VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

Affiliated to JNTUH, Approved by AICTE, Accredited by NAAC and ISO 9001:2015 Certified,
Shamshabad - 501 218,Hyderabad,
Telangana State, India.
www.vardhaman.org

MASTER OF TECHNOLOGY
DIGITAL ELECTRONICS AND COMMUNICATION SYSTEMS
(ELECTRONICS AND COMMUNICATION ENGINEEERING)

CHOICE BASED CREDIT SYSTEM

ACADEMIC REGULATIONS, COURSE STRUCTURE AND SYLLABI FOR M.TECH –DIGITAL ELECTRONICS AND COMMUNICATION SYSTEMS UNDER AUTONOMOUS STATUS
FOR THE BATCHES ADMITTED FROM THE ACADEMIC YEAR 2018 - 2019

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PRELIMINARY DEFINITIONS AND NOMENCLATURES

- "Autonomous Institution / College" means an institution / college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.
- "Academic Autonomy" means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.
- "Commission" means University Grants Commission.
- "AICTE" means All India Council for Technical Education.
- "University" means Jawaharlal Nehru Technological University Hyderabad.
- "College" means Vardhaman College of Engineering, Hyderabad unless indicated otherwise by the context.
- "Program" means:
    - Master of Technology (M. Tech.) Degree program
    - PG Degree Program: M. Tech
- "Branch" means specialization in a program like M. Tech. program in Structural Engineering, M. Tech. program in Computer Science and Engineering etc.
- "Course" or "Subject"means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester. For example, B4911 English for Research Papers Writing, means a theory or practical subject, identified by its course-number and course-title, which is normally studied in a semester. The description of allocation of course code is mentioned in the table 1.

Table 1: Course Code Description

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

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

FOREWORD

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

Vardhaman College of Engineering is proud to win the credence of all the above bodies monitoring the quality in education and has gladly accepted the responsibility of sustaining, if not improving upon the standards and ethics for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Board of Studies are constituted under the guidance of the Governing Body of the College and recommendations of the JNTUH to frame the regulations, course structure and syllabi under autonomous status.

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

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

PRINCIPAL

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Institute Vision:

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

Institute Mission:

- To adopt innovative student centric learning methods.
- To enhance professional and entrepreneurial skills through industry institute interaction.
- To train the students to meet dynamic needs of the society.
- To promote research and continuing education.

Quality Policy:

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

Department Vision:

To produce competent engineers with social responsibility to address the global challenges in the field of Electronics and Communication Engineering.

Department Mission:

- Promote active learning strategies to facilitate student centric learning
- Provide self-learning capabilities to enhance employability and entrepreneurial skills
- Inculcate human values and ethics to make learners sensitive towards societal issues
- Strengthen core competencies among the learners through experiential curriculum.

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ACADEMIC REGULATIONS

M. Tech Regular Two Year Post-Graduate Programme

(For the batches admitted from the Academic Year 2018–2019)

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

1. APPLICABILITY

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

2. EXTENT

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

3. PROGRAMS OFFERED

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

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

4. ADMISSION

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

4.1.1. Eligibility

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

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

4.2. Admission Procedure:

Admissions are made into the first year of two year M. Tech program as per the stipulations of Telangana State Council of Higher Education (TSCHE), Government of Telangana.

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

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

5. MEDIUM OF INSTRUCTION

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

6. DURATION OF THE PROGRAMS

6.1 Normal Duration

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

6.2 Maximum Duration

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

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

7. SEMESTER STRUCTURE

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

Table 2: Academic Calendar

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

8. CHOICE BASED CREDIT SYSTEM

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

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

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

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

9. COURSE REGISTRATION

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

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

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

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

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

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

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

10. EVALUATION - DISTRIBUTION AND WEIGHTAGE OF MARKS

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

10.1. For the theory subjects 70 marks shall be awarded for the performance in the Semester End Examination (SEE) and 30 marks shall be awarded for Continuous Internal Evaluation (CIE). The Final marks of Continuous Internal Evaluation is calculated based on 75% of best Marks and 25% of least marks secured in the two Mid-Term Examinations conducted. First Mid-Term examinations will be conducted in the middle of the Semester and second Mid-Term examinations during the last week of instruction. Each Mid-Term Examination shall be conducted for a total duration of 90 minutes. The question paper consist of 5

questions out of which 3 questions are to be answered, each question carrying 10 marks for a total of 30 marks. The details of the Question Paper pattern for Semester End Examination (Theory) are given below:

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

i. Part A for 20 marks,

ii. Part B for 50 marks.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

10.19. For each subject, the candidate has to pay a fee equivalent to one third of the semester tuition fee and the amount is to be remitted in the form of D.D. in favour of the Principal, Vardhaman College of Engineering payable at Hyderabad along with the requisition through the concerned Head of the Department.

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

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

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

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

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

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

11.5. A student will not be promoted to the next semester unless he satisfies the attendance requirements of the current semester. The student may seek readmission for the semester when offered next. He will not be allowed to register for the subjects of the semester while he is in detention. A student detained due to shortage of attendance, will have to repeat that semester when offered next.

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

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

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

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

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

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

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

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

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

13. SUPPLEMENTARY EXAMINATION

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

14. REVALUATION

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

15. TRANSITORY REGULATIONS

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

16. TRANSCRIPTS

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

17. AWARD OF DEGREE

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

17.1. Eligibility

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

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

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

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

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

v. No disciplinary action is pending against him.

17.2. Award of Class

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

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

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

17.3. Letter Grade and Grade Point

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

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

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

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

Percentage of marks = (CGPA-0.5) X 10

Semester Grade Point Average (SGPA)

The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.

SGPA (S_i) = $\sum (C_i \times G_i) / \sum C_i$

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 = $\sum (C_i \times S_i) / \sum C_j$

Where S_i is the SGPA of the i^{th} semester and C_i is the total number of credits in that semester.
Cj is the total number of credits of entire program.

18. REGISTRATION

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

19. TERMINATION FROM THE PROGRAM

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

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

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

20. CURRICULUM

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

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

21. WITH-HOLDING OF RESULTS

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

22. GRIEVANCES REDRESSAL COMMITTEE

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

Headed by Senior Faculty member

Heads of all departments

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

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

23. MALPRACTICE PREVENTION COMMITTEE

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

Principal

Subject expert of which the subject belongs to

Head of the department of which the student belongs to

The invigilator concerned

In-charge Examination branch of the college

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

Any action on the part of candidate at the examination like trying to get undue advantage in the performance at examinations or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff, who are in charge of conducting examinations,

valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.

24. AMENDMENTS TO REGULATIONS

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

25. STUDENTS' FEEDBACK

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

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

26. GRADUATION DAY

The College shall have its own annual *Graduation Day* for the award of Degrees to students completing the prescribed academic requirements in each case, in consultation with the University and by following the provisions in the Statute.

The College shall institute Prizes and Awards to meritorious students, for being given away annually at the *Graduation Day.* This will greatly encourage the students to strive for excellence in their academic work.

27. AWARD OF A RANK UNDER AUTONOMOUS SCHEME

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

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

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

28. CONDUCT AND DISCIPLINE

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

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

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

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

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

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

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

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

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

29. OTHER ISSUES

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

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

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

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

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

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

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

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

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

30. GENERAL

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

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

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/Improper conduct	Punishment
	If the student:	
1. (a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any other body language methods or communicates through cell phones with any student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the student is to be cancelled and sent to the University.
3.	Impersonates any other student in connection with the examination.	The student who has impersonated shall be expelled from examination hall. The student is also debarred and forfeits the seat. The performance of the original student, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the student(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The students also

	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.	are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.
9.	If student of the college, who is not a student for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the student has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the University for further action to award suitable punishment.	

