensor desirable features, Position sensors, Velocity sensor, Acceleration sensors, Force and Pressure sensors, Torque sensors, Touch and tactile sensor, Proximity sensors and Range sensors.

TEXT BOOKS:

REFERENCE BOOKS:
M. Tech. ED II SEMESTER  

MECHANICAL VIBRATIONS

Course Code: B3713  

UNIT – I

INTRODUCTION: study of vibration, basic concepts of vibration, classification of vibration systems, simple harmonic motion, equilant systems, mathematical modeling-inertia element, stiffness element, dissipation element, model construction.

UNIT – II

SINGLE DEGREE OF FREEDOM SYSTEMS - I: Undamped and Damped free vibrations: forced vibrations; coulomb damping; Response to harmonic excitation; rotating unbalance and support excitation; Vibration isolation and transmissibility.

UNIT – III

TWO DEGREE OF FREEDOM SYSTEMS: Principal modes, undamped and damped free and forced vibrations, coordinate coupling and principal coordinate, undamped vibration absorbers.

UNIT – IV

MULTI DEGREE OF FREEDOM SYSTEMS: Matrix formulation, stiffness and flexibility influence coefficients; Eigen value problem; normal modes and their properties; Free and forced vibration by Modal analysis; Method of matrix inversion;

UNIT – V

NUMERICAL METHODS: Rayleigh’s, Stodola’s, Rayleigh-Ritz Method, Matrix iteration and Holzer’s methods.

UNIT – VI


UNIT – VII

ROTOR UNBALANCED: Introduction, Torsional vibrations of single and multi – rotor systems, geared systems and critical speed without and with damping, secondary critical speed.

UNIT – VIII

VIBRATION MEASUREMENT: Introduction, frequency response function measurement, force input, capacitive probe, laser vibrometers, velocity meters & accelerometers.

TEXT BOOKS:


REFERENCE BOOKS:

5. S Graham Kelly, Mechanical Vibrations: Theory and Applications, Cengage learning
UNIT - I
INTRODUCTION: Principles of gear tooth action, Generation of Cycloid and Involute gears, Involutometry, gear manufacturing processes and inspection, gear tooth failure modes, stresses, selection of right kind of gears.

UNIT - II
SPUR GEARS: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of spur gear teeth considering Lewis beam strength, Buckingham’s dynamic load and wear load, Design of gear shaft and bearings.

UNIT - III
HELICAL GEARS: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of helical gear teeth considering Lewis beam strength, Buckingham’s dynamic load and wear load, Design of gear shaft and bearings.

UNIT - IV
BEVEL GEARS: Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of bevel gear teeth considering Lewis beam strength, Buckingham’s dynamic load and wear load, Design of gear shaft and bearings.

UNIT - V

UNIT - VI
GEAR FAILURES: Analysis of gear tooth failures, Nomenclature of gear tooth wear and failure, tooth breakage, pitting, scoring, wear, overloading, gear-casing problems, lubrication failures.

UNIT - VII
GEAR TRAINS: Simple, compound and epicyclic gear trains, Ray diagrams, Design of a gear box of an automobile, Design of gear trains from the propeller shafts of airplanes for auxiliary systems.

UNIT - VIII
OPTIMAL GEAR DESIGN: Optimization of gear design parameters, Weight minimization, Constraints in gear train design-space, interference, strength, dynamic considerations, rigidity etc. Compact design of gear trains, multi objective optimization of gear trains. Application of Traditional and non-traditional optimization techniques.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT - I
LINEAR PROGRAMMING: Two-phase simplex method, Big-M method, duality, interpretation, applications.

UNIT - II
ASSIGNMENT PROBLEM: Hungarian’s algorithm, Degeneracy, applications, unbalanced problems, Traveling salesman problem.

UNIT - III
CLASSICAL OPTIMIZATION TECHNIQUES: Single variable optimization with and without constraints, multi-variable optimization without constraints, multi-variable optimization with constraints - method of Lagrange multipliers, Kuhn-Tucker conditions.

UNIT - IV
NUMERICAL METHODS FOR OPTIMIZATION: Nelder Mead’s Simplex search method, Gradient of a function, Steepest descent method, Newton’s method, types of penalty methods for handling constraints.

UNIT - V
GENETIC ALGORITHM (GA): Differences and similarities between conventional and evolutionary algorithms, working principle, reproduction, crossover, mutation, termination criteria, different reproduction and crossover operators, GA for constrained optimization, drawbacks of GA.

UNIT - VI
GENETIC PROGRAMMING (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.

UNIT - VII
MULTI-OBJECTIVE(GA): convergence criterion, Pareto’s analysis, Non-dominated front, multi-objective GA, Nondominated sorted GA, applications of multi-objective problems.

UNIT - VIII
APPLICATIONS OF OPTIMIZATION IN DESIGN AND MANUFACTURING SYSTEMS: Some typical applications like optimization of path synthesis of a four-bar mechanism, minimization of weight of a cantilever beam, optimization of springs and gears, general optimization model of a machining process, optimization of arc welding parameters, and general procedure in optimizing machining operations sequence.

TEXT BOOKS:

REFERENCE BOOKS:
M. Tech. ED II SEMESTER

COMPUTATIONAL FLUID DYNAMICS
(Professional Elective - III)

Course Code: B3716

UNIT - I

UNIT - II

UNIT - III

UNIT - IV
FORMULATIONS OF INCOMPRESSIBLE VISCOUS FLOWS: Formulations of Incompressible viscous flows by Finite difference methods, Pressure Correction methods, Vortex methods.

UNIT - V
TREATMENT OF COMPRESSIBLE FLOWS: Potential Equation, Euler Equations, Navier-Stokes system of Equations, flow field-dependent variation methods, boundary conditions, example problems.

UNIT - VI
FINITE VOLUME METHOD: Finite volume method via finite difference method, formulations for two and three-dimensional problems.

UNIT - VII
STANDARD VARIATIONAL METHODS - I: Linear fluid flow problems, Steady state problems.

UNIT - VIII
STANDARD VARIATIONAL METHODS - II: Transient problems.

TEXT BOOK:

REFERENCE BOOK:
M. Tech. ED II SEMESTER

THEORY OF PLATES
(Professional Elective - III)

Course Code: B3717

UNIT - I

BENDING OF LONG RECTANGULAR PLATES TO A CYLINDRICAL SURFACE: Differential equation for cylindrical bending of plates, Cylindrical bending of uniformly loaded rectangular plates with simply supported edges, Cylindrical bending of uniformly loaded rectangular plates with built-in edges.

UNIT - II

PURE BENDING OF PLATES: Slope and curvature of slightly bent plates, Relations between bending moments and curvature in pure bending of plates, Particular cases of pure bending, Strain energy in pure bending of plates.

UNIT - III

SYMMETRICAL BENDING OF CIRCULAR PLATES: Differential equation for symmetrical bending of laterally loaded circular plates, Uniformly loaded circular plates, Circular plate with a circular hole at the center, Circular plate concentrically loaded, Circular plate loaded at the center.

UNIT - IV

SMALL DEFLECTIONS OF LATERALLY LOADED PLATES: The differential equation of the deflection surface, Boundary conditions, Alternate method of derivation of the boundary condition, Reduction of the problem of bending of a plate to that of deflection of a membrane.

UNIT - V

SIMPLY SUPPORTED RECTANGULAR PLATES: Simply supported rectangular plates under sinusoidal load, Navier solution for simply supported rectangular plates.

UNIT - VI

RECTANGULAR PLATES WITH VARIOUS EDGE CONDITIONS: Bending of rectangular plates by moments distributed along the edges - Rectangular plates with two opposite edges simply supported and the other two edges clamped.

UNIT - VII

CONTINUOUS RECTANGULAR PLATES: Simply supported continuous plates, approximate design of continuous plates with equal spans, bending symmetrical with respect to a center.

UNIT - VIII

DEFORMATION OF SHELLS WITHOUT BENDING: Definition and notation, Shells in the form of a surface of revolution and loaded symmetrically with respect to their axis, Particular cases of shells in the form of surfaces of revolution - Shells of constant strength.

