VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

(Permanently Affiliated to JNTUH, Approved by AICTE, New Delhi and Accredited by NBA)

Shamshabad – 501 218, Hyderabad

MASTER OF TECHNOLOGY
POWER ELECTRONICS AND ELECTRIC DRIVES

ACADEMIC REGULATIONS, COURSE STRUCTURE AND SYLLABI FOR M.TECH - POWER ELECTRONICS AND ELECTRIC DRIVES UNDER AUTONOMOUS STATUS FOR THE BATCHES ADMITTED FROM THE ACADEMIC YEAR 2011 - 12

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

PRELIMINARY DEFINITIONS AND NOMENCLATURES

- "Autonomous Institute / College" means an institute / college designated as autonomous institute / college by the Jawaharlal Nehru Technological University, Hyderabad (JNTUH), as per the JNTUH Autonomous College Statutes, 2011.
- "Academic Autonomy" means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.
- "Commission" means University Grants Commission.
- "AICTE" means All India Council for Technical Education.
- "University" the Jawaharlal Nehru Technological University, Hyderabad.
- "College" means Vardhaman College of Engineering, Hyderabad unless indicated otherwise by the context.
- "Program" means:
  Bachelor of Technology (B.Tech) degree program
  UG Degree Program: B.Tech
  PG degree Program: M.Tech
- "Branch" means specialization in a program like M.Tech degree program in Power Electronics and Electrical Drives.
- "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, ABS11T01: Mathematics - I, ACS11T02: Data Structures through C, etc.
- T – Tutorial, P – Practical, D – Drawing, L - Theory, C - Credits

FOREWORD

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

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

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

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

PRINCIPAL

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

(Permanent Affiliation with JNTUH, Approved by AICTE, New Delhi and Accredited by NBA)

ACADEMIC REGULATIONS

M.Tech. Regular Two Year Post-Graduate Programme

(For the batches admitted from the academic year 2011–12)

For pursuing Two year degree program of study in Master of Technology (M.Tech.) offered by Vardhaman College of Engineering under Autonomous status and herein after referred to as VCE:

1. APPLICABILITY

All the rules specified herein, approved by the Academic Council, will be in force and applicable to students admitted from the academic year 2011-2012 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	Intake
1	Computer Science and Engineering	36
2	Software Engineering	18
3	Digital Electronics and Communication Systems	36
4	Wireless and Mobile Communications	18
5	Power Electronics and Electrical Drives	18

4. ADMISSION

Admission into first year of Two Year M.Tech Program shall be made subject to the eligibility, qualifications and specialization as per the guidelines prescribed by the APSCHE and AICTE from time to time.

5. DURATION OF THE PROGRAMS

5.1 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.

5.2 Maximum Duration

5.2.1 The maximum period within which a student must complete a full-time academic program is 4 years for M.Tech. If a student fails to complete the academic program within the maximum duration as specified above, he / she will be required to withdraw from the program.

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

6. 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 23 weeks duration and this period includes time for course work, examination preparation, and conduct of examinations. Each semester shall have a minimum of 90 working days. The academic calendar is shown in Table 1 is declared at the start of the semester. The duration for each semester shall be a minimum of 17 weeks of instruction.

Table 1: Academic Calendar

FIRST SEMESTER (23 weeks)	I Spell Instruction Period	: 9 weeks	19 weeks
	I Mid Examinations	: 1 week	
	II Spell Instruction Period	: 8 weeks	
	II Mid Examinations	: 1 Week	
	Preparation & Practical Examinations		2 weeks
	External Examinations		2 weeks
Semester Break			2 weeks
SECOND SEMESTER (23 weeks)	I Spell Instruction Period	: 9 weeks	19 weeks
	I Mid Examinations	: 1 week	
	II Spell Instruction Period	: 8 weeks	
	II Mid Examinations	: 1 Week	
	Preparation & Practical Examinations		2 weeks
	External Examinations		2 weeks
Summer Vacation			4 weeks
THIRD SEMESTER	Project Work Phase – I		18 Weeks
FOURTH SEMESTER	Project Work Phase – II		18 Weeks

7. CREDIT BASED SYSTEM

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

7.1. The duration of each semester will normally be 23 weeks with 5 days a week. A working day shall have 6 periods each of 60 minutes duration.

- 1 credit per lecture period per week
- 2 credits for three (or more) period hours of practicals
- 2 credits for technical seminar
- 4 credits for comprehensive viva examination
- 18 credits for project work phase – I
- 22 credits for project work phase – II

7.2. The two year curriculum of any M.Tech programme of study shall have total of 88 credits. The exact requirements of credits for each course will be as recommended by the Board of Studies concerned and approved by the Academic Council.

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

8. METHOD OF EVALUATION

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

8.1 Theory

For all lecture based theory courses, the evaluation shall be for 40 marks through internal evaluation and 60 marks through external end semester examination of three hours duration.

8.1.1. Internal evaluation

For theory subjects, during the semester there shall be 2 midterm examinations. Each midterm examination consists of subjective test. The subjective test is for 40 marks, with duration of 2 hours. The Mid-Term Examination question paper shall be set with **six** questions out of which **four** are to be answered. All questions carry equal marks.

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

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

8.1.2. External Evaluation

The question paper shall be set externally and valued both internally and externally. The external end semester examination question paper in theory subjects will be for a maximum of 60 marks to be answered in three hours duration. For End-Semester examination, the candidate has to answer any five out of eight questions. Each question carries 12 marks. Each theory course shall consist of eight units of syllabus.

8.2. Practicals

Practicals shall be evaluated for 100 marks, out of which 60 marks are for external examination and 40 marks are for internal evaluation. The 40 internal marks are distributed as 25 marks for day-to-day work and 15 marks for internal examination. The external end - examination shall be conducted by the teacher concerned and an external examiner from outside the college.

8.3. Technical Seminar

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

8.4. **Comprehensive Viva**

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

8.5. **Project Work**

The project work shall be evaluated for 200 marks out of which 50 marks for phase – I internal evaluation, 50 marks for phase – II internal evaluation and 100 marks for end semester evaluation. A minimum of 50% of marks on the aggregate in the internal evaluation and external end-evaluation taken together shall be obtained to earn the corresponding credits.

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

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

Student shall register for the Project work with the approval of Departmental Committee in the III Semester and continue the work in the IV Semester too. The Departmental Committee (DC) shall monitor the progress of the project work. In III Semester, Phase – I of the Project Work is to be completed. A Student has to identify the topic of work, collect relevant Literature, preliminary data, implementation tools / methodologies etc., and perform a critical study and analysis of the problem identified. He shall submit status report in two different phases in addition to oral presentation before the Departmental Committee for evaluation and award of 50 internal marks at the end of Phase – I.

A candidate shall continue the Project Work in IV Semester (Phase – II) and submit a Project report at the end of Phase – II after approval of the Departmental Committee. During Phase – II, the student shall submit status report in two different phases, in addition to oral presentation before the DC. The DC shall evaluate the project for 50 internal marks based on the progress, presentations and quality of work.

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

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

The department shall submit a panel of three experts for a maximum of 5 students at a time. However, the examiners for conducting viva-voce examination shall be nominated by the Controller of Examinations, VCE. If the report of the examiner is favorable, viva-voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the examiner who adjudicated the dissertation. The board shall jointly evaluate the project work for 100 marks. The candidates who fail in viva-voce examinations shall have to re-appear the viva-voce examination after three months. If he fails again in the second viva-voce examination, the candidate has to re-register for the Project Work.

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

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

9.1. 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.

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

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

9.4. 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.

9.5. 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.

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

9.7. 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 AP norms in vogue.

10. 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 technical seminar and comprehensive viva a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each of them if he/she 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/she 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 88 credits and earn all the 88 credits. Marks obtained in all the 88 credits shall be considered for the award of the class based on aggregate of marks.

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

viii. 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.

11. EVALUATION

Following procedure governs the evaluation.

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

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

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

12. 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.

13. RE-REGISTRATION FOR IMPROVEMENT OF INTERNAL

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

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

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

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

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

14. PERSONAL VERIFICATION

Students shall be permitted for personal verification of the semester-end examination answer scripts within a stipulated period after payment of prescribed fee.

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 upto 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 fulfills all the following conditions:

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

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

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

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

v. No disciplinary action is pending against him.

17.2. Award of Class

Declaration of Class is based on percentage of marks to be secured.

After a student has satisfied the requirement prescribed for the completion of the programme and is eligible for the award of M.Tech. Degree he shall be placed in one of the following four classes Shown in Table 4:

Table 4: Declaration of Class is based on percentage of marks to be secured

Class Awarded	% of marks to be secured	
First Class with Distinction	70% and above	From the aggregate marks secured for the 88 Credits.
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Fail	Below 50%	

Sometimes, 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 Second Class,* as in Table 5.

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

Grade Point	Percentage of Marks / Class
5.75	50 (Second Class)
6.25	55
6.75	60 *(First Class)*
7.25	65
7.75	70 *(First Class with Distinction)*
8.25	75

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

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

20.2. 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 J N T University, Hyderabad 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.

27.5. 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.