COURSE STRUCTURE

M. TECH – DIGITAL ELECTRONICS AND COMMUNICATION SYSTEMS

REGULATIONS: VCE-R18

I YEAR I SEMESTER

Code	Subject	Periods per Week		Credits	Scheme of Examination Maximum Marks		
		L	P		Internal	External	Total
B4401	RTL Simulation and Synthesis with PLDs	3	0	3	30	70	100
B4402	Wireless and Mobile Communication	3	0	3	30	70	100
PROGRAM ELECTIVE - I		3	0	3	30	70	100
PROGRAM ELECTIVE - II		3	0	3	30	70	100
B4403	RTL Simulation and Synthesis with PLDs Lab	0	4	2	30	70	100
B4404	Wireless and Mobile Communication Lab	0	4	2	30	70	100
B4905	Research Methodology and IPR	2	0	2	30	70	100
	Audit Course-I	2	0	0	100*	0	100*
TOTAL		16	08	18	210	490	700

I YEAR II SEMESTER

Code	Subject	Periods per week		Credits	Scheme of Examination Maximum Marks		
		L	P		Internal	External	Total
B4405	Analog and Digital CMOS VLSI Design	3	0	3	30	70	100
B4406	Advanced Digital Signal Processing	3	0	3	30	70	100
PROGRAM ELECTIVE - III		3	0	3	30	70	100
PROGRAM ELECTIVE - IV		3	0	3	30	70	100
B4407	Analog and Digital CMOS VLSI Design Lab	0	4	2	30	70	100
B4408	Advanced Digital Signal Processing Lab	0	4	2	30	70	100
B4409	Mini Project with Seminar	2	0	0	100	0	100
	Audit Course-II	0	4	2	100*	0	100*
TOTAL		14	12	18	280	420	700

II YEAR I SEMESTER

Code	Subject	Periods per week		Credits	Scheme of Examination Maximum Marks		
		L	P		Internal	External	Total
PROGRAM ELECTIVE –V		3	0	3	30	70	100
OPEN ELECTIVE		3	0	3	30	70	100
B4410	Major Project Phase –I	0	20	10	100	0	100
TOTAL		6	20	16	160	140	300

II YEAR II SEMESTER

Code	Subject	Periods per week		Credits	Scheme of Examination Maximum Marks		
		L	P		Internal	External	Total
B4411	Major Project Phase –II	0	32	16	30	70	100
TOTAL		0	32	16	30	70	100

PROGRAM ELECTIVES			
PROGRAM ELECTIVE – I		**PROGRAM ELECTIVE – II**	
Code	**Subject**	**Code**	**Subject**
B4451	Wireless Sensor Networks	**B4454**	Cognitive Radio
B4452	DSP Architecture	**B4455**	Audio Video Coding & Compression
B4453	VLSI signal processing	**B4456**	CAD of Digital System
PROGRAM ELECTIVE – III		**PROGRAM ELECTIVE – IV**	
Code	**Subject**	**Code**	**Subject**
B4457	Satellite Communication	**B4460**	Audio Processing
B4458	IOT and Applications	**B4461**	MIMO System
B4459	Low power VLSI Design	**B4462**	Physical design automation
PROGRAM ELECTIVE – V			
Code	**Subject**		
B4463	Artificial Intelligence		
B4464	Pattern Recognition and Machine learning		
B4465	Communication Network		
OPEN ELECTIVES		**AUDIT COURSE-I & II**	
B4901	Business Analytics	**B4911**	English for Research Papers Writing
B4902	Industrial safety	**B4912**	Disaster Management
B4903	Operations Research	**B4913**	Sanskrit for Technical Knowledge
B4904	Waste to Energy	**B4914**	Value Education
		B4915	Constitution of India
		B4916	Pedagogy Studies
		B4917	Stress Management by Yoga
		B4918	Personality Development through Life Enlightenment skills.

SYLLABI FOR
I YEAR I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

RTL SIMULATION AND SYNTHESIS WITH PLDS

Course Code: B4401

L	P	C
3	0	3

SYLLABUS

UNIT - I:

PLD BASED DESIGN: Design Flow, Design Entry, Simulation, Compilation, Device Programming.

LOGIC DESIGN CONCEPTS: Number Systems, Binary Arithmetic, Basic Gates, Designing Combinational Circuits, Storage Elements, Sequential Circuit Design, Memories.

UNIT - II:

VERILOG FOR SIMULATION AND SYNTHESIS: Design with Verilog, Combinational Circuits, Sequential Circuits, Writing Test benches, Synthesis Issues.

UNIT - III:

PROGRAMMABLE LOGIC DEVICES: Read Only Memories, Programmable Logic Arrays, Complex Programmable Logic Devices, Field Programmable Gate Arrays.

GATE LEVEL COMBINATIONAL DESIGN: Element Design, Iterative Structures, Testing the design.

UNIT - IV:

CASE STUDY - SEQUENTIAL MULTIPLIER: Sequential Multiplier Specification, Shift-and-Add Multiplication, Sequential Multiplier Design, Multiplier Testing, Multiplier Prototyping, Multiplier Interfaces Bidirectional Databus, Operating the Prototype.

UNIT -V:

IP AND PROTOTYPING: IP in various forms: RTL Source code, Encrypted Source code, Soft IP, Netlist, Peripheral IP, Use of external hard IP during prototyping.

TEXT BOOKS:

1. Zainalabedin Navabi, "Digital Design and Implementation with Field Programmable Devices", Springer Science, Kluwer Academic Publishers.
2. Doug Amos, Austin Lesea, Rene Richter, "FPGA based prototyping methodology manual", Xilinx.

REFERENCE BOOKS:

1. Richard S. Sandige, "*Modern Digital Design*", MGH, International Editions.
2. Donald D Givone, "*Digital principles and Design*", TMH
3. Charles Roth, Jr. and Lizy K John, "*Digital System Design using VHDL*", Cengage Learning.
4. Samir Palnitkar, "*Verilog HDL, a guide to digital design and synthesis*", Prentice Hall.
5. Bob Zeidman, "*Designing with FPGAs & CPLDs*", CMP Books.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

WIRELESS AND MOBILE COMMUNICATION

Course Code: B4402

L	P	C
3	0	3

SYLLABUS

UNIT - I

CELLULAR COMMUNICATION FUNDAMENTALS: Cellular system design, Frequency reuse, handover concepts, Co channel and adjacent channel interference, interference reduction techniques and methods to improve cell coverage and Capacity in Cellular systems: Cell Splitting, Sectoring.

UNIT - II

GSM: GSM architecture and interfaces, GSM architecture details, GSM subsystems, GSM Logical Channels, Mobility Management, Call Flows in GSM.2.5 G TDMA Standards: High speed Circuit Switched Data (HSCSD), General Packet Radio Service (GPRS),2.75 G Standards: EDGE.

SPECTRAL EFFICIENCY ANALYSIS FOR MULTIPLE ACCESS TECHNOLOGIES: Spectral Efficiency, FDMA and TDMA Spectral Efficiency, Wideband Systems, Comparison of FDMA,TDMA and DS-CDMA.

UNIT - III

MOBILE RADIO PROPAGATION LARGE SCALE PATH LOSS: Free Space Propagation Model, Reflection, Ground Reflection (Two-Ray) Model, Diffraction, Knife-edge Diffraction model , Scattering, Practical Link Budget Design using Path Loss Models: Log-distance path Loss Model, Log-normal Shadowing.

SMALL SCALE FADING AND MULTIPATH: Factors Influencing Small-Scale Fading, Doppler shift, Small Scale Multipath Measurements: Direct RF Pulse System, Spread Spectrum Sliding Correlator channel sounding, Parameters of Multipath channels, Types of small scale fading.

UNIT - IV

EQUALIZATION, DIVERSITY: Fundamentals of Equalization, Equalizers in a communications receiver, Algorithms for adaptive equalization, diversity techniques- Practical Space Diversity Considerations, polarization and frequency diversities, Interleaving.

UNIT - V

IS-95 and CDMA 2000: IS- 95 system Architecture, IS-95 CDMA Air Interface- Forward Link and Reverse link, Physical and Logical channels of IS 95 CDMA, IS 95 CDMA Call Processing, soft Handoff, cdma2000 System-Evolution of IS 95 (CDMA One) to cdma2000, cdma2000 layering structure and channels.

TEXT BOOKS:

1. T.S.Rappaport, “Wireless Communications Principles and Practice”, 2nd edition, PHI,2002.
2. V.K.Garg, J.E.Wilkes, “Principle and Application of GSM”, Pearson Education, 6th edition, 2009.
3. V.K.Garg, “IS-95 CDMA & CDMA 2000”, Pearson Education, 4th edition, 2009.

REFERENCES:

1. William C.Y.Lee, “Mobile Cellular Telecommunications Analog and Digital Systems”, 2nd edition, TMH, 1995.
2. Andreas F.Molisch, "Wireless Communications", John Wiley & Sons Ltd.,2012.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

WIRELESS SENSOR NETWORKS
(PROGRAM ELECTIVE – I)

Course Code: **B4451**

L	P	C
3	0	3

SYLLABUS

UNIT-I

INTRODUCTION AND OVERVIEW OF SENSOR NETWORK: architecture and its applications, sensor network comparison with Ad Hoc Networks, Sensor node architecture with hardware and software details.