GENERAL THEORY OF CYLINDRICAL SHELLS: A circular cylindrical shell loaded symmetrically with respect to its axis, Particular cases of symmetrical deformation of circular cylindrical shells, Pressure vessels.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT – I
STRESSES IN PRESSURE VESSELS: Introduction - Stresses in a circular ring, cylinder - Membrane stress Analysis of Vessel Shell components - Cylindrical shells, spherical shells, torispherical heads, conical heads - Thermal stresses - Discontinuity stresses in pressure vessels.

UNIT – II
DESIGN OF VESSELS: Design of tall cylindrical selfsupporting process columns - supports for short vertical vessels - stress concentration - at a variable thickness transition section in a cylindrical vessel, about a circular hole, elliptical openings. Theory of reinforcement - pressure vessel design.

UNIT – III: BUCKLING AND FRACTURE ANALYSIS IN VESSELS: Buckling phenomenon - Elastic Buckling of circular ring and cylinders under external pressure - collapse of thick walled cylinders or tubes under external pressure - effect of supports on Elastic Buckling of cylinders - Buckling under combined External pressure and axial loading - Control and significance of Fracture Mechanics in Vessels - FEM application.

UNIT – IV
DISCONTINUITY STRESSES IN PRESSURE VESSELS: Introduction, beam on an elastic foundation, infinitely long beam, semi infinite beam, cylindrical vessel under axially symmetrical loading, extent and significance of load deformations on pressure vessels, discontinuity stresses in vessels, stresses in a bimetallic joints, deformation and stresses in flanges.

UNIT – V
PRESSURE VESSEL MATERIALS AND THEIR ENVIRONMENT: Introduction, ductile material tensile tests, structure and strength of steel, Leuder’s lines, determination of stress patterns from plastic flow observations, behaviour of steel beyond the yield point, effect of cold work or strain hardening on the physical properties of pressure vessel steels, fracture types in tension, toughness of materials, effect of neutron irradiation of steels, fatigue of metals, fatigue crack growth, fatigue life prediction, cumulative fatigue damage, stress theory of failure of vessels subject to steady state and fatigue conditions.

UNIT – VI

UNIT – VII
LOSSES IN PIPES: Head losses, loss due to contraction & expansion, loss due to fittings, equipment length, distribution & mixing losses.

UNIT – VIII
PIPING COMPONENTS: Bends, tees, bellows and valves. Types of piping supports and their behavior, Introduction to piping Codes and Standards. Design of piping system as per B31.1 piping code.

TEXT BOOKS:

REFERENCE BOOKS:
4. American standard code for pressure piping, B 31.1
5. Hand Book of piping Design
UNIT - I

INTRODUCTION: Introduction Size and Shape dependence of material properties at the nanoscale, why is small good? Limits to smallness, scaling relations, can nanorobots walk and nanoplanes fly? Nanoscale elements in conventional technologies.

UNIT - II


UNIT - III


UNIT - IV

CHARACTERIZATION TECHNIQUES: Imaging / Characterization of nanostructures General considerations for imaging, Scanning Probe Techniques: SEM, STM, AFM, NSOM.

UNIT - V

SYNTHESIS - I: Metal and semiconductor Nanoparticles Synthesis, stability, control of size, Optical and Electronic properties, Ultra-sensitive imaging and detection with Nanoparticles, Bioengineering applications, Catalysis.

UNIT - VI

SYNTHESIS - II: Semiconductor and Metal Nanowires Vapor/liquid/solid growth and other synthesis techniques, Nanowire transistors and sensors.

UNIT - VII

CARBON NANO TUBES: Carbon nanotubes Structure and synthesis, Electronic, Vibrational, and Mechanical properties, how can C nanotubes enable faster computers, brighter TV screens, and stronger mechanical reinforcement?

UNIT - VIII

APPLICATIONS OF NANOTECHNOLOGY: Mechanics at Nanoscale Enhancement of mechanical properties with decreasing size, Nano electromechanical systems, Nanomachines, Nanofluidics, Filtration, Sorting, Molecular motors.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT - I
QUALITY BY EXPERIMENTAL DESIGN: Quality, western and Taguchi quality philosophy, Elements of cost, Noise factors causes of variation, Quadratic loss function and variation of quadratic loss functions. Robust Design: Steps in robust design: parameter design and tolerance design, reliability improvement through experiments, illustration through numerical examples.

UNIT - II
EXPERIMENTAL DESIGN: Classical experiments: factorial experiments, terminology, factors. Levels, Interactions, Treatment combination, randomization, 2-level experimental design for two factors and three factors. 3-level experiment designs for two factors and three factors, factor effects, factor interactions, Fractional factorial design, Saturated design, Central composite designs, illustration through numerical examples.

UNIT - III
MEASURES OF VARIABILITY: Measures of variability, Concept of confidence level, Statistical distributions: normal, log normal and Weibull distributions. Hypothesis testing, Probability plots choice of sample size illustration through numerical examples.

UNIT - IV
ANALYSIS AND INTERPRETATION OF EXPERIMENTAL DATA: Measures of variability, Ranking method, column effect method and plotting method, Analysis of variance (ANOVA), in factorial experiments: YATE’s algorithm for ANOVA, Regression analysis, Mathematical models from experimental data, illustration through numerical examples.

UNIT - V
TAGUCHI’S ORTHOGONAL ARRAYS : Types orthogonal arrays, Selection of standard orthogonal arrays, Lineargraphs and interaction assignment, dummy level technique, Compound factor method, modification of linear graphs, Column merging method, Branching design, Strategies for constructing orthogonal arrays.

UNIT - VI
SIGNAL TO NOISE RATIO (S-N RATIOS): Evaluation of sensitivity to noise, Signal to noise ratios for static problems, Smaller – the better types, Nominal – the better type, larger – the better type. Signal to noise ratios for dynamic problems, Illustrations through numerical examples.

UNIT - VII
PARAMETER DESIGN AND TOLERANCE DESIGN: Parameter and tolerance design concepts, Taguchi’s inner and outer arrays, Parameter design strategy, Tolerance design strategy, Illustrations through numerical examples.

UNIT - VIII
RELIABILITY IMPROVEMENT THROUGH ROBUST DESIGN : Role of S-N ratios in reliability improvement; Casestudy; Illustrating the reliability improvement of routing process of a printed wiring boards using robust design concepts.

TEXT BOOKS:

REFERENCE BOOKS:
LIST OF EXPERIMENTS:

1. Determination of damped natural frequency of vibration of the vibrating system with different viscous oils
2. Determination of steady state amplitude of forced vibratory system
3. Static balancing using steel balls
4. Field balancing of the thin rotors using vibration pickups
5. To determine the active and reactive gyroscopic couples and compare them
6. To determine the characteristic curves of the universal governor
7. To determine the characteristics journal bearing
8. To study frictional behavior of different combinations of Materials
9. To study wear of different materials under various load and sliding speed conditions.
10. Determination of natural frequency of given structure using FFT analyzer
11. Diagnosis of a machine using FFT analyzer
12. Direct Kinematic analysis of a robot
13. Inverse Kinematic analysis of a robot
14. Trajectory planning of robot in joint space scheme
15. Palletizing operation using Robot programming

Note: Minimum 12 of the above experiments are to be conducted.
# SOFTWARE ENGINEERING PRINCIPLES

## (OPEN ELECTIVE)

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### UNIT - I
**SOFTWARE ENGINEERING AND PROCESS:** The nature of software, the unique nature of web applications, software engineering, a layered technology, the essence and principles of software engineering practice, generic process model (framework), process patterns, process assessment and improvement, CMMI, software myths.

### UNIT - II
**PRESCRIPTIVE PROCESS MODELS:** The waterfall model, incremental process models, evolutionary process models. The unified process, aspect oriented software development, agile development, agile process, extreme programming.

### UNIT - III
**SOFTWARE REQUIREMENTS:** Introduction to functional and non-functional requirements, requirements engineering activities, eliciting requirements, requirements modeling, requirements validation, software requirements specification (SRS), requirements management, requirements modeling.
**STRUCTURED VIEW:** Data modeling (ERD), functional modeling (DFD) and behavioral modeling.
**OBJECT ORIENTED VIEW:** Use cases, CRC modeling, analysis classes, collaborations, responsibilities, object relationship model, object behavior model.