VARDHAMAN COLLEGE OF ENGINEERING
(Autonomous)

SYLLABUS
M. TECH - POWER ELECTRONICS AND ELECTRIC DRIVES

REGULATIONS: VCE--R11

I SEMESTER

Code	Subject	Periods per Week		Credits	Scheme of Examination Maximum Marks		
		L	P		Internal	External	Total
B1301	Power Semiconductor Devices	3	-	3	40	60	100
B1302	Principles of Machine Modeling Analysis	3	-	3	40	60	100
B1303	Power Electronic Converters-I	3	-	3	40	60	100
B1304	Power Electronic Control of DC Drives	3	-	3	40	60	100
PROFESSIONAL ELECTIVE - I		3	-	3	40	60	100
PROFESSIONAL ELECTIVE - II		3	-	3	40	60	100
B1311	Power Converters Lab	-	3	2	40	60	100
B1312	Technical Seminar	-	-	2	50	-	50
TOTAL		**18**	**03**	**22**	**330**	**420**	**750**

II SEMESTER

Code	Subject	Periods per week		Credits	Scheme of Examination Maximum Marks		
		L	P		Internal	External	Total
B1313	Power Electronic Converters-II	3	-	3	40	60	100
B1314	Power Electronic Control of AC Drives	3	-	3	40	60	100
B1315	Flexible AC Transmission Systems	3	-	3	40	60	100
B1316	Modern Control Engineering	3	-	3	40	60	100
PROFESSIONAL ELECTIVE - III		3	-	3	40	60	100
PROFESSIONAL ELECTIVE - IV		3	-	3	40	60	100
B1323	Power Electronics Simulation Lab	-	3	2	40	60	100
B1324	Technical Seminar	-	-	2	50	-	50
TOTAL		**18**	**03**	**22**	**330**	**420**	**750**

III SEMESTER

Code	Subject	Periods per week		Credits	Scheme of Examination Maximum Marks		
		L	P		Internal	External	Total
B1325	Comprehensive Viva	-	-	4	-	50	50
B1326	Project Work Phase – I	-	-	18	50	-	50
TOTAL		**-**	**-**	**22**	**50**	**50**	**100**

IV SEMESTER

Code	Subject	Periods per week		Credits	Scheme of Examination Maximum Marks		
		L	P		Internal	External	Total
B1327	Project Work Phase – II	-	-	22	50	100	150
TOTAL		**-**	**-**	**22**	**50**	**100**	**150**

VARDHAMAN COLLEGE OF ENGINEERING
(Autonomous)

SYLLABUS

M. TECH - POWER ELECTRONICS AND ELECTRIC DRIVES

REGULATIONS: VCE--R11

ELECTIVES			
PROFESSIONAL ELECTIVE - I		**PROFESSIONAL ELECTIVE – II**	
Code	**Subject**	**Code**	**Subject**
B1305	Advanced Micro Processor and Micro Controllers	B1308	Evolutionary Computation
B1306	Optimization Techniques	B1309	Energy Conversion Systems
B1307	Distribution Automation	B1310	Advanced Digital Signal Processing
PROFESSIONAL ELECTIVE - III		**PROFESSIONAL ELECTIVE – IV**	
Code	**Subject**	**Code**	**Subject**
B1317	Reliability Engineering	B1320	Programmable Logic Controllers and Applications
B1318	Power Quality	B1321	Reactive Power Compensation and Management
B1319	Embedded Systems	B1322	Optimal Control

VARDHAMAN COLLEGE OF ENGINEERING

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I SEMESTER

POWER SEMICONDUCTOR DEVICES

Course Code: **B1301**

L	P	C
3	-	3

UNIT - I

OVERVIEW OF POWER SWITCHING DEVICES: Introduction to power switching devices, classification of devices, controlled and un-controlled devices, I-V characteristics of ideal and real switching devices.

UNIT - II

POWER DIODES: Device structure and I-V characteristics, SPICE model, ratings and specifications, switching characteristics, reverse recovery, classification of various diodes: Schotky diode, line frequency diodes, fast recovery diodes.

UNIT - III

POWER TRANSISTORS: Device structure and I-V characteristics, SPICE model, ratings and specifications, switching characteristics, on to off and off to on state transitions, on/off transition loss analysis, driver circuit.

UNIT - IV

POWER MOSFETS: Device structure and I-V characteristics, ratings and specifications, switching characteristics, on to off and off to on state transitions, on/off transition loss analysis, driver circuit.

UNIT - V

IGBT: Device structure and I-V characteristics, ratings and specifications, switching characteristics, on to off and off to on state transitions, on/off transition loss analysis. Comparison of all the above devices with reference to power handling capability, frequency of operation, driver circuit, emerging power switching devices.

UNIT - VI

THYRISTOR: Device structure and I-V characteristics, ratings and specifications, switching characteristics, SPICE model, device protection against over voltage/currents, DI/DT and DV/DT, safe operating area, design of snubbers for power devices.

UNIT - VII

THERMAL MANAGEMENT: Conduction and transition losses computation, thermal model of the device, steady state temperature rise, electrical equivalent circuit of thermal model, sizing of the heat sink.

UNIT - VIII

PASSIVE COMPONENTS: Magnetic circuit, review of design of line frequency inductors and transformers, design of high frequency inductors and transformers.

TEXT BOOKS:

1. B. W. Williams (1992), *Power Electronics: Devices Drivers and Applications, and Passive components*, 2nd Edition, Tata Mac Graw Hill, New Delhi.

REFERENCE BOOKS:

1. M. H. Rashid (2003), *Power Electronics Circuits, Devices and Applications*, Prentice Hall of India, New Delhi.
2. Mohan, Undeland (1989), *Power Electronics –Converters, Applications and Design,* John Wiley & Sons, India.
3. L. Umanand (2009), *Power Electronics: Essentials and Applications,* 1st edition, Wiley India publishers, India.

VARDHAMAN COLLEGE OF ENGINEERING

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I SEMESTER

PRINCIPLES OF MACHINE MODELING ANALYSIS

Course Code: **B1302**

L	P	C
3	-	3

UNIT - I

BASIC MACHINE THEORY: Magnetically coupled circuits, rotating field theory, operation of Induction motor, equivalent circuit, steady state equations of D.C machines, operation of synchronous motor, power angle characteristics.

UNIT - II

BASIC TWO POLE MACHINE: Two pole machine diagram of various machines, primitive two-axis machine, voltage and current relationship, torque equation.

UNIT - III

MODELING AND ANALYSIS OF DC MACHINES: Mathematical model of separately excited D.C motor, steady state analysis, transient state analysis, sudden application of Inertia load transfer function of separately excited D.C motor, mathematical model of D.C series motor, shunt motor, linearization techniques for small perturbations.

UNIT - IV

TRANSFORMATIONS: Linear transformation, phase transformation (a, b, c to α, β, 0), active transformation (α, β, 0 to d, q).

UNIT - V

REFERENCE FRAME THEORY: Voltage and current equations in stator, rotor reference frame and equation in synchronously rotating frame, torque equation, equations in state space form.

UNIT - VI

MODELING OF THREE PHASE INDUCTION MACHINES: Two axis model, voltage and torque equations in machine variables, voltage and torque equations in arbitrary reference frame, steady state analysis and its operation.

UNIT - VII

DYNAMIC ANALYSIS OF THREE-PHASE INDUCTION MACHINE: Induction machine dynamics during starting and braking, accelerating time, induction machine dynamics during normal operation, equation for dynamical response of the induction motor.

UNIT - VIII

MODELING OF SYNCHRONOUS MACHINE: Two axis representation, voltage and current equation in state space variable forms-torque equation.

TEXT BOOKS:

1. P. S. Bimbra (1995), *Generalized Theory of Electrical Machines*, 5th edition, Khanna publications, New Delhi.
2. D. P. Sengupta, J. B. Lynn (1980), *Electrical Machine Dynamics*, The Macmillan Press, USA.

REFERENCE BOOKS:

1. Vedam Subramanyam (1988), *Thyristor control of Electric Drives,* 2nd Edition, Tata McGraw Hill, New Delhi.
2. P. C. Krause (1980), *Analysis of Electrical Machinery*,2nd Edition, McGraw Hill, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

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I SEMESTER

POWER ELECTRONIC CONVERTERS - I

Course Code: **B1303**

L	P	C
3	-	3

UNIT - I

AC VOLTAGE CONTROLLERS: Single phase AC voltage controllers with resistive, resistive inductive and resistive inductive induced EMF loads, AC voltage controllers with PWM Control, effects of source and load inductances, synchronous tap changers, applications, numerical problems.

UNIT - II

THREE PHASE AC VOLTAGE CONTROLLERS: Analysis of controllers with star and delta connected resistive, resistive inductive loads, effects of source and load Inductances, applications, numerical problems.

UNIT - III

CYCLO CONVERTERS: Single phase to single phase cycloconverters, analysis of midpoint and bridge configurations, three phase to three phase cycloconverters, analysis of midpoint and bridge configurations, limitations, advantages, applications, numerical problems, matrix converter.

UNIT - IV

SINGLE PHASE CONVERTERS: Single phase converters, half controlled and fully controlled converters, evaluation of input power factor and harmonic factor, continuous and discontinuous load current, single phase dual converters, power factor improvements, extinction angle control, symmetrical angle control, PWM, single phase sinusoidal PWM, single phase series converters, applications, numerical problems.

UNIT - V

THREE PHASE CONVERTERS : Half controlled and fully controlled converters, evaluation of input power factor and harmonic factor, continuous and discontinuous load current, three phase dual converters, power factor Improvements, three phase PWM, twelve pulse converters, applications, numerical problems.