HARDWARE: Examples like mica2, micaZ, telosB, cricket, Imote2, tmote, btnode, and Sun SPOT.

UNIT-II

SOFTWARE (OPERATING SYSTEMS): tinyOS, MANTIS, Contiki, and RetOS.

PROGRAMMING TOOLS: C, nesC. Performance comparison of wireless sensor networks simulation and experimental platforms like open source (ns-2) and commercial (QualNet, Opnet)

UNIT-III

OVERVIEW OF SENSOR NETWORK PROTOCOLS: (DETAILS OF ATLEAST 2 IMPORTANT PROTOCOL PER LAYER): Physical, MAC and routing/ Network layer protocols, node discovery protocols, multi-hop and cluster based protocols, Other related Technologies: Fundamentals of 802.15.4, Bluetooth, BLE (Bluetooth low energy), UWB.

UNIT-IV

DATA DISSEMINATION AND PROCESSING: differences compared with other database management systems, data storage; query processing.

UNIT-V

SPECIALIZED FEATURES: Energy preservation and efficiency; security challenges; fault-tolerance, Issues related to Localization, connectivity and topology, Sensor deployment mechanisms; coverage issues; sensor Web; sensor Grid, Open issues for future research, and Enabling technologies in wireless sensor network.

TEXT BOOKS:

1. 1.H. Karl and A. Willig, “Protocols and Architectures for Wireless Sensor Networks”, John Wiley & Sons, India, 2012.
2. 2.C. S. Raghavendra, K. M. Sivalingam, and T. Znati, Editors, “Wireless Sensor Networks”, Springer Verlag, 1st Indian reprint, 2010.

REFERENCES:

1. Nandini Mukherjee,Sarmistha Neogy,Sarbani Roy, “ Building Wireless Sensor Networks:Theoritical and practical perspectives”, CRC Press publisher,ISSBN:9781482230062,2015.
2. F. Zhao and L. Guibas, “Wireless Sensor Networks: An Information Processing Approach”, Morgan Kaufmann, 1st Indian reprint, 2013.
3. YingshuLi, MyT. Thai, Weili Wu, “Wireless sensor Network and Applications”, Springer series on signals and communication technology, 2008.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

DSP ARCHITECTURE
(PROGRAM ELECTIVE – I)

Course Code: **B4452**

L	P	C
3	0	3

SYLLABUS

UNIT-I

PROGRAMMABLE DSP HARDWARE: Processing Architectures (von Neumann, Harvard), DSP core algorithms (FIR, IIR, Convolution, Correlation, FFT), Fixed and Floating Point Formats, Special Architectures Modules used in Digital Signal Processors: Multiplier, MAC unit, Barrel shifters, ALU.

UNIT-II

STRUCTURAL AND ARCHITECTURAL CONSIDERATIONS: Parallelism in DSP processing, TMS320C25 – Internal Architecture, Arithmetic and Logic Unit, Auxiliary Registers, Addressing Modes (Immediate, Direct and Indirect, Bit-reverse Addressing), Basics of TMS320C54x and C55x Families in respect of Architecture improvements and new applications fields, TMS320C5416 DSP Architecture, Memory Map, Interrupt System, Peripheral Devices, Illustrative Examples for assembly coding.

UNIT-III

VLIW ARCHITECTURE: Current DSP Architectures, TMS320C6X Family, Addressing Modes: Linear and Circular, Pipelining, Replacement of MAC unit by Instruction Level Pipelining, Detailed study of Instruction Set Architecture: Assembly Code Format, Types of Instructions; INTERRUPTS, Multichannel Buffered Serial Ports.

UNIT-IV

MULTI-CORE DSPS: Introduction to Multi-core computing and applicability for DSP hardware, Concept of threads, introduction to P-thread, mutex, heterogeneous and homogenous multi-core systems, Shared Memory parallel programming – Open MP approach of parallel programming, TI TMS320C6678 (Eight Core subsystem): Architecture.

UNIT-V

FPGA BASED DSP SYSTEMS: DSP Algorithm Representations: SFG Description, DFG description; Basics of Mapping DSP system onto FPGAs: Retiming, cut-set theorem; Parallel Operation.

TEXT BOOK:

1. Avtar Singh and S. Srinivasan, “Digital Signal Processing” Thomson Publications, 2004
2. Rulph Chassaing, DSP Applications Using C and the TMS320C6x DSK, John Wiley & Sons, 2002
3. Naim Dahnoun, “Multicore DSP: From Algorithms to Real-time Implementation on the TMS320C66x SoC”, John Wiley & Sons

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

VLSI SIGNAL PROCESSING
(PROGRAM ELECTIVE – I)

Course Code: **B4453**

L	P	C
3	0	3

SYLLABUS

UNIT - I

INTRODUCTION TO DSP: Typical DSP algorithms, DSP algorithms benefits, Representation of DSP algorithms

PIPELINING AND PARALLEL PROCESSING: Introduction, Pipelining of FIR Digital filters, Parallel Processing, Pipelining and Parallel Processing for Low Power

RETIMING: Introduction – Definitions and Properties – Solving System of Inequalities – Retiming Techniques

UNIT-II:

FOLDING: Introduction -Folding Transform - Register Minimization Techniques – Register minimization in folded architectures – folding of multirate systems

UNFOLDING: Introduction – An Algorithm for Unfolding – Properties of Unfolding – critical Path, Unfolding and Retiming – Applications of Unfolding

UNIT-III:

SYSTOLIC ARCHITECTURE DESIGN: Introduction – Systolic Array Design Methodology – FIR Systolic Arrays – Selection of Scheduling Vector – Matrix Multiplication and 2D Systolic Array Design – Systolic Design for Space Representations contain Delays

UNIT-IV:

FAST CONVOLUTION: Introduction – Cook-Toom Algorithm – Winograd algorithm – Iterated Convolution – Cyclic Convolution – Design of Fast Convolution algorithm by Inspection

UNIT-V:

LOW POWER DESIGN: Scaling Vs Power Consumption –Power Analysis, Power Reduction techniques – Power Estimation Approaches

PROGRAMMABLE DSP: Evaluation of Programmable Digital Signal Processors, DSP Processors for Mobile and Wireless Communications, Processors for Multimedia Signal Processing.

TEXT BOOKS:

1. VLSI Digital Signal Processing- System Design and Implementation – Keshab K. Parhi, 1998, Wiley Inter Science.
2. VLSI and Modern Signal Processing – Kung S. Y, H. J. While House, T. Kailath, 1985, Prentice Hall.

REFERENCE BOOKS:

1. Mohammad Ismail and Terri Fiez, Analog VLSI Signal and Information Processing, McGraw Hill, 1994
2. S.Y. Kung, H.J. White House, T. Kailath, VLSI and Modern Signal Processing, Prentice Hall, 1985.
3. Design of Analog – Digital VLSI Circuits for Telecommunications and Signal
4. Processing – Jose E. France, Yannis Tsividis, 1994, Prentice Hall.
5. VLSI Digital Signal Processing – Medisetti V. K, 1995, IEEE Press (NY), USA

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

COGNITIVE RADIO

(PROGRAM ELECTIVE – II)

Course Code: **B4454**

L	P	C
3	0	3

SYLLABUS

UNIT-I: INTRODUCTION TO COGNITIVE RADIOS: Digital dividend, cognitive radio (CR) architecture, functions of cognitive radio, dynamic spectrum access (DSA), components of cognitive radio, spectrum sensing, spectrum analysis and decision, potential applications of cognitive radio.

UNIT-II: SPECTRUM SENSING: Spectrum sensing, detection of spectrum holes (TVWS), collaborative sensing, geo-location database and spectrum sharing business models (spectrum of commons, real time secondary spectrum market).

UNIT-III: OPTIMIZATION TECHNIQUES OF DYNAMIC SPECTRUM ALLOCATION: Linear programming, convex programming, non-linear programming, integer programming, dynamic programming, stochastic programming.

UNIT-IV: DYNAMIC SPECTRUM ACCESS AND MANAGEMENT: Spectrum broker, cognitive radio architectures, centralized dynamic spectrum access, distributed dynamic spectrum access, learning algorithms and protocols.