**SOFTWARE PROJECT ESTIMATION:** Empirical estimation models.

### UNIT - IV
**DESIGN CONCEPTS:** Software design quality guidelines and attributes - design concepts.
**SOFTWARE ARCHITECTURE:** Architecture and its importance - architectural styles - data design - architectural design.
**DESIGN:** STRUCTURED VIEW (TRADITIONAL VIEW): Architectural mapping using data flow (call and return architecture), interface design, function based component design.
**OBJECT ORIENTED VIEW:** Object oriented architecture, class hierarchies, message design, class based component design.

### UNIT - V
**PERFORMING USER INTERFACE DESIGN:** Golden rules, user interface analysis and design, interface analysis, interface design steps.
**PATTERN BASED DESIGN:** Design patterns, pattern based software design, architectural patterns, component level design patterns, user interface design patterns.

### UNIT - VI
**SOFTWARE TESTING STRATEGIES:** A strategic approach to software testing, test strategies (unit testing and integration testing) for conventional and object oriented software, validation testing, system testing, the art of debugging.

### UNIT - VII
**TESTING CONVENTIONAL APPLICATIONS:** Software testing fundamentals.
**WHITE-BOX TESTING:** Basis path testing, condition (predicate) testing, data flow testing, loop testing.
**BLACK BOX TESTING:** Equivalence partitioning, boundary value analysis, graph based testing methods.
**TESTING OBJECT ORIENTED APPLICATIONS:** Object oriented testing methods, testing methods applicable at class level, interclass test case design.

### UNIT - VIII
**UMBRELLA ACTIVITIES:** Risk management, software quality assurance, software configuration management.
**MEASUREMENT AND METRICS:** Size oriented metrics, function oriented metrics, metrics for software quality
**PRODUCT METRICS:** Metrics for the requirements model, metrics for the design model, metrics for source code, metrics for testing, metrics for maintenance.
**SOFTWARE REENGINEERING:** A software reengineering process model, software reengineering activities.

### TEXT BOOKS:

### REFERENCE BOOKS:
UNIT I
INTRODUCTION: Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design,

UNIT II
THE GRAPHICAL USER INTERFACE: popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user – Interface popularity, characteristics- Principles of user interface.

UNIT III
DESIGN PROCESS: Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT IV

UNIT V

UNIT VI
COMPONENTS: text and messages, Icons and increases – Multimedia, colors, uses problems, choosing colors.

UNIT VII

UNIT VIII

TEXT BOOKS:
1. The essential guide to user interface design, Wilbert O Galitz, Wiley DreamTech.
2. Designing the user interface. 3rd Edition Ben Shneidermann, Pearson Education Asia.

REFERENCE BOOKS:
M. Tech. ED II SEMESTER

COMPUTER GRAPHICS CONCEPTS
(OPEN ELECTIVE)

Course Code: B3273

UNIT - I
INTRODUCTION: Application areas of computer graphics, overview of graphics systems, video-display devices and raster-scan systems, random scan systems, graphics monitors, work stations and input devices, graphics standards.

UNIT - II
OUTPUT PRIMITIVES: Points and lines, line drawing algorithms, midpoint circle and ellipse algorithms. Filled area primitives - scan line polygon fill algorithm, boundary fill and flood fill algorithms.

UNIT - III
2D - GEOMETRICAL TRANSFORMS: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms transformations between coordinate systems.

UNIT - IV
2D - VIEWING: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland–Hodgeman polygon clipping algorithm.

UNIT - V
3D - GEOMETRIC TRANSFORMATIONS: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

3D - VIEWING: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

UNIT - VI
3D - OBJECT REPRESENTATION: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-spline curves, Bezier and B-spline surfaces.

UNIT - VII
VISIBLE SURFACE DETECTION METHODS: classifications, back face detection, depth buffer, scan line and depth sorting.

UNIT - VIII
COMPUTER ANIMATION: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT - I
INTRODUCTION AND THE TAXONOMY OF BUGS: Purpose of testing, some dichotomies, a model for testing, the consequences of bugs, taxonomy for bugs, some bug statistics.

UNIT - II
FLOW GRAPHS AND PATH TESTING: Path testing basics, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, implement and application of path testing.

UNIT - III
TRANSACTION FLOW TESTING AND DATA FLOW TESTING: Transaction flows, transaction flow testing techniques, dataflow testing basics, data flow testing strategies, application, tools and effectiveness.

UNIT - IV
DOMAIN TESTING: Domains and paths, nice and ugly domains, domain testing, domains and interfaces testing, domains and testability.

UNIT - V
PATHS, PATH PRODUCTS AND REGULAR EXPRESSIONS: Path products and path expressions, a reduction procedure, applications, regular expressions and flow anomaly detection.

UNIT - VI
LOGIC BASED TESTING: Motivational overview, decision tables, path expressions again, KV charts, specifications.

UNIT - VII
STATES, STATE GRAPHS AND TRANSITION TESTING: State graphs, good state graphs and bad, state testing, testability tips.

UNIT - VIII
GRAPH MATRICES AND APPLICATIONS: Motivational overview, the matrix of a graph, relations, the powers of a matrix, node reduction algorithm, building tools.

UNIT - VIII
AN OVERVIEW OF SOFTWARE TESTING TOOLS: Overview of win runner and QTP testing tools for functional / regression testing, testing an application using win runner and QTP, synchronization of test cases, data driven testing, testing a web application.

TEXT BOOKS:
2. Dr. K. V. K. Prasad (2005), Software Testing Tools, Dreamtech Press, India.

REFERENCE BOOKS:
M. Tech. ED II SEMESTER

SYSTEM ON CHIP ARCHITECTURE
(Open Elective)

Course Code: B3676

UNIT - I
INTRODUCTION TO PROCESSOR DESIGN: Abstraction in Hardware Design, MUO a Simple processor, Processor Design Trade Off, Design For Low Power Consumption.

UNIT - II

UNIT - III
ARM ASSEMBLY LANGUAGE PROGRAMMING: ARM Instruction Types, Data Transfer, Data processing and Control Flow Instructions, ARM Instruction Set, Co-Processor Instructions.

UNIT - IV
ARCHITECTURE SUPPORT FOR HIGH LEVEL LANGUAGE: Data Types, Abstraction in Software Design, Expressions, Loops, Functions and Procedures, Conditional Statements, Use of Memory.

UNIT - V
MEMORY HIERARCHY: Memory Size and Speed On-Chip, Memory-Caches, Cache Design, An example Memory Management.

UNIT - VI

UNIT - VII
ARCHITECTURAL SUPPORT FOR OPERATING SYSTEMS: An Introduction to Operating Systems, ARM System Control Co Processor-CP15 Protection Unit Registers-ARM Protection Unit-CP15MMU Registers-ARM MMU Architecture-Synchronization-Context Switching Input and Output.

UNIT - VIII
ARM CPU CORES: The ARM710T, ARM720T and ARM730T, the ARM810, the Strong ARM SA-110.

TEXT BOOKS:

REFERENCE BOOKS:
M. Tech. ED II SEMESTER

CRYPTOGRAPHY AND COMPUTER SECURITY
(Open Elective)

Course Code: B3677

UNIT – I
INTRODUCTION SECURITY ATTACKS: Interruption, interception, modification and fabrication.
SECURITY SERVICES: Confidentiality, authentication, integrity, non repudiation, access control and availability.
SECURITY MECHANISMS: A model for internetwork security, internet standards and RFCs, conventional encryption principles, Caesar cipher, Hill cipher, poly and mono alphabetic cipher.

UNIT – II
ENCRYPTION PRINCIPLES: Conventional encryption algorithms: Feistal structure, DES algorithm, S: Boxes, Triple DES, advanced data encryption standard (AES), cipher block modes of operation, location of encryption devices, key distribution approaches.

UNIT – III
CRYPTOGRAPHY AND APPLICATIONS: Public key cryptography principles, public key cryptography algorithms, digital signatures, RSA, elliptic algorithms, digital certificates, certificate authority and key management, Kerberos, X.509, directory authentication service. Message authentication, secure hash functions and HMAC.