UNIT - VI

DC TO DC CONVERTERS: Analysis of step down and step up DC to DC converters with resistive and resistive inductive loads, switched mode regulators, analysis of buck regulators, boost regulators, buck and boost regulators, Cuk regulators, condition for continuous inductor current and capacitor voltage, comparison of regulators, multi output boost converters, advantages, applications, numerical problems.

UNIT - VII

PULSE WIDTH MODULATED INVERTERS (SINGLE PHASE): Principle of operation, performance parameters, single phase bridge inverter, evaluation of output voltage and current with resistive, inductive and capacitive loads, voltage control of single phase inverters, single PWM, multiple PWM, sinusoidal PWM, modified PWM, phase displacement control, advanced modulation techniques for improved performance, trapezoidal, staircase, stepped, harmonic injection and delta modulation, advantage, application, numerical problems.

UNIT - VIII

PULSE WIDTH MODULATED INVERTERS (THREE PHASE): Three phase inverters, analysis of 180 degree condition for output voltage and current with resistive, inductive loads, analysis of 120 degree conduction, voltage control of three phase inverters, sinusoidal PWM, third harmonic PWM, 60 degree PWM, space vector modulation, comparison of PWM techniques, harmonic reductions, current source inverter, variable D.C. link inverter, boost inverter, buck and boost inverter, inverter circuit design, advantages, applications, numerical problems.

TEXT BOOKS:

1. Mohammed H. Rashid (2004), *Power Electronics- circuits, devices, and applications*, 3rd Edition, Prentice Hall of India, New Delhi.
2. Ned Mohan, Tore M. Undeland, William P. Robbins (2003), *Power Electronics- converters, applications, and design*, 2nd Edition, John Wiley & Sons, USA.

REFERENCE BOOKS:

1. Milliman Shepherd, Lizang (2004), *Power converters circuits,* 2nd Edition, CRC Press, USA.
2. M. H. Rashid (2001), *Power electronics hand book*, 3rd Edition, John Wiley & Sons, New York.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

I SEMESTER

POWER ELECTRONIC CONTROL OF DC DRIVES

Course Code: **B1304**

L	P	C
3	-	3

UNIT - I

CONTROLLED BRIDGE RECTIFIER (1-Φ) WITH DC MOTOR LOAD: Separately exited DC motors with rectified single phase supply, single phase semi converter and single phase full converter for continuous and discontinuous modes of operation, power and power factor.

UNIT - II

CONTROLLED BRIDGE RECTIFIER (3-Φ) WITH DC MOTOR LOAD: Three phase semi converter and three phase full converter for continuous and discontinuous modes of operation, power and power factor, addition of free wheeling diode, three phase double converter.

UNIT - III

THREE PHASE NATURALLY COMMUTATED BRIDGE CIRCUIT AS A RECTIFIER OR AS AN INVERTER: Three phase controlled bridge rectifier with passive load impedance, resistive load and ideal supply, highly inductive load and ideal supply for load side and supply side quantities, shunt capacitor compensation, three phase controlled bridge rectifier inverter.

UNIT - IV

PHASE CONTROLLED DC MOTOR DRIVES: Three phase controlled converter, control circuit, control modeling of three phase converter, steady state analysis of three phase converter control DC motor drive, two quadrant, three phase converter controlled DC motor dive, DC motor and load converter.

UNIT - V

CURRENT AND SPEED CONTROLLED DC MOTOR DRIVES: Current and speed controllers, current and speed feedback, design of controllers, current and speed controllers, motor equations, filter in the speed feed back loop speed controller, current reference generator, current controller and flow chart for simulation, harmonics and associated problems, sixth harmonics torque.

UNIT - VI

CHOPPER CONTROLLED DC MOTOR DRIVES: Principles of operation of the chopper, four quadrant chopper circuit, chopper for inversion, chopper with other power devices, model of the chopper, input to the chopper steady state analysis of chopper controlled DC motor drives, rating of the devices, pulsating torque.

UNIT - VII

CLOSED LOOP OPERATION OF DC MOTOR DRIVES: Speed controlled drive system, current control loop, pulse width modulated current controller, hysterisis current controller, modeling of current controller, design of current controller.

UNIT - VIII

SIMULATION OF DC MOTOR DRIVES: Dynamic simulations of the speed controlled DC motor drives, speed feedback speed controller, command current generator, current controller.

TEXT BOOKS:

1. Shepherd, Hulley, Liang (2000), *Power Electronic and motor control*, 2nd Edition, Cambridge University Press, UK.
2. R. Krishnan (2005), *Electric Motor drives modeling, Analysis and control,* 1st Edition, Prentice Hall of India, New Delhi, India.

REFERENCE BOOKS:

1. M. H. Rashid (1995), *Power Electronic circuits, Drives and Applications,* 1st Edition, Prentice Hall of India, New Delhi, India.
2. G. K. Dubey (1995), *Fundamentals of Electric Drives*, 1st Edition, Narosa Publications, New Delhi, India.
3. S. B. Dewan, A. Straughen (1984), *Power Semiconductor drives,* 1st Edition*,* Wiley & sons, USA.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

I SEMESTER

ADVANCED MICROPROCESSORS AND MICROCONTROLLERS

(Professional Elective - I)

Course Code: **B1305**

L	P	C
3	-	3

UNIT - I

INTEL 8086: Architecture, its register organization, pin diagram, minimum and maximum mode system and timings, machine language instruction formats, addressing modes, instruction set, assembler directives.

UNIT - II

HARDWARE DESCRIPTION: Pin diagram, minimum and maximum mode and bus timings, ready and wait states and 8086 based micro-computing system.

UNIT - III

ALP AND SPECIAL FEATURES: ALP, programming with an assembler, stack structure, interrupts, service subroutines and interrupt programming and macros.

UNIT - IV

ADVANCED PROCESSORS: Architectural features of 80386, 486 and Pentium processors their memory management, introduction to Pentium pro processors their features, RISC vs. CISC processors.

UNIT - V

BASIC PERIPHERALS AND THEIR INTERFACING: Memory interfacing (DRAM), PPI-modes of operation of 8255, interfacing to ADC and DAC.

UNIT - VI

SPECIAL PURPOSE OF PROGRAMMABLE PERIPHERAL DEVICES AND THEIR INTERFACING: Programmable timer-8253, PIC 8259A, display controller, programmable communication interface 8251- USART and their interfacing.

UNIT - VII

MICROCONTROLLERS: Introduction to Intel 8-bit and 16-bit microcontrollers, 8051 architecture, memory organization, addressing modes.

UNIT - VIII

HARDWARE DESCRIPTION OF 8051: Instruction formats, instruction sets, interrupt structure and interrupt priorities, port structures and operation linear counter functions, different modes of operation and programming examples.

TEXT BOOKS:

1. Barry B. Brey (2009), *The Intel Microprocessors, Architecture, Programming and interfacing*, 8th edition, Prentice Hall Higher education, USA.
2. Muhammad Ali Mazidi, Janice Gillis pie, Mazidi (2007), *The 8051 Microcontroller and Embedded systems,* Pearson Education , New Delhi, India.

REFERENCE BOOKS:

1. Kenrith J. Ayala (1995), *8086 Microprocessor*, 3rd Edition, Thomson publishers, New Delhi.
2. Kenrith J. Ayala 1993(), *Microcontrollers,* 3rd Edition, Thomson publishers, New Delhi
3. Douglas V. Hall(1991), *Microprocessor and Interfacing Programming and Hardware*, Greg Community College Division Publisher, India.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

I SEMESTER

OPTIMIZATION TECHNIQUES
(Professional Elective - I)

Course Code: **B1306**

L	P	C
3	-	3

UNIT - I
INTRODUCTION AND CLASSICAL OPTIMIZATION TECHNIQUES: Statement of an optimization problem, design vector, design constraints, constraint surface, objective function, objective function surfaces, classification of optimization problems.

UNIT - II
CLASSICAL OPTIMIZATION TECHNIQUES: Single variable optimization, multi variable optimization without constraints, necessary and sufficient conditions for minimum/maximum, multivariable optimization with equality constraints. Solution by method of Lagrange multipliers, multivariable optimization with inequality constraints, Kuhn – tucker conditions.

UNIT - III
LINEAR PROGRAMMING: Standard form of a linear programming problem, geometry of linear programming problems, definitions and theorems, solution of a system of linear simultaneous equations, pivotal reduction of a general system of equations, motivation to the simplex method, simplex algorithm.

UNIT - IV
TRANSPORTATION PROBLEM: Finding initial basic feasible solution by north - west corner rule, least cost method and Vogel's approximation method, testing for optimality of balanced transportation problems.

UNIT - V
UNCONSTRAINED NONLINEAR PROGRAMMING: One dimensional minimization methods, classification, Fibonacci method and quadratic interpolation method.

U**NIT - VI**
UNCONSTRAINED OPTIMIZATION TECHNIQUES: Univariate method, Powell's method and steepest descent method.

UNIT - VII
CONSTRAINED NONLINEAR PROGRAMMING: Characteristics of a constrained problem, classification, basic approach of penalty function method, basic approach of penalty function method, basic approaches of interior and exterior penalty function methods. Introduction to convex programming problem.

UNIT - VIII
DYNAMIC PROGRAMMING: Dynamic programming multistage decision processes, types, concept of sub optimization and the principle of optimality, computational procedure in dynamic programming, examples illustrating the calculus method of solution, examples illustrating the tabular method of solution.