UNIT-V: SPECTRUM TRADING: Introduction to spectrum trading, classification to spectrum trading, radio resource pricing, brief discussion on economics theories in DSA (utility, auction theory), classification of auctions (single auctions, double auctions, concurrent, sequential).

REFERENCES:

- Ekram Hossain, Dusit Niyato, Zhu Han, "*Dynamic Spectrum Access and Management in Cognitive Radio Networks*", Cambridge University Press, 2009.
- Kwang-Cheng Chen, Ramjee Prasad, "*Cognitive radio networks*", John Wiley & Sons Ltd., 2009.
- Bruce Fette, *"Cognitive radio technology"*, Elsevier, 2nd edition, 2009.
- Huseyin Arslan, *"Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems"*, Springer, 2007.
- Francisco Rodrigo Porto Cavalcanti, Soren Andersson, *"Optimizing Wireless Communication Systems"* Springer, 2009.
- Linda Doyle, *"Essentials of Cognitive Radio"*, Cambridge University Press, 2009.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

AUDIO VIDEO CODING & COMPRESSION
(PROGRAM ELECTIVE – II)

Course Code: **B4455**

L	P	C
3	0	3

SYLLABUS

UNIT-I. SCALAR AND VECTOR QUANTIZATION TECHNIQUES:

SCALAR QUANTIZATION: Introduction, Optimum scalar quantization, Predictive scalar quantization,
VECTOR QUANTIZATION: Introduction, Rationale, Optimum code book generation, Optimum quantizer performance, Using the quantizer, Gain-shape vector quantization

UNIT-II: CODING TECHNIQUES

SUB-BAND TRANSFORM CODING: Introduction, Equivalence of filter banks and transforms, Bit allocation, Optimum transform, Performance
ENTROPY CODING: Introduction, Noiseless coding of discrete, memoryless sources, Noiseless coding of a discrete source with memory, Scalar quantizer with entropy constraint, Capacity of a discrete memoryless channel, Coding a discrete source with a fidelity criterion.

UNIT-III: AUDIO SIGNALS, SPEECH AND AUDIO CODING

INTRODUCTION TO AUDIO SIGNALS: Speech signal characteristics, Characteristics of music signals, Standards and recommendations
SPEECH CODING: PCM and ADPCM coders, The 2.4 bit/s LPC-10 coder, The CELP coder
AUDIO CODING: Principles of "perceptual coders", MPEG-1layer 1 coder, MPEG-2AACcoder, DolbyAC-3 coder, Psychoacoustic model: calculating a masking threshold

UNIT-IV H.264 PRELIMINARIES:

INTRODUCTION: A change of scene, Driving the change, the role of standards, Why H.264 Advanced Video Coding is important.
VIDEO FORMATS AND QUALITY: Introduction, Natural video scenes, Capture, Colour spaces, Video formats, Quality.
VIDEO CODING CONCEPTS: Introduction, Video CODEC, Prediction model, Image model, Entropy coder, The hybrid DPCM/DCT video CODEC model

UNIT-V: H.264 - MORE DETAILS

Introduction, What is H.264? How does an H.264 codec work? The H.264/AVC Standard, H.264 Profiles and Levels, The H.264 Syntax, H.264 in practice.

Text Books:

1. Nicolas Moreau - Tools for Signal Compression Applications to Speech and Audio Coding-Wiley (2011)
2. Iain E. Richardson-The H.264 Advanced Video Compression Standard, Second Edition-Wiley (2010)

References:

1. M. Ghanbari, Standard Codecs (Iet Telecommunications Series), 3rd Edition -Institution of Engineering and Technology (2011)
2. Khalid Sayood, Introduction to Data Compression, Fourth Edition, (The Morgan Kaufmann Series in Multimedia Information and Systems).

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS I YEAR I SEM **VCE-R18**

CAD OF DIGITAL SYSTEM
(PROGRAM ELECTIVE – II)

Course Code: **B4456**

L	P	C
3	0	3

SYLLABUS

UNIT-I

VLSI DESIGN METHODOLOGIES: Introduction to VLSI Design Methodologies-Review of Data structures and Algorithms-Review of VLSI Design Automation Tools-Algorithmic Graph Theory and Computational Complexity- Tractable and Intractable problems-general purpose methods for combinational optimization.

UNIT-II

DESIGN RULES: Layout Compaction-Design rules–problem formulation-algorithms for constraint graph compaction – placement and Partitioning-Circuit Representation-Placement algorithms-partitioning.

UNIT-III

FLOOR PLANNING: Floor planning concepts-shape functions and floor plan sizing-Types of local routing problems- Area routing-channel routing – global routing-algorithms for global routing.

UNIT-IV

SIMULATION: Simulation- Gate level modelling and simulation- Switch-level modelling and Simulation-Combinational Logic synthesis- Binary Decision Diagrams- Two Level Logic Synthesis.

UNIT-V

MODELLING AND SYNTHESIS: High level Synthesis-Hardware models- Internal Representation-Allocation- assignment and scheduling- Simple Scheduling Algorithm-Assignment problem- High level transformations.

Text Book:

1. S.H. Gerez, “Algorithms for VLSI Design Automation”, John Wiley & Sons, 1999.
2. Giovanni De Michele “Synthesis and optimization of digital circuits”, Mc Graw Hill, 1994.

References:

1. Soha Hassoun and Tsutomu Sasao “Logic Synthesis and verification”, Kluwer Academic Publisher, 2003.
2. Sherwani “An Introduction to Physical VLSI Design”, Prentice Hall of India, 2004

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS I YEAR I SEM **VCE-R18**

RTL SIMULATION AND SYNTHESIS WITH PLDS LAB

Course Code: **B4403**

L	**P**	**C**
0	**3**	**2**

LIST OF EXPERIMENTS:

1. Verilog implementation of 8:1 Mux/Demux, Full Adder, 8-bit Magnitude comparator, Encoder/decoder, Priority encoder, D-FF, 4-bit Shift registers (SISO, SIPO, PISO, bidirectional), 3-bit Synchronous Counters, Binary to Gray converter, Parity generator.
2. Sequence generator/detectors, Synchronous FSM – Mealy and Moore machines.
3. Vending machines - Traffic Light controller, ATM, elevator control.
4. PCI Bus & arbiter and downloading on FPGA.
5. UART/ USART implementation in Verilog.
6. Realization of single port SRAM in Verilog.
7. Verilog implementation of Arithmetic circuits like serial adder/ subtractor, parallel adder/subtractor, serial/parallel multiplier.
8. Discrete Fourier transform/Fast Fourier Transform algorithm in Verilog.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

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

WIRELESS AND MOBILE COMMUNICATION LAB

Course Code: **B4404**

L	P	C
0	3	2

LIST OF EXPERIMENTS:

1. Understanding Cellular Fundamentals like Frequency Reuse, Interference, cell splitting, multi path environment, Coverage and Capacity issues using communication software.
2. Knowing GSM and CDMA architecture, network concepts, call management, call setup, call release, Security and Power Control, Handoff Process and types, Rake Receiver etc.
3. Study of GSM handset for various signalling and fault insertion techniques (Major GSM handset sections: clock, SIM card, charging, LCD module, Keyboard, User interface).
4. To study transmitters and receiver section in mobile handset and measure frequency band signal and GMSK modulating signal.
5. To study various GSM AT Commands their use and developing new application using it. Understating of 3G Communication System with features like; transmission of voice and videocalls, SMS, MMS, TCP/IP, HTTP, GPS and File system by AT Commands in 3G network.
6. Study of DSSS technique for CDMA, observe effect of variation of types of PN codes, chip rate, spreading factor, processing gain on performance.
7. To learn and develop concepts of Software Radio in real time environment by studying the building blocks like Base band and RF section, convolution encoder, Interleaver and De-Interleaver.
8. To study and analyze different modulation techniques in time and frequency domain using SDR kit.

VARDHAMAN COLLEGE OF ENGINEERING

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M. Tech. DECS I YEAR I SEM **VCE-R18**

RESEARCH METHODOLOGY AND IPR

Course Code: **B4905**

L	P	C
2	0	2

SYLLABUS

UNIT – I

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

UNIT – II

Effective literature studies approaches, analysis Plagiarism, and Research ethics.