UNIT – IV
ELECTRONIC MAIL SECURITY: Email privacy, PGP operations, radix: 64 conversions, key management for PGP, PGP trust model, multipurpose internet mail extension (MIME), secure/MIME(S/MIME).

UNIT – V
IP SECURITY ARCHITECTURE AND SERVICES: IP security overview, IP security architecture, security association, authentication header, encapsulating security payload, combining security associations and key management, Oakley key determination protocol, ISAKMP.

UNIT – VI
WEB SECURITY: Web security considerations, secure socket layer (SSL) and transport layer security (TLS), secure electronic transaction (SET).

UNIT – VII
NETWORK MANAGEMENT SECURITY: Basic concepts of SNMP, SNMPv1 community facility and SNMPv3. System Security, intruders, intrusion techniques, intrusion detection, password management, bot nets.

UNIT – VIII
MALICIOUS SOFTWARE: Viruses and related threats, virus counter measures, distributed denial of service attacks.
FIREWALLS: Firewall design principles, trusted systems, common criteria for information technology security evolution.

TEXT BOOKS:

REFERENCE BOOKS:
M. Tech. ED II SEMESTER

INTERNETWORKING AND INTERNET PROTOCOLS
(Open Elective)

Course Code: B3678

UNIT – I
REVIEW OF NETWORKING AND DESIGN CONCEPTS: Connectivity Multiplexing, Circuit-switching vs. packet-switching, Multiple-access Routing, addressing, Congestion control, End-to-end principle, Protocols, Layering, encapsulation, and indirection, System design: Amdahl’s law, Overlays, Cross-layer design.

UNIT – II
INTERNETWORKING: Heterogeneity and scale, IP approach, Address resolution, Hierarchical addressing and subnets, Fragmentation and re-assembly, Packet format design.

UNIT – III
ROUTING BASICS: Routing and forwarding tables, Routers vs. bridges, Addressing and routing scalability, Link-state vs. distance-vector routing, Source-based routing.

UNIT – IV
INTRA-DOMAIN ROUTING: RIP, EIGRP, OSPF, PNNI, IS-IS, QoS routing, Traffic engineering and routing
INTER-DOMAIN ROUTING: Autonomous systems, Policy routing, EGP, BGP, CIDR.

UNIT – V
TRANSPORT PROTOCOL DESIGN CONNECTIONLESS VS. CONNECTION: Oriented service, Connection management: establishment, termination, UDP, TCP.

UNIT – VI
CONGESTION CONTROL CONGESTION INDICATIONS/FEEDBACKS: explicit vs. implicit, Queuing disciplines: scheduling and buffer management, RED, ARED, FRED, REM, TCP congestion control variants, Reno, Vegas, TCP modeling.

UNIT – VII

UNIT – VIII
NETWORK MANAGEMENT: Auto-configuration, SNMP, DHCP, ICMP, IP Next Generation (IPv6), Motivation, IPv6 addressing, IPv6 header format, IPv6 features: routing flexibility, multicast support.

TEXT BOOKS:

REFERENCES:
1. Radia Perlman, (2011) Inter connections, Bridges, Router, Switches and internetworking protocols, 2nd Edition
M. Tech. ED II SEMESTER
MULTIMEDIA COMMUNICATION AND NETWORKS
(Open Elective)

Course Code: B3679

UNIT I

UNIT II

UNIT III
MULTICASTING: Abstraction of Multicast groups, Group management, IGMP, Group Shared Multicast Tree, Source based Multicast Tree, Multicast routing in Internet, DVMRP and MOSPF, PIM, Sparse mode and Dense mode.

UNIT IV

UNIT V

UNIT VI
MULTIMEDIA COMMUNICATION: Stream characteristics for Continuous media, Temporal Relationship, Object Stream Interactions, Media Levity, Media Synchronization – Models for Temporal Specifications.

UNIT VII

UNIT VIII
HYBRID MAC PROTOCOL FOR MULTIMEDIA TRAFFIC: Call Admission Control in Wireless Multimedia Networks – A Global QoS Management for Wireless Networks

TEXT BOOKS:

REFERENCES:
M. Tech. ED II SEMESTER

TELECOMMUNICATION SWITCHING SYSTEMS AND NETWORKS
(Open Elective)

Course Code: B3476  L  P  C
3    3

UNIT - I
INTRODUCTION: Evolution of telecommunications, simple telephone communication, basics of switching system, manual switching system, major telecommunication networks.

CROSSBAR SWITCHING: Principles of common control, touch tone dial telephone, principles of crossbar switching, crossbar switch configurations, cross point technology, crossbar exchange organization.

UNIT - II
ELECTRONIC SPACE DIVISION SWITCHING: Stored program control, centralized SPC, distributed SPC, software architecture, application software, enhanced services, two-stage networks, three stage networks, n-stage networks.

UNIT - III
TIME DIVISION SWITCHING: Basic time division space switching, basic time division time switching, time multiplexed space switching, time multiplexed time switching, combination switching, three-stage combination switching n-stage combination switching.

UNIT - IV
TELEPHONE NETWORKS: Subscriber loop system, switching hierarchy and routing, transmission plan, transmission systems, numbering plan, charging plan, signaling techniques, in-channel signaling, common channel signaling, cellular mobile telephony.

UNIT - V
SIGNALING: Customer line signaling, audio-frequency junctions and trunk circuits, FDM carrier systems, PCM signaling inter-register signaling, common-channel signaling principles, CCITT signaling system no.6, CCITT signaling system no.7, digital customer line signaling.

UNIT - VI
PACKET SWITCHING: Statistical multiplexing, local-area and wide-area networks, large-scale networks, broadband networks.


UNIT - VII
TELECOMMUNICATIONS TRAFFIC: The unit of traffic, congestion, traffic measurements, a mathematical model, lost-call systems, queuing systems.

UNIT - VIII
INTEGRATED SERVICES DIGITAL NETWORK: Motivation for ISDN, new services, network and protocol architecture, transmission channels, user-network interfaces, signaling, numbering and addressing, service characterization, interworking, ISDN standards, expert systems in ISDN, broadband ISDN, voice data integration.

TEXT BOOKS:
1. Thayagarajan Viswanath (2000), Telecommunication switching system and networks, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:
MOBILE COMPUTING TECHNOLOGIES
(Open Elective)

Course Code: B3477

UNIT - I
INTRODUCTION TO MOBILE COMPUTING ARCHITECTURE: Mobile computing, dialog control networks, middleware and gateways, application and services, developing mobile computing applications, security in mobile computing, architecture for mobile computing, three tier architecture, design considerations for mobile computing, mobile computing through internet, making existing applications mobile enabled.

UNIT - II
CELLULAR TECHNOLOGIES - GSM: Bluetooth, radio frequency identification, wireless broadband mobile IP, internet protocol version 6(IPv6), Java card, GSM architecture, GSM entities, call routing in GSM, PLNM interfaces, GSM addresses and identifiers, network aspects in GSM, authentication and security.

UNIT - III
GPS, GPRS, CDMA AND 3G: Mobile computing over SMS, GPRS and packet data network, GPRS network architecture, GPRS network operations, data services in GPRS, applications for GPRS, limitations of GPRS, spread spectrum technology, Is-95, CDMA versus GSM, wireless data, third generation networks, applications on 3G.

UNIT - IV
WIRELESS APPLICATION PROTOCOL (WAP) AND WIRELESS LAN: WAP - MMS wireless LAN advantages, IEEE 802.11 standards, wireless LAN architecture, mobility in wireless LAN.

UNIT - V
INTELLIGENT AND INTERNETWORKING: Introduction, fundamentals of call processing, intelligence in the networks, SS#7 signaling, IN Conceptual Model (INCM), softswitch, programmable networks, technologies and interfaces for IN.

UNIT - VI
CLIENT PROGRAMMING, PLAM OS, SYMBIAN OS, WIN CE ARCHITECTURE: Introduction, moving beyond the desktop, a peek under the hood: hardware overview, mobile phones, PDA, design constraints in applications for handheld devices, palm OS architecture, application development, multimedia symbian OS architecture, applications for Symbian, different flavours of windows CE, windows CE architecture.