TEXT BOOKS:

1. S. S. Rao (1998), *Engineering optimization*, 3rd edition, New Age International (P) Limited, New Delhi.
2. H. S. Kasene, K. D. Kumar (2004), *Introductory Operations Research,* Springer Private limited, India.

REFERENCE BOOKS:

1. K. V. Mital, C. Mohan(1996), *Optimization Methods in Operations Research and systems Analysis*, 3rd Edition, New Age International (P) Limited, New Delhi.
2. Dr. S. D. Sharma, H. A. Taha (1997), *Operations Research,* 6th Edition*,* Prentice Hall of India, New Delhi.
3. G. Hadley (1964), *Linear Programming,* 1st Edition, SIAM Publications, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

I SEMESTER

DISTRIBUTION AUTOMATION
(Professional Elective - I)

Course Code: **B1307**

L	P	C
3	-	3

UNIT - I

DISTRIBUTION AUTOMATION AND THE UTILITY SYSTEM: Introduction to distribution automation (DA), control system interfaces, control and data requirements, centralized vs. decentralized control, DA system (DAS), DA hardware, DAS software.

UNIT - II

DISTRIBUTION AUTOMATION FUNCTIONS: DA capabilities, automation system computer facilities, management processes, information management, system reliability management, system efficiency management, voltage management, load management.

UNIT- III

COMMUNICATION SYSTEMS FOR DA: DA communication requirements, communication reliability, cost effectiveness, data rate requirements, two way capability, ability to communicate during outages and faults, ease of operation and maintenance, conforming to the architecture of data flow.

UNIT - IV

COMMUNICATION SYSTEMS USED IN DA: Distribution line carrier (power line carrier), ripple control, zero crossing technique, telephone, cable TV, radio, AM broadcast, FM SCA, VHF radio, UHF radio, microwave satellite. Fiber optics, hybrid communication systems, communication systems used in field tests.

UNIT - V

TECHNICAL BENEFITS: DA benefit categories, capital deferred savings, operation and maintenance savings, interruption related savings, customer related savings, operational savings, improved operation, function benefits, potential benefits for functions, and function shared benefits, guidelines for formulation of estimating equations.

UNIT - VI

Parameters required, economic impact areas, resources for determining benefits impact on distribution system, integration of benefits into economic evaluation.

UNIT - VII

ECONOMIC EVALUATION METHODS: Development and evaluation of alternate plans, select study area, select study period, project load growth, develop alternatives, calculate operating and maintenance costs, evaluate alternatives.

UNIT - VIII

Economic comparison of alternate plans, classification of expenses and capital expenditures, comparison of revenue requirements of alternative plans, book life and continuing plant analysis, year by year revenue requirement analysis, short term analysis, end of study adjustment, break even analysis, sensitivity analysis computational aids.

TEXT BOOKS:

1. R. P. Gupta (2006), *Electric Power Distribution Automation,* 2nd Edition, Narosa Publication, India.
2. James A. Momoh (2004), *Electric Power Distribution, Automation, Protection, and Control,* 3rd Edition, CRC Press, India.

REFERENCE BOOKS:

1. James N. Green, Robert G. Wilson (2005), *Control and Automation of Electrical Power Distribution Systems*, 3rd edition, CRC Press, India.
2. Dr M. K. Khedkar, Dr G. M. Dhole (2004), *A Textbook of Electric Power Distribution Automation*, 2nd edition, Laxmi Publishier, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

I SEMESTER

EVOLUTIONARY COMPUTATION
(Professional Elective - II)

Course Code: **B1308**

L	P	C
3	-	3

UNIT - I

INTRODUCTION TO ANN: Introduction, humans and computers, organization of brain, biological neuron, artificial neuron model, Mc-Culloh Pitts model, types of activation functions, ANN architectures.

UNIT - II

ESSENTIALS OF ANN: Learning strategy, learning rules, activation dynamics, synaptic dynamics, Rosenblatt's perceptron model ,perceptron learning algorithm, adaline and madaline, back propagation.

UNIT - III

ASSOCIATIVE MEMORIES: Concept of associative memory, bidirectional associative memory, BAM training algorithm, BAM energy function. Hopfield network architecture, self organizing networks, adaptive resonance theory (ART), hamming networks, MAX networks.

UNIT - IV

INTRODUCTION TO GENETIC ALGORITHM: Genetic algorithms, history, biological background, working principle, mathematical foundations.

UNIT - V

COMPUTER IMPLEMENTATION OF GENETIC ALGORITHM: Reproduction, cross over and mutation, fitness scaling, coding, discretization, applications of GA

UNIT - VI

FUZZY LOGIC SYSTEMS: Introduction to crisp and fuzzy sets, fuzzy set properties and operations, fuzzy relations, membership functions and cardinalities.

UNIT - VII

FUZZY LOGICS AND APPLICATIONS: Geometry of fuzzy sets, fuzzy theorems-fuzzy entropy theorem, subset hood theorem, measure of fuzziness, index of fuzziness, defuzzification of crisp sets, defuzzification methods.

UNIT - VIII

PARTICLE SWARM OPTIMIZATION: Concept of particle swarm optimization, PSO modeling, PSO parameter control, comparison between PSO and GA, comparison between PSO and ANN.

TEXT BOOKS:

1. Rajasekharan, Rai (2004), *Neural Networks, Fuzzy Logic and* Genetic Algorithm, Prentice Hall of India, New Delhi, India
2. S. N. Sivanandam, S. Sumathi, S. N. Deepa (2006), *Introduction to Neural Networks using MATLAB,* Tata Mc graw Hill, New Delhi.

REFERENCE BOOKS:

1. James A. Freeman, Davis S. Kapura (2002), *Neural networks,* 2nd Edition, Pearson Education, India.
2. Simon Halkins (1998), *Neural Networks and Learning Machines,* 2nd Edition, Prentice Hall of India, New Delhi.
3. C .Eliasmith, CH. Anderson (2003), *Neural Engineering*, Prentice Hall of India, New Delhi.
4. Bark Kosko (1992), *Neural Networks and Fuzzy Logic System*, Prentice Hall of India, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

I SEMESTER

ENERGY CONVERSION SYSTEMS
(Professional Elective - II)

Course Code: **B1309**

L	P	C
3	-	3

UNIT - I

PHOTO VOLTAIC POWER GENERATION: Spectral distribution of energy in solar radiation, solar cell configurations, voltage developed by solar cell, photo current and load current, practical solar cell performance, commercial photo voltaic systems, test specifications for PV systems, applications of super conducting materials in electrical equipment systems.

UNIT - II

PRINCIPLES OF MHD POWER GENERATION: Ideal MHD generator performance, practical MHD generator, MHD technology.

UNIT - III

WIND ENERGY CONVERSION: Power from wind, properties of air and wind, types of wind turbines, operating characteristics.

UNIT - IV

TIDES AND TIDAL POWER STATIONS: Modes of operation, tidal project examples, turbines and generators for tidal power generation.

UNIT - V

WAVE ENERGY CONVERSION: Properties of waves and power content, vertex motion of waves, device applications. Types of ocean thermal energy conversion systems application of OTEC systems examples.

UNIT - VI

MISCELLANEOUS ENERGY CONVERSION SYSTEMS: Coal gasification and liquefaction, biomass conversion, geothermal energy, thermo electric energy conversion.

UNIT - VII

PRINCIPLES OF EMF GENERATION: Description of fuel cells, co-generation and energy storage, combined cycle co-generation, energy storage. Global energy position and environmental effects, energy units, global energy position.

UNIT - VIII

TYPES OF FUEL CELLS: H_2O_2 fuel cells, application of fuel cells, batteries, description of batteries, battery application for large power. Environmental effects of energy conversion systems, pollution from coal and preventive measures steam stations and pollution, pollution free energy systems.

TEXT BOOKS:

1. Rakosh das Begamudre (2000), *Energy conversion systems*, 1st edition, New age international publishers, New Delhi.

REFERENCE BOOKS:

1. Godfrey Boyle (2004), *Renewable Energy*, 2nd Edition, Oxford University Press Inc, New York.
2. John Twidell, Tony Weir (2005), *Renewable Energy Resources*, 2nd edition, Taylor and Francis group, New York, USA.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

I SEMESTER

ADVANCED DIGITAL SIGNAL PROCESSING
(Professional Elective - II)

Course Code: **B1310**

L	P	C
3	-	3

UNIT - I

INTRODUCTION: Analog to digital and digital to analog conversion, sampled and hold circuit, continuous time Fourier transforms.

UNIT - II

DISCRETE TIME SIGNALS AND SYSTEMS: Discrete time Fourier transform, its properties and applications, fast Fourier transform (in time domain and frequency domain), IDFT and its properties.

UNIT - III

Z -TRANSFORM: Definition and properties, rational z -transforms, region of convergence of a rational z -transform, the inverse z -transform, z -transform properties, computation of the convolution sum of finite length sequences, the transfer function.

UNIT - IV

DIGITAL FILTER STRUCTURES: Block diagram representation, equivalent structures, basic FIR digital filter structures, basic IIR digital filter structures, realization of basic structures using MATLAB, all pass filters, computational complexity of digital filter structures.

UNIT - V

IIR DIGITAL FILTER DESIGN: Preliminary considerations, bilinear transformation method of IIR filter design, design of low pass IIR digital filters, design of high pass, band pass and band stop IIR digital filters, spectral transformations of IIR filter, IIR digital filter design using MATLAB, computer aided design of IIR digital filters.