UNIT – III

Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT – IV

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

UNIT – V

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

SYLLABI FOR
I YEAR II SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. DECS I YEAR II SEM **VCE-R18**

ANALOG AND DIGITAL CMOS VLSI DESIGN

Course Code: **B4405**

L	P	C
3	0	3

SYLLABUS

UNIT - I:

Review: Basic MOS structure and its static behavior, Quality metrics of a digital design: Cost, Functionality, Robustness, Power, Stick diagram and Layout, Wire delay models. Inverter: Static CMOS inverter, Switching threshold and noise margin concepts and their evaluation, Dynamic behavior, Power consumption.

UNIT - II:

Combinational logic: Static CMOS design, Logic effort, Ratioed logic, Pass transistor logic, Dynamic logic, Speed and power dissipation in dynamic logic, Cascading dynamic gates, CMOS transmission gate logic.

UNIT - III:

Sequential logic: Static latches and registers, Bi-stability principle, MUX based latches, Static SR flip-flops, Master-slave edge-triggered register, Dynamic latches and registers, Concept of pipelining, Pulse registers, Non-bistable sequential circuit.

UNIT – IV:

Single Stage Amplifier: CS stage with resistance load, Divide connected load, Current source load, Triode load, CS stage with source degeneration, Source follower, Common gate stage, Cascade stage, Choice of device models. Differential Amplifiers: Basic difference pair, Common mode response, Differential pair with MOS loads, Gilbert cell.

UNIT - V:

Passive and active current mirrors: Basic current mirrors, Cascade mirrors, Active current mirrors.
Frequency response of CS stage: Source follower, Common gate stage, Cascade stage and difference pair.

TEXT BOOKS:

3. Jan M Rabaey, A P Chandrakasan, B Nikolic, “Digital Integrated circuits: A design perspective”, Prentice Hall electronics and VLSI series, 2nd Edition.
4. Behzad Razavi , “Design of Analog CMOS Integrated Circuits”, TMH, 2007.

REFERENCE BOOKS:

1. Kang, S. and Leblebici, Y., “CMOS Digital Integrated Circuits, Analysis and Design”, TMH, 3rdEdition.
2. Baker, Li, Boyce, “CMOS Circuit Design, Layout and Simulation”, Wiley, 2nd Edition.
3. Phillip E. Allen and Douglas R. Holberg, “CMOS Analog Circuit Design”, Oxford, 3rd Edition.
4. R J Baker, “CMOS circuit Design, Layout and Simulation”, IEEE Inc., 2008.
5. Pucknell, D.A. and Eshraghian, K., “Basic VLSI Design”, PHI, 3rd Edition.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. DECS I YEAR II SEM **VCE-R18**

ADVANCED DIGITAL SIGNAL PROCESSING

Course Code: **B4406**

L	P	C
3	0	3

SYLLABUS

UNIT-I: Overview of DSP, Characterization in time and frequency, FFT Algorithms, Digital filter design and structures: Basic FIR/IIR filter design &structures, design techniques of linear phaseFIR filters,IIR filters by impulse invariance, bilinear transformation, FIR/IIR Cascaded lattice structures, parallel realization of IIR.

UNIT-II: Multi rate DSP, Decimators and Interpolators, Sampling rate conversion, multistage decimator & interpolator, poly phase filters, QMF, digital filter banks, Applications in sub band coding.

UNIT-III: Linear prediction & optimum linear filters, stationary random process, forward-backward linear prediction filters, solution of normal equations, AR Lattice and ARMA Lattice-Ladder Filters, Wiener Filters for Filtering and Prediction.

UNIT-IV: Adaptive Filters, Applications, Gradient Adaptive Lattice, Minimum mean squarecriterion, LMS algorithm, Recursive Least Square algorithm

UNIT-V: Estimation of Spectra from Finite-Duration Observations of Signals. Nonparametric Methods for Power Spectrum Estimation, Parametric Methods for Power Spectrum Estimation,Minimum-Variance Spectral Estimation, Eigen analysis Algorithms for Spectrum Estimation.

References:

- J.G.Proakis and D.G.Manolakis“Digital signal processing: Principles, Algorithm and Applications”, 4th Edition, Prentice Hall, 2007.
- N. J. Fliege, “Multirate Digital Signal Processing: Multirate Systems -Filter Banks –Wavelets”, 1st Edition, John Wiley and Sons Ltd, 1999.
- Bruce W. Suter, “Multirate and Wavelet Signal Processing”,1st Edition, Academic Press,1997.
- M. H. Hayes, “Statistical Digital Signal Processing and Modeling”, John Wiley & Sons Inc., 2002.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. DECS I YEAR II SEM **VCE-R18**

SATELLITE COMMUNICATION
(PROGRAM ELECTIVE – III)

Course Code: **B4457**

L	P	C
3	0	3

SYLLABUS

UNIT-I: INTRODUCTION

Over view of Satellite Communication Systems: Principles and architecture of satellite Communications, Brief history of Satellite communications, advantages, disadvantages, applications of satellites, and frequency Allocations for satellite services.

UNIT-II: Orbital Mechanics:

Kepler's laws of planetary motion, Orbital parameters, satellite velocity, look angle determination, Orbital Perturbations, Orbital Effects in Communications systems performance: Solar Eclipse, Sun Transit Outage and remedies, Doppler frequency shift phenomena and expression for Doppler shift.

UNIT-III: Satellite sub-systems:

Attitude and orbit control system (AOCS), Telemetry, tracking, command and monitoring (TTC & M), power sub-systems, Communications sub-systems, satellite antenna sub-system, Equipment Reliability and Space Qualification.

UNIT-IV: Satellite link budget:

Flux density and received signal power equations, Calculation of System noise temperature for satellite receiver and G/T ratio, drafting of satellite link budget and C/N ratio calculations in clear air and rainy conditions, Case study of Personal Communication system (satellite telephony) using LEO.

UNIT-V: Modulation and Multiple Access Schemes: FDMA, TDMA and CDMA. Satellite Mobile and Specialized Services- VSATs, Global Positioning Satellite System(GPS) and few recent communication satellites launched by NASA/ ISRO.

Text books:

1. Timothy Pratt and Others, "Satellite Communications", Wiley India, 2nd edition,2010.
2. Dennis Roddy, "Satellite Communication", McGraw Hill, 4th Edition, 2008.

References:

1. Tri T. Ha, "Digital Satellite Communications", Tata McGraw Hill, 2009.
2. S. K. Raman, "Fundamentals of Satellite Communication", Pearson Education India, 2011

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. DECS I YEAR II SEM **VCE-R18**

IOT AND APPLICATIONS
(PROGRAM ELECTIVE – III)

Course Code: **B4458**

L	P	C
3	0	3

SYLLABUS

UNIT-I:

INTRODUCTION TO INTERNET OF THINGS: Introduction, Definition & Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels & Deployment Templates.

DOMAIN SPECIFIC IOTS: Introduction, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Lifestyle

UNIT-II

IoT, M2M and IoT SYSTEM MANAGEMENT WITH NETCONF-YANG: Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT

IoT SYSTEM MANAGEMENT WITH NETCONF-YANG: Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Network Operator Requirements, NETCONF, YANG, IoT Systems Management with NETCONF-YANG

UNIT-III

IoT PLATFORMS DESIGN METHODOLOGY: Introduction, IoT Design Methodology, Case Study on IoT System for Weather Monitoring, Motivation for Using Python

IoT SYSTEMS - LOGICAL DESIGN USING PYTHON: Introduction, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/Time Operations, Classes, Python Packages of Interest for IoT

UNIT-IV

IoT PHYSICAL DEVICES & ENDPOINTS: What is an IoT Device, Exemplary Device: Raspberry Pi, About the Board, Linux on Raspberry Pi, Raspberry Pi Interface, Programming Raspberry Pi with Python, Other IoT Devices

IoT PHYSICAL SERVERS & CLOUD OFFERINGS: Introduction to Cloud Storage Models & Communication APIs, WAMP - AutoBahn for IoT, Xively Cloud for IoT, Python Web Application Framework, Designing a RESTful Web API, Amazon Web Services for IoT, SkyNet IoT Messaging Platform

UNIT V

CASE STUDIES ILLUSTRATING IOT DESIGN: Introduction, Home Automation Cities, Environment, Agriculture, Productivity Applications

TEXT BOOKS:

1. Arshdeep Bahga, Vijay Madisetti(2015), *Internet of Things A Hands-On Approach*, University Press,India.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. DECS I YEAR II SEM **VCE-R18**

LOW POWER VLSI DESIGN
(PROGRAM ELECTIVE – III)

Course Code: **B4459**

L	P	C
3	0	3

SYLLABUS

UNIT - I:

TECHNOLOGY & CIRCUIT DESIGN LEVELS: Sources of power dissipation in digital ICs, degree of freedom, recurring themes in low-power, emerging low power approaches, dynamic dissipation in CMOS, effects of Vdd & Vt on speed, constraints on Vt reduction, transistor sizing & optimal gate oxide thickness, impact of technology scaling, technology innovations.