UNIT - VII
J2ME: Java in the handset, the three prong approach to JAVA everywhere, JAVA 2 micro edition (J2ME) technology, programming for CLDC, GUI in MIDP, UI design issues, multimedia, record management system, communication in MIDP, security considerations in MIDP, optional packages.

UNIT - VIII
SECURITY ISSUES IN MOBILE COMPUTING: Introduction, information security, security techniques and algorithms, security protocols, public key infrastructure, trust, security models, security frameworks for mobile environment.

TEXT BOOKS:

REFERENCE BOOKS:
M. Tech. ED II SEMESTER

HIGH PERFORMANCE NETWORKS
(Open Elective)

Course Code: B3478

UNIT I


UNIT II
HIGH SPEED LANS: Fast Ethernet, Gigabit Ethernet, Fiber Channel – Wireless LANs: applications, requirements and Architecture of 802.11

UNIT III

UNIT IV
TRAFFIC MANAGEMENT: Congestion Control in Packet Switching, Networks – Frame Relay Congestion Control.

UNIT V

UNIT VI

UNIT VII
INTEGRATED AND DIFFERENTIATED SERVICES: Integrated Services Architecture – Approach, Components, Services- Queuing Discipline, FQ, PS, BRFQ, GPS, WFQ – Random Early Detection, Differentiated Services

UNIT VIII

TEXT BOOKS:

REFERENCES:
UNIT – I
Overview of Metal-Oxide-Semiconductor (MOS) Transistors: Introduction, Moore’s law, Feature sizes of a transistors and a chip, Physics of silicon, Silicon Devices, MOS transistors.

UNIT – II

UNIT – III

UNIT – IV
Oxidation: Introduction, Structure of Silicon Dioxide, Oxidation equipment and process, Kinetics of Oxidation, Silicon Oxide Characterisation, Electrical Characterization of MOS capacitance.
Mask: Introduction, Properties of Mask, Types of masks and mask fabrication techniques.

UNIT – V
Etching: Introduction, Etching Techniques, Wet Etching, Dry Etching.

UNIT – VI

UNIT – VII

UNIT – VIII
Thin Film Deposition: Introduction, Film-Deposition Techniques, MetalWirings and Contacts, Metal Film Deposition Techniques, Film thickness Measurements.

TEXT BOOKS:

REFERENCE BOOKS:
UNIT – I
INTRODUCTION
Nanotechnology and its role in sustainable energy - Energy conversion process, Direct and in-direct energy conversion - Materials for: Light emitting diodes, Batteries, Advance turbines, Catalytic reactors, Capacitors and Fuel cells.

UNIT – II
RENEWABLE ENERGY TECHNOLOGY
Energy challenges - Development and implementation of renewable energy technologies - Nanotechnology enabled renewable energy technologies - Energy transport.

UNIT – III
RENEWABLE ENERGY CONVERSION AND STORAGE
Energy conversion and storage - Nano, micro, poly crystalline Silicon and amorphous Silicon for solar cells, Silicon-composite structure, Techniques for Si deposition.

UNIT – IV
MICRO FUEL-CELL TECHNOLOGY

UNIT – V
MICROFLUIDIC SYSTEMS-I

UNIT – VI
MICROFLUIDIC SYSTEMS-II
Power generation - Micro channel battery - Micro heat engine (MHE) fabrication – Thermo capillary forces – Thermo capillary pumping (TCP) - Piezoelectric membrane.

UNIT – VII
HYDROGEN STORAGE METHODS-I
Hydrogen storage methods - Metal hydrides and size effects - Hydrogen storage capacity - Hydrogen reaction kinetics - Carbon-free cycle.

UNIT – VIII
HYDROGEN STORAGE METHODS-II
Gravimetric and volumetric storage capacities – Hydriding / Dehydriding kinetics - High enthalpy of formation and thermal management during the hydriding reaction.

TEXT BOOKS:

REFERENCE BOOKS:
M. Tech. ED II SEMESTER

SOLAR ENERGY AND APPLICATIONS
(Open Elective)

Course Code: B3372

UNIT - I
PRINCIPLES OF SOLAR RADIATION: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and Sun shine, solar radiation data.

UNIT - II
SOLAR ENERGY COLLECTORS: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT - III

UNIT - IV

UNIT - V
PV CELL PROPERTIES: Solar cell properties and design, p-n junction photodiodes, depletion region, electrostatic field across the depletion layer, electron and holes transports, device physics, charge carrier generation, recombination and other losses, I-V characteristics, output power.

UNIT - VI
SOLAR CELL APPLICATIONS: PV cell interconnection, module structure and module fabrication, Equivalent circuits, load matching, efficiency, fill factor and optimization for maximum power, Design of stand-alone PV systems, system sizing, device structures, device construction, DC to AC conversion, inverters, on-site storage and grid connections.

UNIT - VII
COST ANALYSIS AND ENVIRONMENTAL ISSUES: Cost analysis and pay back calculations for different types of solar panels and collectors, installation and operating costs, Environmental and safety issues, protection systems, performance monitoring.

UNIT - VIII

TEXT BOOKS:

REFERENCES BOOKS:
M. Tech. ED II SEMESTER

INDUSTRIAL ELECTRONICS
(Open Elective)

Course Code: B3373

UNIT - I
INTRODUCTION: Definition – Trends - Control Methods: Standalone , PC Based ( Real Time Operating Systems, Graphical User Interface , Simulation ) - Applications: SPM, Robot, CNC, FMS, CIM.

UNIT – II

UNIT – III

UNIT – IV
ELECTRONIC INTERFACE SUBSYSTEMS: TTL, CMOS interfacing - Sensor interfacing – Actuator interfacing – solenoids , motors Isolation schemes- opto coupling, buffer IC's - Protection schemes – circuit breakers , over current sensing , resetable fuses , thermal dissipation - Power Supply - Bipolar transistors / mosfets

UNIT – V
ELECTROMECHANICAL DRIVES: Relays and Solenoids - Stepper Motors - DC brushed motors – DC brushless motors - DC servo motors - 4-quadrant servo drives, PWM’s - Pulse Width Modulation – Variable Frequency Drives, Vector Drives - Drive System load calculation.

UNIT – VI

UNIT – VII

Unit – VIII

TEXT BOOKS:
2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

REFERENCES:
M. Tech. ED II SEMESTER

ENERGY MANAGEMENT AND AUDIT
(Open Elective)

Course Code: B3374

UNIT - I

UNIT - II

UNIT - III
ECONOMIC ANALYSIS: Scope, Characterization of an Investment Project, Types of Depreciation, Time Value of money, budget considerations, Risk Analysis.

UNIT - IV

UNIT - V

UNIT - VI
VOLTAGE AND REACTIVE POWER IN DISTRIBUTION SYSTEM: Voltage and reactive power calculations and control: Voltage classes and nomenclature, voltage drop calculations, Voltage control, VAR requirements and power factor, Capacitors unit and bank rating, Protection of capacitors and switching, Controls for switched capacitors and fields testing.

UNIT – VII
EFFICIENCY IN LIGHTING SYSTEM: Load scheduling/shifting, Lighting - lighting levels, efficient options, fixtures, day lighting, timers, Energy efficient windows. UPS selection, Installation operation and maintenance

UNIT – VIII
EFFICIENCY IN MOTORS: Motor drives- motor efficiency testing, energy efficient motors, and motor speed control. Indian Electricity Act 1956, Distribution Code and Electricity Bill 2003

TEXT BOOKS:

REFERENCE BOOKS:
Unit-01: Introduction and Basic Concepts of NSS
a) History, philosophy, aims & objectives of NSS
b) Emblem, flag, motto, song, badge etc.
c) Organizational structure, roles and responsibilities of various NSS functionaries

Unit-02: NSS Programmes and Activities
a) Concept of regular activities, special camping, Day Camps
b) Basis of adoption of village/slums, Methodology of conducting Survey
c) Financial pattern of the scheme
d) Other youth prog./schemes of GOI
e) Coordination with different agencies
f) Maintenance of the Diary

Unit-03: Understanding Youth
a) Definition, profile of youth, categories of youth
b) Issues, challenges and opportunities for youth
c) Youth as an agent of social change

Unit-04: Community Mobilisation
a) Mapping of community stakeholders
b) Designing the message in the context of the problem and the culture of the community
c) Identifying methods of mobilization
d) Youth-adult partnership

Unit-05: Voluntterism and Shramdan
a) Indian Tradition of volunteerism
b) Needs & importance of volunteerism
c) Motivation and Constraints of Volunteerism
d) Shramdan as a part of volunteerism
UNIT - I
INTRODUCTION TO INTELLECTUAL PROPERTY: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II
TRADE MARKS: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting and evaluating trademarks, trade mark registration process.