UNIT - VI

FIR DIGITAL FILTER DESIGN: Preliminary considerations, FIR filter design based on windowed Fourier series, computer aided design of Equiripple linear phase FIR filters, design of minimum phase FIR filters, FIR digital filter design using MATLAB, design of computationally efficient FIR digital filters.

UNIT - VII

ANALYSIS OF FINITE WORD LENGTH EFFECTS: The quantization process and errors, quantization of fixed point numbers, quantization of floating point numbers, analysis of coefficient quantization effects, analysis of arithmetic round off errors, low sensitivity digital filters, reduction of product round off errors using error feedback, round off errors in FFT algorithms.

UNIT - VIII

DEVICES: The basic sample rate alteration devices, multi rate structures for sampling rate conversion, multistage design of decimator and interpolator, the polyphase decomposition, arbitrary rate sampling rate converter, nyquist filters and some applications of digital signal processing.

TEXT BOOKS:

1. S. K. Mitra (2006)*, Digital Signal Processing*, 3rd Edition, Tata McGraw Hill, New Delhi.
2. B. P. Lathi (2009), *Principle of Signal Processing and Linear Systems*, 2nd Edition, Oxford International Student Version, New York.

REFERENCE BOOKS:

1. Li Tan (2008), *Digital Signal Processing- Fundamentals and Applications*, 2nd Edition, Elsevier Publication, New Delhi, India.
2. Alan V. Oppen heim, Ronald W. Schafer, John R. Buck (2008), *Discrete Time Signal Processing,* 2nd Edition, Pearson Education, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

I SEMESTER

POWER CONVERTERS LAB

Course Code: **B1311**

L	P	C
-	3	2

LIST OF EXPERIMENTS:

1. Speed measurement and closed loop control using PMDC motor.
2. Thyristorised drive for PMDC motor with speed measurement and closed loop control.
3. IGBT used single 4 quadrant chopper drive for PMDC motor with speed measurement and closed loop control.
4. Thyristorised drive for 1Hp DC motor with closed loop control.
5. 3 Phase input, Thyristorised drive, 3 Hp DC motor with closed loop.
6. 3 Phase input IGBT, 4 quadrant chopper drive for DC motor with closed loop control equipment.
7. Cycloconverter based AC Induction motor control equipment.
8. Speed control of 3 phase wound rotor Induction motor.
9. Single phase fully controlled converter with inductive load
10. Single phase half wave controlled converter with inductive load.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

II SEMESTER

POWER ELECTRONIC CONVERTERS - II

Course Code: **B1313**

L	P	C
3	-	3

UNIT - I

MODERN POWER SEMICONDUCTOR DEVICES: Modern power semiconductor devices, MOS turn off thyristor (MTO), Emitter turn off thyristor(ETO), Integrated gate commutated thyristor(IGCTs), MOS controlled thyristors(MCTs), Static induction thyristors(SITHs), Power integrated circuits(PICs), symbol, structure and equivalent circuit, comparison of their features.

UNIT - II

RESONANT PULSE INVERTERS: Resonant pulse inverters, series resonant inverters, series resonant inverters with unidirectional switches, series resonant inverters with bidirectional switches, analysis of half bridge resonant inverter, evaluation of currents and voltages of a simple resonant inverter, analysis of half bridge and full bridge resonant inverter with bidirectional switches.

UNIT - III

FREQUENCY RESPONSE: Series resonant inverters, for series loaded inverter, for parallel loaded inverter, for series and parallel loaded inverters, parallel resonant inverters, voltage control of resonant inverters, class E resonant inverter, class E resonant rectifier, evaluation of values of *C*'s and *L's* for class E inverter and class E rectifier, numerical problems.

UNIT - IV

RESONANT CONVERTERS: Resonant converters, zero current switching resonant converters, L type ZCS resonant converter, M type ZCS resonant converter, zero voltage switching resonant converters, comparison between ZCS and ZVS resonant converters, two quadrant ZVS resonant converters, resonant DC link inverters, evaluation of L and C for a zero current switching inverter, numerical problems.

UNIT - V

MULTILEVEL INVERTERS: Multilevel concept, classification of multilevel inverters, diode clamped multilevel inverter, principle of operation, main features, improved diode clamped inverter, principle of operation, flying capacitors multilevel inverter principle of operation, main features, cascaded multilevel inverter principle of operation, main features.

UNIT - VI

MULTILEVEL INVERTER APPLICATIONS: Reactive power compensation, back to back intertie system, adjustable drives, switching device currents, DC link capacitor voltage balancing, features of multilevel inverters, comparisons of multilevel converters.

UNIT - VII

D.C AND A.C POWER SUPPLIES: DC power supplies, classification, switched mode DC power supplies, fly back converter, forward converter, push pull converter, half bridge converter, full bridge converter, resonant DC power supplies, bidirectional power supplies, applications.

UNIT - VIII

AC POWER SUPPLIES: Classification, switched mode AC power supplies, resonant AC power supplies, bidirectional AC power supplies, multistage conversions, control circuits, applications. Introduction to power line disturbances, power conditioners, uninterruptible power supplies, applications.

TEXT BOOKS:

1. Mohammed H. Rashid (2004), *Power Electronics*, 3rd edition, Pearson Education, India.
2. Ned Mohan, Tore M. Undeland, William P. Robbins (2002), *Power Electronics,* 3rd edition*,* John Wiley & Sons, New York.

REFERENCE BOOKS:

1. Robert W. Erickson, Dragan Maksimovic(2000),*Fundamentals of Power Electronics*, 2nd edition, Kluwer Academic Publisher, USA.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

II SEMESTER

POWER ELECTRONIC CONTROL OF AC DRIVES

Course Code: **B1314**

L	P	C
3	-	3

UNIT - I

INTRODUCTION TO AC DRIVES: Introduction to motor drives, torque production, equivalent circuit analysis, speed torque characteristics with variable voltage operation, variable frequency operation, constant V/F operation, induction motor characteristics in constant torque and field weakening regions.

UNIT - II

CONTROL OF INDUCTION MOTOR DRIVES AT STATOR SIDE: Scalar control, voltage fed inverter control, open loop volts/Hz control, speed control slip regulation, speed control with torque and flux control, current controlled voltage fed inverter drive, current fed inverter control, independent current and frequency control, speed and flux control in current fed inverter drive volts/hertz control, current fed inverter drive efficiency optimization control by flux program.

UNIT - III

CONTROL OF INDUCTION MOTOR AT ROTOR SIDE: Slip power recovery drives, tatic Kramer drive phasor diagram, torque expression, speed control of Kramer drive, static scheribus drive, modes of operation.

UNIT - IV

VECTOR CONTROL OF INDUCTION MOTOR DRIVES: Principles of vector control, vector control methods, direct method of vector control, adaptive control principles, self tuning regulator model referencing control.

UNIT - V

CONTROL OF SYNCHRONOUS MOTOR DRIVES: Synchronous motor and its characteristics, control strategies, constant torque angle control, unity power factor control, constant mutual flux linkage control.

UNIT - VI

CONTROLLERS: Flux weakening operation, maximum speed, direct flux weakening algorithm, constant torque mode controller, flux weakening controller, indirect flux weakening, maximum permissible torque speed control scheme, implementation strategy, speed controller design.

UNIT - VII

VARIABLE RELUCTANCE MOTOR DRIVE: Variable reluctance motor drives, torque production in the variable reluctance motor, drive characteristics and control principles, current control variable reluctance servo drive.

UNIT - VIII

BRUSHLESS DC MOTOR DRIVES: Three phase full wave brushless DC motor, sinusoidal type of brushless DC motor, current controlled brushless DC servo drives.

TEXT BOOKS:

1. R. Krishnan (2002), *Electric Motor Drives analysis and control*, 1st edition, Prentice Hall of India, New Delhi.
2. B. K. Bose (2001), *Modern Power Electronics and AC Drives,* 1st edition, Pearson Education, New Delhi.

REFERENCE BOOKS:

1. M. H Rashid (1995), *Power Electronics Circuits, Devices and Application*s, Prentice Hall of India, New Delhi.
2. G. K. Dubey (1995), *Fundamentals of Electric Drives*, Narosa Publications, New Delhi.
3. M. D. Murphy (1988), *Power Electronic Control of AC motors,* 1st edition, FG Turn Bull Pergman Press, India.
4. B. K. Bose (2001), *Power Electronics and AC drives*, 1st Edition, Prentice Hall Publication, New Jersey.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

II SEMESTER

FLEXIBLE AC TRANSMISSION SYSTEMS

Course Code: **B1315**

L	P	C
3	-	3

UNIT - I

FACTS CONCEPTS: Transmission interconnections power flow in an AC system, loading capability limits, dynamic stability considerations, importance of controllable parameters basic types of FACTS controllers, benefits from FACTS controllers.

UNIT - II

VOLTAGE SOURCE CONVERTERS: Single phase three phase full wave bridge converters transformer connections for 12 pulse 24 and 48 pulse operation.

UNIT - III

THREE LEVEL VOLTAGE SOURCE CONVERTERS: Pulse width modulation converter, basic concept of current source converters, comparison of current source converters with voltage source converters.

UNIT - IV

STATIC SHUNT COMPENSATION: Objectives of shunt compensation, mid point voltage regulation voltage instability prevention, improvement of transient stability.

UNIT - V

POWER OSCILLATION DAMPING: Methods of controllable var generation, variable impedance type static var generators, switching converter type var generators, hybrid var generators.