UNIT - II:

LOW POWER CIRCUIT TECHNIQUES: Power consumption in circuits, flip-flops & latches, high capacitance nodes, energy recovery, reversible pipelines, high performance approaches.

UNIT - III:

LOW POWER CLOCK DISTRIBUTION: Power dissipation in clock distribution, single driver versus distributed buffers, buffers & device sizing under process variations, zero skew Vs. Tolerable skew, chip & package co-design of clock network.

UNIT - IV:

LOGIC SYNTHESIS FOR LOW POWER: Power Estimation Techniques, Power minimization techniques, low power arithmetic components- circuit design styles, adders, multipliers.

UNIT -V:

LOW POWER MEMORY DESIGN: Sources and reductions of power dissipation in memory subsystem, sources of power dissipation in DRAM and SRAM, low power DRAM circuits, low power SRAM circuits.

TEXT BOOKS:

1. P. Rashinkar, Paterson and L. Singh, "*Low Power Design Methodologies*", Kluwer Academic, 2002

REFERENCE BOOKS:

1. Kaushik Roy, Sharat Prasad, "*Low power CMOS VLSI circuit design*", John Wiley sons Inc.,2000.
2. J.B.Kulo and J.H Lou, *"Low voltage CMOS VLSI Circuits*", Wiley, 1999.
3. A.P.Chandrasekaran and R.W.Broadersen, "*Low power digital CMOS design*", Kluwer,1995
4. Gary Yeap, "*Practical low power digital VLSI design*", Kluwer, 1998.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. DECS I YEAR II SEM **VCE-R18**

AUDIO PROCESSING

(PROGRAM ELECTIVE – IV)

Course Code: **B4460**

L	P	C
3	0	3

SYLLABUS

UNIT-I:

Speech Analysis and Analysis - synthesis systems: Digitization, Spectral Analysis, Cestrum, Filter bank and zero crossing analysis, analysis –by-Synthesis, analysis-synthesis systems, Pitch Extraction.

UNIT-II:

Linear Predictive Coding Analysis: Principles of LPC analysis, LPC analysis procedure, Maximum likelihood spectral estimation, Source parameter estimation from residual signals, Speech Analysis-Synthesis System by LPC, PARCOR analysis, Line Spectrum Pair (LSP) analysis, Pole-zero analysis.

UNIT-III:

Speech Coding: Principal Techniques for Speech Coding, coding in Time Domain, coding in frequency domain, vector quantization, hybrid coding, evaluation and standardization of coding methods, robust and flexible speech coding.

UNIT-IV:

Principles of Speech Synthesis. Synthesis Based on Waveform Coding, Synthesis Based on Analysis-Synthesis Method, Synthesis Based on Speech Production Mechanism, Synthesis by Rule 226 7.5.1 Principles of synthesis by rule, Text-to-Speech Conversion, Corpus-Based Speech Synthesis

UNIT-V: SPEECH RECOGNITION Principles of Speech Recognition, Speech Period Detection Spectral Distance Measures, Structure of Word Recognition Systems , Dynamic Time Warping (DTW), Word recognition using phoneme units, Theory and Implementation of HMM evaluation

Text Books:

1. SadaokiFurui, “Digital Speech Processing, Synthesis and Recognition” 2nd Edition, Taylor & Francis, 2000.
2. Rabiner and Schafer, “Digital Processing of Speech Signals”, Pearson Education, 1979.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. DECS I YEAR II SEMESTER **VCE-R18**

MIMO SYSTEM

(Professional Elective - IV)

Course Code: **B4461**

L	P	C
3	0	3

SYLLABUS

UNIT-I: Introduction to Multi-antenna Systems, Motivation, Types of multi-antenna systems, MIMO vs. multi-antenna systems.

UNIT-II: Diversity, Exploiting multipath diversity, Transmit diversity, Space-time codes, The Alamouti scheme, Delay diversity, Cyclic delay diversity, Space-frequency codes, Receive diversity, The rake receiver, Combining techniques, Spatial Multiplexing, Spectral efficiency and capacity, Transmitting independent streams in parallel, Mathematical notation.

UNIT-III: The generic MIMO problem, Singular Value Decomposition, Eigenvalues andeigenvectors, Equalising MIMO systems, Disadvantages of equalising MIMO systems, Predistortion in MIMO systems, Disadvantages of pre-distortion in MIMO systems, Pre-coding and combining in MIMO systems, Advantages of pre-coding and combining, Disadvantages of precoding and combining, Channel state information.

UNIT-IV: Codebooks for MIMO, Beamforming, Beamforming principles, Increased spectrum efficiency, Interference cancellation, Switched beamformer, Adaptive beamformer, Narrowband beamformer, Wideband beamformer

UNIT-V: Case study: MIMO in LTE, Codewords to layers mapping, Pre-coding for spatial multiplexing, Pre-coding for transmit diversity, Beamforming in LTE, Cyclic delay diversitybased pre-coding, Pre-coding codebooks, Propagation Channels, Time & frequency channel dispersion, AWGN and multipath propagation channels.

References:

1. Claude Oestges, Bruno Clerckx, "MIMO Wireless Communications : From Real-world Propagation to Space-time Code Design",Academic Press, 1st edition, 2010.
2. Mohinder Janakiraman, “Space - Time Codes and MIMO Systems”, Artech House Publishers, 2004.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. DECS I YEAR II SEMESTER **VCE-R18**

PHYSICAL DESIGN AUTOMATION

(Professional Elective - IV)

Course Code: **B4462**

L	P	C
3	0	3

SYLLABUS

UNIT - I:

Introduction to VLSI Physical Design Automation: VLSI Design Cycle, New Trends in VLSI Design Cycle, Physical Design Cycle, New Trends in Physical Design Cycle, Design Styles, System Packaging Styles, Historical Perspectives, Existing Design Tools

UNIT - II:

Performance issues in circuit layout: Delay Models, Timing-Driven Placement, Timing-Driven Routing, Via Minimization, Power Minimization.

UNIT - III:

Placement: Problem Formulation, Classification of Placement Algorithms, Simulation Based Placement Algorithms, Partitioning Based Placement Algorithms, Other Placement Algorithms, Performance Driven Placement.

UNIT - IV:

Timing-driven placement. Global Routing: Problem Formulation, Classification of Global Routing, Maze Routing Algorithms, Line-Probe Algorithms, Shortest Path Based Algorithms, Steiner Tree based Algorithms, Integer Programming Based Approach, Performance Driven Routing.

UNIT -V:

Over the Cell Routing Via Minimization, Clock and Power Routing, Physical Design Automation of FPGAs.

TEXT BOOKS:

1. Naveed A. Sherwani “Algorithms for VLSI Physical Design Automation”, Third Edition, Kluwer Academic Publishers.
2. M. Sarrafzadeh, C. K. Wong, “An Introduction to VLSI Physical Design”, The McGraw-Hill Companies, Inc .

REFERENCE BOOKS:

1. Charles J. alpert, Dinesh p. Mehta, Sachin S. Sapatnekar “Handbook of Algorithms for Physical design Automation”, CRC press.
2. Andrew B. Kahng • Jens Lienig Igor L. Markov • Jin Hu, “VLSI Physical Design: From Graph Partitioning to Timing Closure”, Springer
3. Sadiq M Sait Habib Youssef, “VLSI Physical Desi,gn Automation Theory and Practice”, World Scientific.
4. Sung Kyu Lim, “Practical Problems in VLSI Physical Design Automation”, Springer.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. DECS I YEAR II SEM **VCE-R18**

ANALOG AND DIGITAL CMOS VLSI DESIGN LAB

Course Code: **B4407**

L	P	C
0	3	2

LIST OF EXPERIMENTS:

1. Use VDD=1.8V for 0.18um CMOS process, VDD=1.3V for 0.13um CMOS Process and VDD=1V for 0.09um CMOS Process.
    a. Plot ID vs. VGS at different drain voltages for NMOS, PMOS.
    b. Plot ID vs. VGS at particular drain voltage (low) for NMOS, PMOS and determine Vt.
    c. Plot log ID vs. VGS at particular gate voltage (high) for NMOS, PMOS and determine IOFF and sub-threshold slope.
    d. Plot ID vs. VDS at different gate voltages for NMOS, PMOS and determine Channel length modulation factor.
    e. Extract Vth of NMOS/PMOS transistors (short channel and long channel). Use VDS =30mV
       To extract Vth use the following procedure.
        i. Plot gm vs VGS using Cadence and obtain peak gm point.
        ii. Plot y=ID/(gm)1/2 as a function of VGS using Cadence.
        iii. Use Cadence to plot tangent line passing through peak gm point in y (VGS) plane and determine Vth.
    f. Plot ID vs. VDS at different drain voltages for NMOS, PMOS, plot DC load line and calculate gm, gds, gm/gds, and unity gain frequency.
    g. Tabulate your result according to technologies and comment on it.