UNIT - III
LAW OF COPY RIGHTS: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

LAW OF PATENTS: Foundation of patent law, patent searching process, ownership rights and transfer.

UNIT - IV
TRADE SECRETS: Trade secrete law, determination of trade secretes status, liability for misappropriations of trade secrets, protection for submission, and trade secrete litigation.

UNFAIR COMPETITION: Misappropriation right of publicity, false advertising.

UNIT - V
GEOGRAPHICAL INDICATIONS: Introduction to geographical indication, Geographical indication protection, Importance to protect geographical indications.

UNIT - VI
INDUSTRIAL DESIGNS: Introduction to industrial design, industrial designs protection, Kinds of protection provided to industrial designs, Rights to owner of industrial designs.

UNIT - VII

UNIT - VIII

TEXT BOOKS:

REFERENCE BOOKS:
2. P.N. Cheremisinoff, R.P. Ouellette and R.M. Bartholomew, Biotechnology Applications and Research, Technomic Publishing Co., Inc. USA, 1985
3. P. Narayanan; Law of Copyright and Industrial Designs; Eastern law House, Delhi, 2010
M. Tech. ED II SEMESTER

TECHNICAL SEMINAR

Course Code: B3724

L T P C

- - - 2

3. OBJECTIVE:
Seminar is an important component of learning in an Engineering College, where the student gets acquainted with preparing a report & presentation on a topic.

4. PERIODICITY / FREQUENCY OF EVALUATION: Twice

3. PARAMETERS OF EVALUATION:

vi. The seminar shall have two components, one chosen by the student from the course work without repetition and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work.

vii. The two components of the seminar are distributed between two halves of the semester and are evaluated for 100 marks each. The average of the two components shall be taken as the final score.

viii. The students shall be required to submit the rough drafts of the seminar outputs within one week of the commencement of the class work.

ix. Supervisor shall make suggestions for modification in the rough draft. The final draft shall be presented by the student within a week thereafter.

x. Presentation schedules will be prepared by different Departments in line with the academic calendar.

The Seminars shall be evaluated in two stages as follows:

A. Rough Draft

In this stage, the student should collect information from various sources on the topic and collate them in a systematic manner. He/She may take the help of the concerned supervisor.

The report should be typed in “MS-Word” file with “calibri” font, with font size of 16 for main heading, 14 for sub-headings and 11 for the body text. The contents should also be arranged in Power Point Presentation with relevant diagrams, pictures and illustrations. It should normally contain 18 to 25 slides, consisting of the followings:

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Slides</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>Topic, name of the student &amp; guide</td>
<td>1 Slide</td>
</tr>
<tr>
<td>9.</td>
<td>List of contents</td>
<td>1 Slide</td>
</tr>
<tr>
<td>10.</td>
<td>Introduction</td>
<td>1 - 2 Slides</td>
</tr>
<tr>
<td>11.</td>
<td>Descriptions of the topic (point-wise)</td>
<td>7 - 10 Slides</td>
</tr>
<tr>
<td>12.</td>
<td>Images, circuits etc.</td>
<td>6 - 8 Slides</td>
</tr>
<tr>
<td>13.</td>
<td>Conclusion</td>
<td>1 - 2 Slides</td>
</tr>
<tr>
<td>14.</td>
<td>References/Bibliography</td>
<td>1 Slide</td>
</tr>
</tbody>
</table>

The soft copy of the rough draft of the seminar presentation in MS Power Point format along with the draft Report should be submitted to the concerned supervisor, with a copy to the concerned HOD within 30 days of the commencement of class work.

The evaluation of the Rough draft shall generally be based upon the following.

<table>
<thead>
<tr>
<th>No.</th>
<th>Description</th>
<th>Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Punctuality in submission of rough draft and discussion</td>
<td>2 Marks</td>
</tr>
<tr>
<td>7.</td>
<td>Resources from which the seminar have been based</td>
<td>4 Marks</td>
</tr>
<tr>
<td>8.</td>
<td>Report</td>
<td>6 Marks</td>
</tr>
<tr>
<td>9.</td>
<td>Lay out, and content of Presentation</td>
<td>6 Marks</td>
</tr>
<tr>
<td>10.</td>
<td>Depth of the students knowledge in the subject</td>
<td>10 Marks</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>30 Marks</td>
</tr>
</tbody>
</table>
After evaluation of the first draft the supervisor shall suggest further reading, additional work and fine tuning, to improve the quality of the seminar work.

Within 7 days of the submission of the rough draft, the students are to submit the final draft incorporating the suggestions made by the supervisor.

B. **Presentation:**

After finalization of the final draft, the students shall be allotted dates for presentation (in the designated seminar classes) and they shall then present it in presence students, supervisor, faculties of the department and at least one faculty from some department / other department.

The student shall submit 3 copies of the Report neatly bound along with 2 soft copies of the PPT in DVD medium. The students shall also distribute the title and abstract of the seminar in hard copy to the audience. The final presentation has to be delivered with 18-25 slides.

The evaluation of the Presentation shall generally be based upon the following.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6.</td>
<td>Contents</td>
</tr>
<tr>
<td>7.</td>
<td>Delivery</td>
</tr>
<tr>
<td>8.</td>
<td>Relevance and interest the topic creates</td>
</tr>
<tr>
<td>9.</td>
<td>Ability to involve the spectators</td>
</tr>
<tr>
<td>10.</td>
<td>Question answer session</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>70 Marks</strong></td>
</tr>
</tbody>
</table>

4. **WHO WILL EVALUATE?**

The presentation of the seminar topics shall be made before an internal evaluation committee comprising the Head of the Department or his/her nominee, seminar supervisor and a senior faculty of the department / other department.
1. **OBJECTIVE:**
   - To enable the examiners to assess the candidate’s knowledge in his or her particular field of learning.
   - To test the student’s awareness of the latest developments and relate them to the knowledge acquired during the classroom teaching.

2. **PARAMETERS OF EVALUATION:**

<table>
<thead>
<tr>
<th>Subject Knowledge</th>
<th>Current Awareness</th>
<th>Career Orientation</th>
<th>Communication Skills</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

3. **WHO WILL EVALUATE?**

   The comprehensive Viva will be conducted by a committee comprising Head of the Department or his/her nominee, two senior faculty of the respective department and an external examiner from outside the college. The comprehensive viva shall be evaluated for 100 marks at the end of III semester. A minimum of 50% of maximum marks shall be obtained to earn the corresponding credits.

4. **PERIODICITY / FREQUENCY OF EVALUATION:**

   Once

5. **PEDAGOGY:**
   - The viva will be held on a face to face basis.
   - The students will be expected to answer the questions related to latest developments and all courses taken till date.
   - Viva voce will be conducted within week before the beginning of midterm examinations. However, in exceptional circumstances it can be scheduled immediately after the end of midterm examinations.
   - Students will have to make themselves available on the date of the viva voce.
1. **OBJECTIVE:**
The main objective of the Project Work is for the students to learn and experience all the major phases and processes involved in solving “real life engineering problems”.

2. **EXPECTED OUTCOME:**
The major outcome of the M. Tech project must be well-trained students. More specifically students must have acquired:
   - System integration skills
   - Documentation skills
   - Project management skills
   - Problem solving skills

3. **PROJECT SELECTION:**
Projects are suggested by the faculty, with or without collaboration with an industry. All faculty are to suggest projects. Students are also encouraged to give project proposals after identifying a faculty who would be willing to supervise the work. A Project brief is to be given by the faculty to the group defining the project comprehensively.