UNIT - VI

SVC: The regulation and slope transfer function and dynamic performance, transient stability enhancement and power oscillation damping operating point control and summary of compensator control.

UNIT - VII

STATCOM: The regulation and slope transfer function and dynamic performance, transient stability enhancement and power oscillation damping operating point control and summary of compensator control.

UNIT - VIII

STATIC SERIES COMPENSATORS: Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements. GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC) control schemes for GSC TSSC and TCSC.

TEXT BOOKS:

1. N. G. Hingorani, L. Guygi (2000), *Understanding FACTS Devices*, 1st edition, Wiley -IEEE Press, USA.

REFERENCE BOOKS:

1. Xiao ping Zhang (2000), *Flexible Ac Transmission Systems,* 1st edition, The Institution of Engineering and Technology (IET), UK.
2. K. R. Padiyar (2007), *FACTS: Controllers in Power Transmission and Distribution*, 1st edition, New Age International, India.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

II SEMESTER

MODERN CONTROL ENGINEERING

Course Code: **B1316**

L	P	C
3	-	3

UNIT - I

MATHEMATICAL PRELIMINARIES: Fields, vectors and vector spaces, linear combinations and bases, linear transformations and matrices, scalar product and norms, Eigen values, Eigen vectors and a canonical form representation of linear operators.

UNIT - II

SAMPLING AND RECONSTRUCTION: Sample and hold operations, sampling theorem, reconstruction of original sampled signal to continuous time signal. The z -transforms, properties of z -transforms and inverse z -transforms, modified z -transforms. Introduction, linear difference equations, pulse response, z -transforms, theorems of z -transforms, the inverse z -transforms. Pulse transforms function, block diagram analysis of sampled data systems.

UNIT - III

STATE SPACE ANALYSIS: The concept of state, obtaining state equations for continuous and discrete time dynamic systems, time invariance and linearity, non uniqueness of state model, state diagrams for continuous and discrete time state models. Discretization of continuous time state space equations.

UNIT - IV

EXISTENCE AND UNIQUENESS OF SOLUTIONS TO CONTINUOUS AND DISCRETE TIME STATE EQUATIONS: Solutions of linear time invariant continuous and discrete time state equations, state transition matrix and its properties.

UNIT - V

CONTROLLABILITY AND OBSERVABILITY: General concept of controllability, general concept of observability, controllability tests for continuous and discrete time invariant systems, observability tests for continuous and discrete time invariant systems, controllability and observability of state model in Jordan canonical form, controllability and observability canonical forms of state model. Controllability and observability conditions for pulse transfer function.

UNIT - VI

STABILITY ANALYSIS: Stability in the sense of lyapunov, lyapunov's stability and lypanov's instability theorems, stability analysis of the linear continuous time invariant systems by lyapunov second method, generation of lyapunov functions, variable gradient method, krasooviski's method.

UNIT - VII

STABILITY ANALYSIS OF CLOSED LOOP SYSTEMS: For z -plane, jury stability test, stability analysis by use of the bilinear transformation and routh stability criterion.

UNIT - VIII

STATE FEEDBACK CONTROLLERS AND OBSERVERS: State feedback controller design through pole assignment for continuous and discrete time systems. State observers, full order and reduced order for continuous and discrete time systems. Design digital control through deadbeat response method.

TEXT BOOKS:

1. M. Gopal (1993)**,** *Modern Control System Theory,* 2nd Edition, New Age International, New Delhi.

REFERENCE BOOKS:

1. Ogata. K (1994), *Modern Control Engineering*, 3rd Edition, Prentice Hall of India, New Delhi, India.
2. Ogata. K (1995), *Discrete time Control Systems*, 2nd Edition, Prentice Hall of India, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

II SEMESTER

RELIABILITY ENGINEERING
(Professional Elective - III)

Course Code: **B1317**

L	P	C
3	-	3

UNIT - I

ELEMENTS OF PROBABILITY THEORY PROBABILITY DISTRIBUTIONS: Random variables, density and distribution functions, mathematical expectation, binominal distribution, poisson distribution, normal distribution, exponential distribution, weibull distribution.

UNIT - II

DEFINITION OF RELIABILITY: Significance of the terms appearing in the definition. Component reliability, hazard rate, derivation of the reliability functions in terms of the hazard rate, hazard models.

UNIT - III

FAILURES: Causes of failures, types of failures (early failures, chance failures and wear-out failures). Modes of failure, bath tub curve, effect of preventive maintenance, measures of reliability, mean time to failure and mean time between failures.

UNIT - IV

RELIABILITY LOGIC DIAGRAMS (RELIABILITY BLOCK DIAGRAMS) CLASSIFICATION OF ENGINEERING SYSTEMS: Series, parallel, series parallel, parallel series and non series-parallel configurations. Expressions for the reliability of the basic configurations.

UNIT - V

RELIABILITY EVALUATION OF NON SERIES PARALLEL CONFIGURATIONS: Minimal tie set, minimal cut set and decomposition methods. Deduction of the minimal cut sets from the minimal path sets.

UNIT - VI

DISCRETE MARKOV CHAINS: General modeling concepts, stochastic transitional probability matrix, time dependent probability evaluation and limiting state probability evaluation, absorbing states.

UNIT - VII

CONTINUOUS MARKOV PROCESSES: Modeling concepts, state space diagrams, stochastic transitional probability matrix, evaluating limiting state probabilities. Reliability evaluation of repairable systems.

UNIT - VIII

SERIES SYSTEMS AND PARALLEL SYSTEMS: Series systems and parallel systems with two and more than two components, network reduction techniques. Minimal cut set/failure mode approach.

TEXT BOOKS:

1. Roy Billinton, Ronald N. Allan (1992), *Reliability Evaluation of Engineering Systems*, 2nd Edition, Plenum Press, New York.
2. Hoang Pham (2003*), Handbook of reliability engineering*, 1st Edition, Springer Verlag, New York.

REFERENCE BOOKS:

1. Roy Billinton, Wenyuan Li(1994), *Reliability assessment of electric power systems using Monte Carlo methods*, 1st Edition, Plenum Publishing Corporation, USA.
2. Ajit Kumar Verma, Srividya Ajit, Durga Rao Karanki (2010), *Reliability and Safety Engineering*, 1st Edition, Spinger Publication, New York.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

II SEMESTER

POWER QUALITY

(Professional Elective - III)

Course Code: **B1318**

L	P	C
3	-	3

UNIT - I

INTRODUCTION: Introduction of the power quality (PQ) problem, terms used in PQ, sags, swells, surges, harmonics, interruptions, assessing PQ, remedies, customer side of meter, utility side of the meter.

UNIT - II

POWER QUALITY DATA: Data collection, data analysis, database structure, creating PQ databases, processing PQ data.

UNIT - III

VOLTAGE SAG ANALYSIS: Voltage sag characteristics, methodology for computation of voltage sag magnitude and occurrence, accuracy of sag analysis, duration and frequency of sags, effect of transformer connections, effect of pre fault voltage, simple examples, voltage dip problems, fast assessment methods for voltage sags in distribution systems.

UNIT - IV

PQ CONSIDERATIONS IN INDUSTRIAL POWER SYSTEMS: Adjustable speed drive (ASD) systems and applications, sources of power system harmonics, mitigation of harmonics. Characterization of voltage sags experienced by three phase.

UNIT - V

ASD SYSTEMS: Types of sags and phase angle jumps, effects of momentary voltage dips on the operation of induction and synchronous motors, voltage sag coordination for reliable plant operation.

UNIT - VI

EFFECTS OF HARMONICS ON POWER QUALITY: Harmonic analysis of industrial customers, technical barriers in ASDs. Methods of evaluation of harmonic levels in industrial distribution systems, harmonic effects on transformers, impact of distribution system capacitor banks on PQ. Guidelines for limiting voltage harmonics.

UNIT - VII

POWER QUALITY AND FACTORY AUTOMATION: General plant description, monitoring strategy, equipment selection and testing, design philosophy of filters to reduce harmonic distortion, power conditioners, voltage flicker measurement and analysis system.

UNIT - VIII

POWER QUALITY STANDARDS AND GUIDELINES: Industry standards and general guidelines. Global quality standards: ISO 9000, framework for quality, rewards of quality with ISO 9000.

TEXT BOOKS:

1. C. Sankaran (2001), *Power Quality*, 1st edition, CRC Press, USA.
2. Surajit Chattopadhyay, Madhuchhanda Mitra, Samarjit Sengupta (2011), *Electrical Power Quality*, 1st Edition, Springer Verlag, New York.

REFERENCE BOOKS:

1. Angelo Baggini (2008), *Hand Book of Power Quality*, 1st Edition, John Wily & sons, New York.
2. R. Sastry Vedam, Mulukutla S. Sarma (2008), *Power Quality: VAR Compensation in Power Systems*, 1st Edition, CRC Press, USA.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

II SEMESTER

EMBEDDED SYSTEMS
(Professional Elective - III)

Course Code: **B1319**

L	P	C
3	-	3

UNIT - I

EMBEDDED COMPUTING: Introduction, complex systems and microprocessor, the embedded system design process, formalisms for system design, design examples.

UNIT - II

THE 8051 ARCHITECTURE: Introduction, 8051 micro controller hardware, input/output ports and circuits, external memory, counter and timers, serial data input/output, interrupts.