2. Use VDD=1.8V for 0.18um CMOS process, VDD=1.2V for 0.13um CMOS Process and VDD=1V for 0.09um CMOS Process.
    a. Perform the following
        i. i. Plot VTC curve for CMOS inverter and thereon plot dVout vs. dVin and determine transition voltage and gain g. Calculate VIL, VIH, NMH, NML for the inverter.
        ii. ii. Plot VTC for CMOS inverter with varying VDD.
        iii. iii. Plot VTC for CMOS inverter with varying device ratio.
    b. Perform transient analysis of CMOS inverter with no load and with load and determine tpHL, tpLH, 20%-to-80% tr and 80%-to-20% tf. (use VPULSE = 2V, Cload = 50fF)
    c. Perform AC analysis of CMOS inverter with fanout 0 and fanout 1. (Use Cin= 0.012pF, Cload = 4pF, Rload = k)

3. Use Cadence to build a three stage and five stage ring oscillator circuit in 0.18um and 0.13um technology and compare its frequencies and time period.

4. Perform the following
    a. Draw small signal voltage gain of the minimum-size inverter in 0.18um and 0.13um technology as a function of input DC voltage. Determine the small signal voltage gain at the switching point using Cadence and compare the values for 0.18um and 0.13um process.

b. Consider a simple CS amplifier with active load, as explained in the lecture, with NMOS transistor MN as driver and PMOS transistor MP as load, in 0.18um technology. (W/L)MN=5, (W/L)MP=10 and L=0.5um for both transistors.
    i. Establish a test bench, as explained in the lecture, to achieve VDSQ=VDD/2.
    ii. Calculate input bias voltage if bias current=50uA.
    iii. Use Cadence and obtain the bias current. Compare its value with 50uA.
    iv. Determine small signal voltage gain, -3dB BW and GBW of the amplifier using small signal analysis in Cadence (consider 30fF load capacitance).
    v. Plot step response of the amplifier for input pulse amplitude of 0.1V. Derive time constant of the output and compare it with the time constant resulted from -3dB BW
    vi. Use Cadence to determine input voltage range of the amplifier

5. Three OPAMP INA. Vdd=1.8V Vss=0V, CAD tool: Mentor Graphics DA. Note: Adjust accuracy options of the simulator (setup->options in GUI). Use proper values of resistors to get a three OPAMP INA with differential-mode voltage gain=10. Consider voltage gain=2 for the first stage and voltage gain=5 for the second stage.
    a. Draw the schematic of op-amp macro model.
    b. Draw the schematic of INA.
    c. Obtain parameters of the op-amp macro model such that
        i. Low-frequency voltage gain = 5x104,
        ii. Unity gain BW (fu) = 500KHz,
        iii. Input capacitance=0.2pF,
        iv. Output resistance =_,
        v. CMRR=120dB
    d. Draw schematic diagram of CMRR simulation setup.
    e. Simulate CMRR of INA using AC analysis (it's expected to be around 6dB below CMRR of OPAMP).
    f. Plot CMRR of the INA versus resistor mismatches (for resistors of second stage only) changing from -5% to +5% (use AC analysis). Generate a separate plot for mismatch in each resistor pair. Explain how CMRR of OPAMP changes with resistor mismatches.
    g. Repeat (iii) to (vi) by considering CMRR of all OPAMPs to be 90dB.

6. 6) Technology: UMC 0.18um, VDD=1.8V. Use MAGIC or Microwind.
    a. Draw layout of a minimum size inverter in UMC 0.18um technology using MAGIC Station layout editor. Use that inverter as a cell and lay out three cascaded minimum-sized inverters. Use M1 as interconnect line between inverters.
    b. Run DRC, LVS and RC extraction. Make sure there is no DRC error. Extract the netlist.
    c. Use extracted netlist and obtain tPHLtPLH for the middle inverter using Eldo.
    d. Use interconnect length obtained and connect the second and third inverter. Extract the new netlist and obtain tPHL and tPLH of the middle inverter. Compare new values of delay times with corresponding values obtained in part ‘c’.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. DECS I YEAR II SEM **VCE-R18**

ADVANCED DIGITAL SIGNAL PROCESSING LAB

Course Code: **B4408**

L	**P**	**C**
0	**3**	**2**

LIST OF EXPERIMENTS:

1. Basic Signal Representation
2. Correlation Auto and Cross
3. Stability Using Hurwitz Routh Criteria
4. Sampling FFT Of Input Sequence
5. Butterworth Lowpass and Highpass Filter Design
6. Chebychev Type I,II Filter
7. State Space Matrix from Differential Equation
8. Normal Equation Using Levinson Durbin
9. Decimation and Interpolation Using Rationale Factors
10. Maximally Decimated Analysis DFT Filter
11. Cascade Digital IIR Filter Realization
12. Convolution and M Fold Decimation &PSD Estimator
13. Estimation of PSD
14. Inverse Z Transform
15. Group Delay Calculation
    a. Seperation of T/F
    b. Parallel Realization of IIR filter

SYLLABI FOR
II YEAR I SEMESTER

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. DECS II YEAR I SEM **VCE-R18**

ARTIFICIAL INTELLIGENCE
(PROGRAM ELECTIVE – V)

Course Code: **B4463**

L	P	C
3	0	3

SYLLABUS

UNIT-I:

What is AI (Artificial Intelligence)?: The AI Problems, The Underlying Assumption, What are AI Techniques, The Level Of The Model, Criteria For Success, Some General References, One Final Word Problems.

State Space Search & Heuristic Search Techniques: Defining The Problems As A State Space Search, Production Systems, Production Characteristics, Production System Characteristics, Generate- And-Test, Hill Climbing, Best-First Search, Problem Reduction, Constraint Satisfaction, Means- Ends Analysis.

UNIT-II:

Knowledge Representation Issues: Representations and Mappings, Approaches To Knowledge Representation. Using Predicate Logic: Representation Simple Facts In Logic, Representing Instance And Isa Relationships, Knowledge Using Rules: Procedural Versus Declarative Knowledge, Logic Programming, Forward Versus Backward Reasoning.

Symbolic Reasoning Under Uncertainty: Introduction to No monotonic Reasoning, Logics For Non-monotonic Reasoning. Statistical Reasoning: Probability and Bays' Theorem, Certainty Factors And Rule-Base Systems, Bayesian Networks, Dempster Shafer Theory.

UNIT-III:

Fuzzy Logic. Weak Slot-and-Filler Structures: Semantic Nets, Frames. Strong Slot-and-Filler Structures: Conceptual Dependency, Scripts, CYC

UNIT-IV:

Game Playing: Overview, And Example Domain: Overview, Mini Max, Alpha-Beta Cut-off, Refinements, Iterative deepening, The Blocks World, Components of A Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques.

Understanding: What is understanding? What makes it hard? As constraint satisfaction.

UNIT-V:

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing, Spell Checking Connectionist Models: Introduction: Hopfield Network, Learning In Neural Network, Application Of Neural Networks, Recurrent Networks, Distributed Representations, Connectionist AI And Symbolic AI.

Text books

1. Elaine Rich and Kevin Knight "Artificial Intelligence", 2nd Edition, Tata McGraw-Hill, 2005.
2. Stuart Russel and Peter Norvig, "Artificial Intelligence: A Modern Approach", 3rd Edition, Prentice Hall, 2009.