4. **WHO WILL EVALUATE?**
The end semester examination shall be based on the report submitted and a viva-voce exam for 140 marks by committee comprising of the Head of the Department, project supervisor and an external examiner.

5. **EVALUATION:**
The basic purpose is to assess the student competencies with regard to his project work. More specifically to assess the student’s individual contribution to the project, to establish the level of understanding of basic theoretical knowledge relevant to the project and to ensure that the student has good understanding and appreciation of design and development decisions taken in the course of the project. It is desirable that all faculty members are present for the evaluations as this is a platform to get to know the student projects and to motivate the students to do good projects. The faculty should adopt a clear and consistent pattern of asking questions from general to specific aspects of the project. The presentation and evaluation is open to other students of the department.

The project work shall be evaluated for 300 marks out of which 160 marks for internal evaluation and 140 marks for end-semester evaluation. The evaluation shall be done on the following basis

<table>
<thead>
<tr>
<th>Semester III</th>
<th>Semester IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary Evaluation - 100 marks</td>
<td>Design Evaluation I - 30 marks</td>
</tr>
<tr>
<td></td>
<td>Design Evaluation II - 30 marks</td>
</tr>
<tr>
<td></td>
<td>Final Evaluation – 140 marks</td>
</tr>
</tbody>
</table>

6. **GUIDELINES FOR THE PREPARATION OF M. TECH PROJECT REPORTS**

6.1 Project reports should be typed neatly only on one side of the paper with 1.5 or double line spacing on an A4 size bond paper (210 x 297 mm). The margins should be: Left - 1.25", Right - 1", Top and Bottom - 0.75".

6.2 The total number of reports to be prepared are:
   - One copy to the department
   - One copy to the concerned guide(s)
   - One copy to the candidate.

6.3 Before taking the final printout, the approval of the concerned guide(s) is mandatory and suggested corrections, if any, must be incorporated.

6.4 For making copies dry tone Xerox is suggested.

6.5 Every copy of the report must contain
   - Inner title page (White)
6.6. The organization of the report should be as follows:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Usually numbered in roman</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Inner title page</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Abstract or Synopsis</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Acknowledgments</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Table of Contents</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>List of table &amp; figures (optional)</td>
<td></td>
</tr>
</tbody>
</table>

6.7. Chapters (to be numbered) containing Introduction, which usually specifies the scope of work and its importance and relation to previous work and the present developments, Main body of the report divided appropriately into chapters, sections and subsections.

- The chapters, sections and subsections may be numbered in the decimal form for e.g. Chapter 2, sections as 2.1, 2.2 etc., and subsections as 2.2.3, 2.5.1 etc.
- The report should be typed in "MS-Word" file with "calibri" font. The chapter must be left or right justified (font size 16). Followed by the title of chapter centered (font size 18), section/subsection numbers along with their headings must be left justified with section number and its heading in font size 16 and subsection and its heading in font size 14. The body or the text of the report should have font size 11.
- The figures and tables must be numbered chapter wise for e.g.: Fig. 2.1 Block diagram of a serial binary adder, Table 3.1 Primitive flow table, etc.
- The last chapter should contain the summary of the work carried, contributions if any, their utility along with the scope for further work.

6.8. Reference OR Bibliography: The references should be numbered serially in the order of their occurrence in the text and their numbers should be indicated within square brackets for e.g. [3]. The section on references should list them in serial order in the following format.


6.9. Only SI units are to be used in the report. Important equations must be numbered in decimal form for e.g. \[ V = I Z \] .......(3.2)

6.10. All equation numbers should be right justified.

6.11. The project report should be brief and include descriptions of work carried out by others only to the minimum extent necessary. Verbatim reproduction of material available elsewhere should be strictly avoided. Where short excerpts from published work are desired to be included, they should be within quotation marks appropriately referenced.

6.12. Proper attention is to be paid not only to the technical contents but also to the organization of the report and clarity of the expression. Due care should be taken to avoid spelling and typing errors. The student should note that report-write-up forms the important component in the overall evaluation of the project.

6.13. Hardware projects must include: the component layout, complete circuit with the component list containing the name of the component, numbers used, etc. and the main component data sheets as Appendix. At the time of report submissions, the students must hand over a copy of these details to the project coordinator and see that they are entered in proper registers maintained in the department.

6.14. Software projects must include a virus free disc, containing the software developed by them along with the read me file. Read me file should contain the details of the variables used, salient features of the software and procedure of using them: compiling procedure, details of the computer hardware/software requirements to run the same, etc. If the developed software uses any public domain software downloaded from some site, then the address of the site along with the module name etc. must be included on a separate sheet. It must be properly acknowledged in the acknowledgments.

6.15. Sponsored Projects must also satisfy the above requirements along with statement of accounts, bills for the same duly attested by the concerned guides to process further, They must also produce NOC from the concerned guide before taking the internal viva examination.

6.16. The reports submitted to the department/guide(s) must be hard bounded, with a plastic covering.

6.17. Separator sheets, used if any, between chapters, should be of thin paper.
CERTIFICATE

Certified that the project work entitled ................................................ carried out by Mr./Ms. ................................................................., Roll Number ........................................, a bonafide student of .......................................................... in partial fulfillment for the award of Master of Technology in ............................................................... of the Jawaharlal Nehru Technological University, Hyderabad during the year .............................. It is certified that all corrections / suggestions indicated for Internal Assessment have been incorporated in the Report deposited in the departmental library. The project report has been approved as it satisfies the academic requirements in respect of Project work prescribed for the said Degree.

Name & Signature of the Guide  Name Signature of the HOD  Signature of the Principal

External Viva

Name of the examiners  Signature with date
1.
2.
Certificate issued at the Organization where the project was carried out
(On a separate sheet, if applicable)

NAME OF THE INDUSTRY / ORGANIZATION, Address with pin code

CERTIFICATE

Certified that the project work entitled …………………………………………………………………………………………... carried out by
Mr./Ms . ………………………………………….., Roll Number…………………………...………, a bonafide student of
……………………………………………………………………….in partial fulfillment for the award of Master of Technology in
……………………………………………………………………………………………………………………………………….. of the Jawaharlal Nehru Technological University, Hyderabad
during the year ................. It is certified that, he/she has completed the project satisfactorily

Name & Signature of the Guide

Name & Signature of the Head of Organization

7. DISTRIBUTION OF MARKS FOR M.TECH DISSERTATION EVALUATION

<table>
<thead>
<tr>
<th>S No.</th>
<th>Particulars</th>
<th>Max. Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Relevance of the subject in the present context</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Literature Survey</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Problem formulation</td>
<td>10</td>
</tr>
<tr>
<td>4</td>
<td>Experimental observation / theoretical modeling</td>
<td>10</td>
</tr>
<tr>
<td>5</td>
<td>Results – Presentation &amp; Discussion</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>Conclusions and scope for future work</td>
<td>10</td>
</tr>
<tr>
<td>7</td>
<td>Overall presentation of the Thesis / Oral presentation</td>
<td>20</td>
</tr>
<tr>
<td>8</td>
<td>Project Report Writing</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td><strong>Total Marks</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
### Nature of Malpractices/Improper Conduct

<table>
<thead>
<tr>
<th>If the candidate:</th>
<th>Punishment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. (a)</strong> Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination)</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only.</td>
</tr>
<tr>
<td><strong>(b)</strong> Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td><strong>2.</strong> Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the University.</td>
</tr>
<tr>
<td><strong>3.</strong> Impersonates any other candidate in connection with the examination.</td>
<td>The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.</td>
</tr>
<tr>
<td><strong>4.</strong> 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.</td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
<tr>
<td><strong>5.</strong> 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.</td>
<td>Cancellation of the performance in that subject.</td>
</tr>
<tr>
<td><strong>6.</strong> Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance</td>
<td>In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other</td>
</tr>
<tr>
<td>Clause</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
</tr>
<tr>
<td>1.</td>
<td>Of any kind in and around the examination hall 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.</td>
</tr>
<tr>
<td>2.</td>
<td>The candidates also are debarred his person or to any of his relations whether by words, and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.</td>
</tr>
<tr>
<td>3.</td>
<td>The candidates also are debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.</td>
</tr>
<tr>
<td>4.</td>
<td>Student of the college expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</td>
</tr>
<tr>
<td>5.</td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</td>
</tr>
<tr>
<td>6.</td>
<td>Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.</td>
</tr>
<tr>
<td>7.</td>
<td>Expulsion from the examination hall and cancellation of performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</td>
</tr>
<tr>
<td>8.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</td>
</tr>
<tr>
<td>9.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.</td>
</tr>
<tr>
<td>10.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.</td>
</tr>
<tr>
<td>11.</td>
<td>Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.</td>
</tr>
<tr>
<td>12.</td>
<td>Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.</td>
</tr>
</tbody>
</table>

Subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
Frequently asked Questions and Answers about autonomy

1. Who grants Autonomy? UGC, Govt., AICTE or University
   In case of Colleges affiliated to a university and where statutes for grant of autonomy are ready, it is the respective University that finally grants autonomy.