UNIT - III

BASIC ASSEMBLY LANGUAGE PROGRAMMING CONCEPTS: The assembly language programming process, programming tools and techniques, programming the 8051. Data transfer and logical instructions, arithmetic operations, decimal arithmetic, jump and call instructions, further details on interrupts.

UNIT - IV

APPLICATIONS: Interfacing with keyboards, displays, D/A and A/D conversions, multiple interrupts, serial data communication.

UNIT - V

INTRODUCTION TO REAL-TIME OPERATING SYSTEMS: Tasks and task states, tasks and data, semaphores, and shared data; message queues, mailboxes and pipes, timer functions, events, memory management, interrupt routines in an RTOS environment.

UNIT - VI

BASIC DESIGN USING A REAL-TIME OPERATING SYSTEM: Principles, semaphores and queues, hard real-time scheduling considerations, saving memory and power, an example RTOS like uC-OS (open source).

UNIT - VII

EMBEDDED SOFTWARE DEVELOPMENT TOOLS: Host and target machines, linker/locators for embedded software, getting embedded software into the target system

DEBUGGING TECHNIQUES: Testing on host machine, using laboratory tools, an example system.

UNIT - VIII

INTRODUCTION TO ADVANCED ARCHITECTURES: ARM and SHARC, processor and memory organization and instruction level parallelism; networked embedded systems: bus protocols, I^2C bus and CAN bus; internet-enabled systems, design example-elevator controller.

TEXT BOOKS:

1. Wayne Wolf (2008), *Computers as Components-principles of embedded computer system design*, 3rd Edition Elseveir, New Delhi, India.
2. Kenneth J. Ayala (2008), *The 8051 Microcontroller*, 3rd edition, Cengage Learning, India.

REFERENCE BOOKS:

1. David E. Simon (1999), *An Embedded Software Primer*, 2nd Edition, Pearson Education, India.
2. Jean J. Labrosse (2000), Embedding System Building Blocks, 2nd edition, CMP publishers, USA.
3. Raj Kamal (2004), *Embedded Systems*, 3rd Edition, Tata Mcgraw hill, India.
4. Ajay V. Deshmukh (2005), *Micro Controllers*, 3rd Edition, Tata Mcgraw hill, India.
5. Frank Vahid, Tony Givargis (2002), *Embedded System Design*, 2nd Edition, John Wiley, India.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

II SEMESTER

PROGRAMMABLE LOGIC CONTROLLERS AND APPLICATIONS

(Professional Elective - IV)

Course Code: **B1320**

L	P	C
3	-	3

UNIT - I

PLC BASICS: PLC system, I/O modules and interfacing, CPU processor, programming equipment, programming formats, construction of plc ladder diagrams, devices connected to I/O modules.

UNIT - II

PLC PROGRAMMING: Input instructions, outputs, operational procedures, programming examples using contacts and coils, drill press operation.

UNIT - III

DIGITAL LOGIC GATES: Programming in the boolean algebra system, conversion examples.

LADDER DIAGRAMS FOR PROCESS CONTROL: Ladder diagrams and sequence listings, ladder diagram constructions and flow charts for spray process system.

UNIT - IV

PLC REGISTERS: Characteristics of registers module addressing, holding registers, input registers, output registers.

UNIT - V

PLC FUNCTIONS: Timer functions and industrial applications, counters, counter function industrial applications, arithmetic functions, number comparison.

UNIT - VI

DATA HANDLING FUNCTIONS: SKIP, master control relay, jump, move, FIFO, FAL, ONS, CLR and SWEEP functions and their applications.

UNIT - VII

BIT PATTERN AND CHANGING A BIT SHIFT REGISTER: Sequence functions and applications, controlling of two axis and three axis robots with PLC, matrix functions.

UNIT - VIII

ANALOG PLC OPERATION: Analog modules and systems, analog signal processing, multi bit data processing, analog output application examples, PID principles, position indicator with PID control, PID modules, PID tuning, PID functions.

TEXT BOOKS:

1. Alan J. Crispin (1996), *Programmable Logic Control and their Engineering Applications*, 2nd Edition, Mc Graw Hills Companies, New Delhi.

REFERENCE BOOKS:

1. John W. Webb, Ronald A. Reiss (2005), *Programmable logic controllers Principle and applications*, 5th edition, Prentice Hall of India, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

II SEMESTER

REACTIVE POWER COMPENSATION AND MANAGEMENT

(Professional Elective - IV)

Course Code: **B1321**

L	P	C
3	-	3

UNIT - I

LOAD COMPENSATION: Objectives and specifications, reactive power characteristics, inductive and capacitive approximate biasing, load compensator as a voltage regulator, phase balancing and power factor correction of unsymmetrical loads examples.

UNIT - II

STEADY STATE REACTIVE POWER COMPENSATION IN TRANSMISSION SYSTEM: Uncompensated line, types of compensation, passive shunt and series and dynamic shunt compensation, examples.

UNIT - III

TRANSIENT STATE REACTIVE POWER COMPENSATION IN TRANSMISSION SYSTEMS: Characteristic time periods, passive shunt compensation, static compensations, series capacitor compensation, compensation using synchronous condensers, examples.

UNIT - IV

REACTIVE POWER COORDINATION: Objective mathematical modeling, operation planning, transmission benefits, basic concepts of quality of power supply, disturbances, steady state variations, effects of under voltages, frequency, harmonics, radio frequency and electromagnetic interferences.

UNIT - V

DEMAND SIDE MANAGEMENT: Load patterns, basic methods load shaping, power tariffs, KVAR based tariffs, penalties for voltage flickers and harmonic voltage levels.

UNIT - VI

DISTRIBUTION SIDE REACTIVE POWER MANAGEMENT: System losses, loss reduction methods, examples, reactive power planning, objectives, economics planning capacitor placement, retrofitting of capacitor banks.

UNIT - VII

USER SIDE REACTIVE POWER MANAGEMENT: KVAR requirements for domestic appliances, purpose of using capacitors, selection of capacitors, deciding factors, types of available capacitor, characteristics and limitations.

UNIT - VIII

REACTIVE POWER MANAGEMENT IN ELECTRIC TRACTION SYSTEMS AND ARC FURNACES: Typical layout of traction systems, reactive power control requirements, distribution transformers, electric arc furnaces, basic operations, furnaces transformer, filter requirements, remedial measures, power factor of an arc furnace.

TEXT BOOKS:

1. T. J .E .Miller (1982), *Reactive power control in Electric power systems*, 1st Edition, John Wiley & sons, New Delhi, India.

REFERENCE BOOKS:

1. D. M. Tagare (2004), *Reactive power Management,* Tata McGraw Hill, New Delhi.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

II SEMESTER

OPTIMAL CONTROL
(Professional Elective - IV)

Course Code: **B1322**

L	P	C
3	-	3

UNIT - I

AN OVERVIEW OF OPTIMIZATION PROBLEM: Concepts and terms related to optimization, constrained and unconstrained problems and their solutions using different techniques.

UNIT - II

CONVEX SET AND CONVEX FUNCTION: Convex optimization problem, quadratic optimization problem, Karush Kuhn tucker (KKT) necessary and sufficient conditions for quadratic programming problem.

UNIT - III

INTERIOR POINT METHOD FOR CONVEX OPTIMIZATION: Linear programming, primal and dual problems and basic concept of multi objective optimization problem.

UNIT - IV

CONCEPT OF FUNCTIONAL: Different types of performance indices, Euler Lagrange equation.

UNIT - V

CALCULUS OF VARIATION TO OPTIMAL CONTROL PROBLEM: Fundamental concepts, functional of a single function, functional involving several independent functions, necessary conditions for optimal control, linear regulator problems.

UNIT - VI

Linear quadratic regulator, remarks on weighting matrices, solution of Riccati equation.

UNIT - VII

FREQUENCY DOMAIN: Frequency domain interpretation of linear quadratic regulator, robustness studies.

UNIT - VIII

DYNAMIC PROGRAMMING: Pontrygin's minimum principle, time optimal control, concept of system and signal norms, statement of problem and its solution.

TEXT BOOKS:

1. Jasbir S. Arora (2011)*, Introduction to optimum design*, 3rd edition, Academic Press, Elesevier, USA.
2. A. Ravindran, K.M. Ragsdell, G. V. Reklaitis (2006)*, Engineering optimization: Methods and applications*, 2nd edition, Wiley student edition, New Delhi, India.
3. Donald E. Kirk (2004), *Optimal Control Theory an Introduction*, 1st Edition, Courier Dover Publications Prentice Hall Network series, New York, USA.

REFERENCE BOOKS:

1. D. S. Naidu (2002), *Optimal control systems*, CRC Press, USA.
2. Arturo Locatelli (2001), *Optimal control: An Introduction*, Birkhauser Verlag, USA.
3. S. H. Zak (2003), *Systems and Control*, Indian Edition, Oxford University, UK.
4. Niclas Anreasson, Anton Evgrafov, Michael Patriksson (2006), *An introduction to continuous optimization*, Overseas Press (India) Private Limited, New Delhi, India.