Reference

1. Patrick Henry Winston (2001), Artificial Intelligence, 3rd edition, Pearson Education Private Limited, India.
2. P. H. Winston, Artificial Intelligence, Third Edition, Pearson Education.
3. G.F. Luger, Artificial Intelligence, Fourth Edition, Pearson Education.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. DECS II YEAR I SEMESTER **VCE-R18**

PATTERN RECOGNITION AND MACHINE LEARNING

(PROGRAM ELECTIVE – V)

Course Code: **B4464**

L	**P**	**C**
3	**0**	**3**

SYLLABUS

Unit-I:

Mathematical Foundations: Linear Algebra, Lagrange optimization, Probability Theory, Gaussian Derivatives and Integrals, Computational Complexity.

Unit-II:

Introduction to Pattern recognition and Bayesian Decision theory: Machine perception, An example, Pattern recognition systems, The Design Cycle, Learning and Adaptation, Introduction to Bayesian decision theory, Bayesian decision theory-continuous features, Minimum error rate classification, Classifiers, Discriminant Functions and decision surfaces, the normal density, discriminant functions for the normal density, error probabilities and integrals, Error bounds and normal densities, Bayesian decision theory – discrete features, missing and noisy features, Bayesian belief networks, Compound Bayesian decision theory and context.

UNIT-III:

Maximum-likelihood and Bayesian parameter estimation: Introduction, maximum likelihood estimation, Bayesian estimation, Bayesian parameter estimation: Gaussian case, Bayesian parameter estimation – general theory, sufficient statistics, problems of dimensionality, component analysis and discriminants, Expectation – maximization, Hidden Markov Models (HMM).

UNIT-IV:

Linear Modelling - A least squares approach: Linear Modelling, Making predictions, vector/matrix notation, non-linear response from a linear model, generalization and overfitting, regularised least squares

UNIT-V:

Clustering, principal component analysis: The general problem, K-means clustering, Mixture models, principal component analysis: the general problem, principal component analysis.

References:

1. Richard O. Duda, Peter E. Hart, David G. Stork, “Pattern Classification”, 2nd Edition John Wiley & Sons, 2001.
2. Trevor Hastie, Robert Tibshirani, Jerome H. Friedman, “The Elements of Statistical Learning”, 2nd Edition, Springer, 2009.
3. C. Bishop, “Pattern Recognition and Machine Learning”, Springer, 2006.
4. Simon Rogers, Mark Girolami, “A First Course in Machine Learning”, Chapman & Hall CRC, 2012

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. TECH. DECS II YEAR I SEM **VCE-R18**

COMMUNICATION NETWORK
(PROGRAM ELECTIVE – V)

Course Code: **B4465**

L	P	C
3	0	3

SYLLABUS

UNIT-I:

Introduction to communication networks: Evolution of Network Architecture and services, Performance, Future Network Architectures, key factors Connecting nodes: Connecting links, Encoding, framing, Reliable transmission.

UNIT-II:

Overview: Ethernet and Multiple access networks, Wireless networks Queuing models: For a) one or more servers b) with infinite and finite queue size c) Infinite population

UNIT-III:

Internetworking: Switching and bridging, IPv4, Addressing, Routing Protocols, Scale issues, Routers - Architecture, IPv6.

End-to-End Protocols: Services, Multiplexing, De-multiplexing, UDP, TCP, RPC, RTP.

UNIT-IV:

congestion control and Resource Allocation: Issues, Queuing disciplines, TCP congestion control, Congestion Avoidance

QOS Applications: Domain Name Resolution, File Transfer, Electronic Mail, WWW.

UNIT-V:

Multimedia Applications, Network monitoring – Packet sniffing tools such as Wireshark Simulations using NS2/OPNET.

Text Books:

1. Larry L. Peterson, Bruce S, Devie, “Computer Networks” , MK, 5th Edition
2. Vijay Ahuja, “Communications Network Design and Analysis of Computer Communication Networks”, MGH, International Editions
3. Indra Widjaja “ Communication networks”,TMH.2nd Edition

References:

2. Aaron Kershenbaum, “Telecommunication Network Design Algorithms”, MGH, International Edition 1993.
3. Douglas E. Comer, “Internetworking with TCP/IP”, Pearson Education, 6th Edition
4. Nadar F.Mir, “ Computer and Communication Networks”,Pearson Education,2007.

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS II Year I SEM **VCE-R18**

BUSINESS ANALYTICS

(Open Elective)

Course Code: B4901

L	P	C
3	0	3

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

DECISION ANALYSIS: Formulating Decision Problems, Decision Strategies with the without Outcome Probabilities, Decision Trees, The Value of Information, Utility and Decision Making.

TEXT BOOKS

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS II Year I SEM **VCE-R18**

INDUSTRIAL SAFETY

(Open Elective)

Course Code: B4902

L	P	C
3	0	3

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS II Year I SEM **VCE-R18**

OPERATIONS RESEARCH

(Open Elective)

Course Code: B4903

L	P	C
3	0	3

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS II Year I SEM **VCE-R18**

WASTE TO ENERGY

(Open Elective)

Course Code: B4904

L	P	C
3	0	3

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS I YEAR I / II SEM **VCE-R18**

ENGLISH FOR RESEARCH PAPERS WRITING

(AUDIT COURSE)

Course Code: B4911

L	P	C
2	0	0

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS I YEAR I / II SEM **VCE-R18**

DISASTER MANAGEMENT

(AUDIT COURSE)

Course Code: B4912

L	P	C
2	0	0

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS I YEAR I / II SEM **VCE-R18**

SANSKRIT FOR TECHNICAL KNOWLEDGE

(AUDIT COURSE)

Course Code: B4913

L	P	C
2	0	0

SYLLABUS

UNIT - I

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

UNIT - II

Order Introduction of roots Technical information about Sanskrit Literature

UNIT - III

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS I YEAR I / II SEM **VCE-R18**

VALUE EDUCATION

(AUDIT COURSE)

Course Code: B4914

L	P	C
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SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Free from anger, Dignity of labour. Universal brotherhood and religious tolerance.

UNIT - IV

True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature.

UNIT - V

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

TEXT BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS I YEAR I / II SEM **VCE-R18**

CONSTITUTION OF INDIA

(AUDIT COURSE)

Course Code: B4915

L	P	C
2	0	0

SYLLABUS

UNIT - I

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

UNIT - II

PHILOSOPHY OF THE INDIAN CONSTITUTION: Preamble, Salient Features

UNIT - III

CONTOURS OF CONSTITUTIONAL RIGHTS & DUTIES: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy Fundamental Duties.

UNIT - IV

ORGANS OF GOVERNANCE: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

UNIT - V

LOCAL ADMINISTRATION: District's Administration head, Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayatiraj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.

TEXT BOOKS:

1. The Constitution of India, 1950 (Bare Act), Government Publication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.

REFERENCE BOOKS

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS I YEAR I / II Sem. **VCE-R18**

PEDAGOGY STUDIES

(AUDIT COURSE)

Course Code: B4916

L	P	C
2	0	0

SYLLABUS

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT - IV

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

UNIT - V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS I YEAR I / II Sem. **VCE-R18**

STRESS MANAGEMENT BY YOGA

(AUDIT COURSE)

Course Code: B4917

L	P	C
2	0	0

SYLLABUS

UNIT - I

Definitions of Eight parts of yoga. (Ashtanga)

UNIT - II

Yam and Niyam.

Do`s and Don'ts in life.

i) Ahimsa, satya, astheya, bramhacharya and aparigraha, ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan

UNIT - III

Asan and Pranayam

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

REFERENCE BOOKS:

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

VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. DECS I YEAR I / II Sem. **VCE-R18**

PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

(AUDIT COURSE)

Course Code: B4918	**L**	**P**	**C**
	2	**0**	**0**

SYLLABUS

UNIT - I

NEETISATAKAM-HOLISTIC DEVELOPMENT OF PERSONALITY: Verses- 19,20,21,22 (wisdom), Verses- 29, 31, 32 (pride & heroism),Verses- 26,28,63,65 (virtue), Verses- 52,53,59 (dont's),Verses- 71,73,75,78 (do's).

UNIT - II

APPROACH TO DAY TO DAY WORK AND DUTIES: Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47, 48, Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17,23, 35,Chapter 18-Verses 45, 46, 48.

UNIT - III

STATEMENTS OF BASIC KNOWLEDGE: Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68, Chapter 12 -Verses 13, 14, 15, 16,17, 18, Personality of Role model. Shrimad Bhagwad Geeta: Chapter2-Verses 17, Chapter 3-Verses 36, 37, 42, Chapter 4-Verses 18, 38,39 , Chapter18 – Verses 37,38,63.

REFERENCE BOOKS:

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