2. Shall VCE award its own Degrees?
   No. Degree will be awarded by Jawaharlal Nehru Technological University, Hyderabad with a mention of the name Vardhaman College of Engineering on the Degree Certificate.

3. What is the difference between a Deemed University and an Autonomy College?
   A Deemed University is fully autonomous to the extent of awarding its own Degree. A Deemed University is usually a Non-Affiliating version of a University and has similar responsibilities like any University. An Autonomous College enjoys Academic Autonomy alone. The University to which an autonomous college is affiliated will have checks on the performance of the autonomous college.

4. How will the Foreign Universities or other stakeholders know that we are an Autonomous College?
   Autonomous status, once declared, shall be accepted by all the stakeholders. Foreign Universities and Indian Industries will know our status through our college website.

5. What is the change of Status for Students and Teachers if we become Autonomous?
   An autonomous college carries a prestigious image. Autonomy is actually earned out of continued past efforts on academic performances, capability of self-governance and the kind of quality education we offer.

6. Who will check whether the academic standard is maintained / improved after Autonomy? How will it be checked?
   There is a built-in mechanism in the autonomous working for this purpose. An Internal Committee called Academic Programme Evaluation Committee is a Non-Statutory body, which will keep a watch on the academics and keep its reports and recommendations every year. In addition to Academic Council, the highest academic body also supervises the academic matters. At the end of three years, there is an external inspection by the University for this purpose. The standards of our question papers, the regularity of academic calendar, attendance of students, speed and transparency of result declaration and such other parameters are involved in this process.

7. Will the students of VCE as an Autonomous College qualify for University Medals and Prizes for academic excellence?
   No. VCE has instituted its own awards, medals, etc. for the academic performance of the students. However for all other events like sports, cultural and co-curricular organized by the University the students shall qualify.

8. Can VCE have its own Convocation?
   No, since the University awards the Degree the Convocation will be that of the University.

9. Can VCE give a provisional degree certificate?
   Since the examinations are conducted by VCE and the results are also declared by VCE, the college sends a list of successful candidates with their final percentage of marks to the University. Therefore with the prior permission of the University the college will be entitled to give the provisional certificate.

10. Will Academic Autonomy make a positive impact on the Placements or Employability?
    Certainly. The number of students qualifying for placement interviews is expected to improve, due to rigorous and repetitive classroom teaching and continuous assessment, besides the
autonomous status is more responsive to the needs of the industry. As a result, there will be a lot of scope for industry oriented skill development built-in into the system. The graduates from an autonomous college will therefore represent better employability.

11. What is the proportion of Internal and External Assessment as an Autonomous College?
Presently, it is 25% for internal assessment and 75% for external assessment. As the autonomy matures the internal assessment component shall be increased at the cost of external assessment.

12. Will there be any Revaluation or Re-Examination System?
No. There will not be any Revaluation system or Re-examination. But, there is a personal verification of the answer scripts.

13. How fast Syllabi can be and should be changed?
Autonomy allows us the freedom to change the syllabi as often as we need.

14. Will the Degree be awarded on the basis of only final year performance?
No. The percentage of marks will reflect the average performance of all the semesters put together.

15. Who takes Decisions on Academic matters?
The Academic Council of College is the top academic body and is responsible for all the academic decisions. Many decisions are also taken at the lower level like the BOS which are like Boards of Studies of the University.

16. What is the role of Examination committee?
The Exam Committee is responsible for the smooth conduct of inter and external examinations. All matters involving the conduct of examinations, spot valuations, tabulations, preparation of Memorandum of Marks etc fall within the duties of the Examination Committee.

17. Is there any mechanism for Grievance Redressal?
Yes, the college has grievance redressal committee, headed by a senior faculty member of the college.

18. How many attempts are permitted for obtaining a Degree?
All such matters are defined in Rules & Regulations.

19. Who declares the result?
The result declaration process is also defined. After tabulation work the entire result is reviewed by the Moderation Committee. Any unusual deviations or gross level discrepancies are deliberated and removed. The entire result is discussed in the College Academic Council for its approval. The result is then declared on the college notice boards as well put on the web site of the college. It is eventually sent to the University.

20. What is our relationship with the Jawaharlal Nehru Technological University, Hyderabad?
We remain an affiliated college of the Jawaharlal Nehru Technological University, Hyderabad. The University has the right to nominate its members on the academic bodies of the college.

21. Shall we require University approval if we want to start any New Courses?
Yes, It is expected that approvals or such other matters from an autonomous college will receive priority.

22. Shall we get autonomy for PG and Doctoral Programmes also?
Yes, presently our PG programmes are also enjoying autonomous status.

23. How many exams will be there as an autonomous college?
This is defined in the Rules & Regulations.
Undertaking by Students/Parents

“To make the students attend the classes regularly from the first day of starting of classes and be aware of the College regulations, the following Undertaking Form is introduced which should be signed by both student and parent. The same should be submitted to the College Administrative Office.”

I, Mr. / Ms. ____________________________________________ joining in I Semester for the academic year 2014-15 in Vardhaman College of Engineering, Hyderabad, do hereby undertake and abide by the following terms, and I will bring the ACKNOWLEDGEMENT duly signed by me and my parent and submit it to the Admin Office.

1. I will **attend** all the classes from the **joining day** of the College as per the timetable. In case, I do not turn up even after two weeks of starting of classes, I shall be **ineligible** to continue for the current academic year.
2. I will be regular and punctual to all the classes (theory/practical/drawing) and secure overall attendance of **not less than 75%** as stipulated by College/JNT University Hyderabad. I am fully aware that an overall attendance of less than **65% will make me lose one year**.
3. I will compulsorily follow the **dress code** prescribed by the college.
4. I will conduct myself in a highly **disciplined** and decent manner both inside the classroom and in the campus, failing which suitable action may be taken against me as per the rules and regulations of the College.
5. I will concentrate on my **studies** without wasting time in the Campus/Hostel/Residence and attend all the **tests** to secure more than the minimum prescribed Class/Sessional Marks in each subject. I will submit the **assignments** given in time to improve my performance.
6. I will not bring **Mobile Phone** to the College campus and also, I will not involve in any form of **ragging** inside or outside the campus. I am fully aware that bringing mobile phone to the campus and involving in Ragging is an **offence** and punishable as per JNTU/UGC rules and law.
7. I will **pay** tuition fees, examination fees and any other **dues** within the stipulated time as required by the Institute authorities failing which I will not be permitted to attend the classes.
8. I will **not cause or involve** in any sort of **violence or disturbance** both within and outside the college campus.
9. If I **absent continuously for 3 days**, my **parents** will have to meet the concerned HOD/Principal.
10. I hereby **acknowledge** that I have **received** the R14 **Academic Rules and Regulations, Syllabuscopy** and I shall **abide** by all the rules specified in it.

ACKNOWLEDGEMENT

I have gone through carefully the terms of the above undertaking and understand that following these are for my/his/her own benefit and improvement. I also understand that if I/he/she fail to comply with these terms, will be liable to suitable action as per College/JNT University Hyderabad rules and law. I undertake that I/he/she will strictly follow the above terms.

Signature of Student

Signature of Parent

Name & Address with Phone Number