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

II SEMESTER

POWER ELECTRONICS SIMULATION LAB

Course Code: **B1323**

L	P	C
-	3	2

LIST OF EXPERIMENTS:

1. Write program and simulate dynamical system of following models:
   a. I/O Model
   b. State variable model

   Also identify time domain specifications of each.
2. Obtain frequency response of a given system by using various methods:
   a. General method of finding the frequency domain specifications.
   b. Polar plot
   c. Bode plot

   Also obtain the Gain margin and Phase margin.
3. Determine stability of a given dynamical system using following methods.
   a. Root locus
   b. Bode plot
   c. Nyquist plot
   d. Liapunov stability criteria
4. MATLAB Simulation of Single phase full converter using RL&E loads.
5. MATLAB Simulation of Single phase Semi converter using RL&E loads.
6. MATLAB Simulation of Three phase full converter using RL&E loads.
7. MATLAB Simulation of Three phase Semi converter using RL&E loads.
8. Simulink model of Induction Motor Drive.
9. Simulink model of D.C Motor Drive.
10. PSPICE Simulation of Single phase AC Voltage controller using RL load.
11. PSPICE Simulation of Three phase inverter with PWM controller.
12. PSPICE Simulation of resonant pulse commutation circuit.
13. PSPICE Simulation of impulse commutation circuit.
14. Simulation of Torque- Speed Characteristics of Induction Motor with and with out variable resistance using PSPICE.
15. Simulation of D.C separately excited motor with variable loads torques using PSPICE.

M. Tech. PEED I / II SEMESTER

TECHNICAL SEMINAR

L	T	P	C
-	-	-	2

1. OBJECTIVE:

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

2. **PERIODICITY / FREQUENCY OF EVALUATION: Twice**

3. PARAMETERS OF EVALUATION:

1. The seminar shall have two components, one chosen by the student from the course-work without repetition and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work.
2. The two components of the seminar are distributed between two halves of the semester and are evaluated for 50 marks each. The average of the two components shall be taken as the final score.
3. The students shall be required to submit the rough drafts of the seminar outputs within one week of the commencement of the class work.
4. Supervisor shall make suggestions for modification in the rough draft. The final draft shall be presented by the student within a week thereafter.
5. Presentation schedules will be prepared by different Departments in line with the academic calendar.

The Seminars shall be evaluated in two stages as follows:

A. Rough draft

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

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

1.	Topic, name of the student & guide	1 Slide
2.	List of contents	1 Slide
3.	Introduction	1 - 2 Slides
4.	Descriptions of the topic (point-wise)	7 - 10 Slides
5.	Images, circuits etc.	6 - 8 Slides
6.	Conclusion	1 - 2 Slides
7.	References/Bibliography	1 Slide

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

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

1.	Punctuality in submission of rough draft and discussion	2 Marks
2.	Resources from which the seminar have been based	2 Marks
3.	Report	3 Marks
4.	Lay out, and content of Presentation	3 Marks
5.	Depth of the students knowledge in the subject	5 Marks
Total		15 Marks

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

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

B. Presentation:

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

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

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

1.	Contents	10 Marks
2.	Delivery	10 Marks
3.	Relevance and interest the topic creates	5 Marks
4.	Ability to involve the spectators	5 Marks
5.	Question answer session	5 Marks
Total		35 Marks

4. WHO WILL EVALUATE?

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

M. Tech. PEED III SEMESTER

COMPREHENSIVE VIVA

Course Code: **B1325**

L	T	P	C
-	-	-	4

1. OBJECTIVE:

- To enable the examiners to assess the candidate's knowledge in his or her particular field of learning.
- To test the student's awareness of the latest developments and relate them to the knowledge acquired during the classroom teaching.

2. PARAMETERS OF EVALUATION:

Subject Knowledge	Current Awareness	Career Orientation	Communication Skills	Total
20	10	10	10	50

3. WHO WILL EVALUATE?

The comprehensive Viva will be conducted by a committee comprising Head of the Department or his/her nominee, two senior faculty of the respective department and an external examiner from outside the college. The comprehensive viva shall be evaluated for 50 marks at the end of III semester. A minimum of 40% of maximum marks shall be obtained to earn the corresponding credits.

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

5. PEDAGOGY:

- The viva will be held on a face to face basis.
- The students will be expected to answer the questions related to latest developments and all courses taken till date.
- Viva voce will be conducted within week before the beginning of midterm examinations. However, in exceptional circumstances it can be scheduled immediately after the end of midterm examinations.
- Students will have to make themselves available on the date of the viva voce.

M. Tech. PEED III/ IV SEMESTER

PROJECT WORK

1. OBJECTIVE:

The main objective of the Project Work is for the students to learn and experience all the major phases and processes involved in solving "real life engineering problems".

2. EXPECTED OUTCOME:

The major outcome of the M. Tech project must be well-trained students. More specifically students must have acquired:

- System integration skills
- Documentation skills
- Project management skills
- Problem solving skills

3. PROJECT SELECTION:

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

All M. Tech major projects are to be done in the Institute. For industry specified projects, students will be permitted to spend 1-2 weeks in the industry on recommendation by the supervisor. The number of students per batch should be 1.

4. WHO WILL EVALUATE?

The end semester examination shall be based on the report submitted and a viva-voce exam for 100 marks by committee comprising of the Head of the Department, project supervisor and an external examiner.

5. EVALUATION:

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

The project work shall be evaluated for 150 marks out of which 50 marks for internal evaluation and 100 marks for end-semester evaluation. The evaluation shall be done on the following basis

Semester III	**Semester IV**
Preliminary Evaluation - 50 marks	Design Evaluation I - 25 marks
	Design Evaluation II - 25 marks
	Final Evaluation – 100 marks

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

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

1.2. The total number of reports to be prepared are:

- One copy to the department

- One copy to the concerned guide(s)
- One copy to the candidate.

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

1.4. For making copies dry tone Xerox is suggested.

1.5. Every copy of the report must contain

- Inner title page (White)
- Outer title page with a plastic cover
- Certificate in the format enclosed both from the college and the organization where the project is carried out.
- An abstract (synopsis) not exceeding 100 words, indicating salient features of the work.

6.6. The organization of the report should be as follows:

1.	Inner title page	Usually numbered in roman
2.	Abstract or Synopsis	
3.	Acknowledgments	
4.	Table of Contents	
5.	List of table & figures (optional)	

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

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

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

1. For textbooks - A.V. Oppenheim and R.W. Schafer, Digital Signal Processing, Englewood, N.J., Prentice Hall, 3 Edition, 1975.
2. For papers - Devid, Insulation design to combat pollution problem, Proc of IEEE, PAS, Vol 71, Aug 1981, pp 1901-1907.

6.9. Only SI units are to be used in the report. Important equations must be numbered in decimal form for e.g. **V = IZ** ..... **(3.2)**

6.10. All equation numbers should be right justified.

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

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

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

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

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

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

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

VARDHAMAN COLLEGE OF ENGINEERING

(Autonomous)

Shamshabad – 501 218, Hyderabad

Department of ……..

CERTIFICATE

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

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

External Viva

Name of the examiners Signature with date

1.

2.

Certificate issued at the Organization where the project was carried out

(On a separate sheet, If applicable)

NAME OF THE INDUSTRY / ORGANIZATION, Address with pin code

CERTIFICATE

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

Name & Signature of the Guide **Name & Signature of the Head of Organization**

7. **DISTRIBUTION OF MARKS FOR M.TECH DISSERTATION EVALUATION**

S No.	Particulars	Max. Marks
1	Relevance of the subject in the present context	**10**
2	Literature Survey	**10**
3	Problem formulation	**10**
4	Experimental observation / theoretical modeling	**10**
5	Results – Presentation & Discussion	**20**
6	Conclusions and scope for future work	**10**
7	Overall presentation of the Thesis / Oral presentation	**20**
8	Project Report Writing	**10**
Total Marks		**100**

MALPRACTICES RULES
DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS

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

	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.	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 candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all University examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
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 candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the colleges expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the College will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of 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.	

Frequently asked Questions and Answers about autonomy

1. Who grants Autonomy? UGC, Govt., AICTE or University

In case of Colleges affiliated to a university and where statutes for grant of autonomy are ready, it is the respective University that finally grants autonomy.

2. Shall VCE award its own Degrees?

No. Degree will be awarded by Jawaharlal Nehru Technological University, Hyderabad with a mention of the name Vardhaman College of Engineering on the Degree Certificate.

3. What is the difference between a Deemed University and an Autonomy College?

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

4. How will the Foreign Universities or other stake – holders know that we are an Autonomous College?

Autonomous status, once declared, shall be accepted by all the stake holders. Foreign Universities and Indian Industries will know our status through our college website.

5. What is the change of Status for Students and Teachers if we become Autonomous?

An autonomous college carries a prestigious image. Autonomy is actually earned out of continued past efforts on academic performances, capability of self:governance and the kind of quality education we offer.

6. Who will check whether the academic standard is maintained / improved after Autonomy? How will it be checked?

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

7. Will the students of VCE as an Autonomous College qualify for University Medals and Prizes for academic excellence?

No. VCE has instituted its own awards, medals, etc. for the academic performance of the students. However for all other events like sports, cultural and co:curricular organized by the University the students shall qualify.

8. Can VCE have its own Convocation?

No, since the University awards the Degree the Convocation will be that of the University.

9. Can VCE give a provisional degree certificate?

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

10. Will Academic Autonomy make a positive impact on the Placements or Employability?

Certainly. The number of students qualifying for placement interviews is expected to improve, due to rigorous and repetitive classroom teaching and continuous assessment, besides the autonomous status is more responsive to the needs of the industry. As a result, there will be a lot of scope for

industry oriented skill development built:in into the system. The graduates from an autonomous college will therefore represent better employability.

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

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

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

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

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

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

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

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

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

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

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

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

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