



# **VARDHAMAN COLLEGE OF ENGINEERING**

## **(AUTONOMOUS)**

**Affiliated to JNTUH, Approved by AICTE, Accredited by NAAC and ISO 9001:2008 Certified**  
**Shamshabad - 501 218, Hyderabad, Telangana State, India.**  
[www.vardhaman.org](http://www.vardhaman.org)

## **MASTER OF TECHNOLOGY**

### **COMPUTER SCIENCE AND ENGINEERING**

### **CHOICE BASED CREDIT SYSTEM**

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

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

## PRELIMINARY DEFINITIONS AND NOMENCLATURES

- “Autonomous Institution / College” means an institution / college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.
- “Academic Autonomy” means freedom to a College in all aspects of conducting its academic programs, granted by the University for promoting excellence.
- “Commission” means University Grants Commission.
- “AICTE” means All India Council for Technical Education.
- “University” the Jawaharlal Nehru Technological University Hyderabad.
- “College” means Vardhaman College of Engineering, Hyderabad unless indicated otherwise by the context.
- “Program” means:
  - Master of Technology (M. Tech.) Degree program
  - PG Degree Program: M. Tech.
- “Branch” means specialization in a program like M. Tech. Degree program in Computer Science and Engineering, M. Tech. Degree program in Embedded Systems etc.
- “Course” or “Subject” means a theory or practical subject, identified by its course – number and course-title, which is normally studied in a semester. For example, **B3201**: Principles of Machine Modeling Analysis, **B3601**: Microcontrollers for Embedded System Design, etc.

**Table1: Course Code Description**

First Digit	Second Digit	Third Digit	Fourth and Fifth Digits
<b>Indicates Program</b>	<b>Indicates Regulation</b>	<b>Indicates Department</b>	<b>Indicates Course Number</b>
<b>A</b> : B. Tech. <b>B</b> : M. Tech. <b>C</b> : MBA	<b>1</b> : R11 <b>2</b> : R14 <b>3</b> : R15	<b>1</b> : WMC <b>2</b> : CSE <b>3</b> : PEED <b>4</b> : DECS <b>5</b> : SE <b>6</b> : ES <b>7</b> : ED <b>8</b> : Str Eng <b>9</b> : Other	<b>01</b> <b>02</b> .. ..

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

## FOREWORD

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

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

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

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

**PRINCIPAL**



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## VISION OF THE COLLEGE:

To aim at inculcating the spirit of high ambitions, healthy attitudes, discipline and multidimensional excellence in the students and strive to mould them to scale new heights and get their mental horizons enlarged through value-based technical education and congenial study environment.

## MISSION OF THE COLLEGE:

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

## QUALITY POLICY:

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

## GOALS:

1. To initiate strategic planning process to review its present plans and goals in identifying thrust areas.
2. To tie up with national and international premier organizations for the purpose of exchange of research and innovation through the students and faculty of the Institution.
3. To develop consultancy in all disciplines through alliances with research organizations, government establishments, industries and alumni.
4. To attain status as the provider of quality education and independent research center.
5. To evolve as a Deemed University offering programs of relevance in emerging areas of technology.
6. To achieve 100% placement for students.



# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

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## ACADEMIC REGULATIONS

### M.Tech. Regular Two Year Post-Graduate Programme

(For the batches admitted from the Academic Year 2015–2016)

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

#### 1. APPLICABILITY

All the rules specified herein, approved by the Academic Council, will be in force and applicable to students admitted from the academic year 2015-2016 onwards. Any reference to “College” in these rules and regulations stands for Vardhaman College of Engineering.

#### 2. EXTENT

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

#### 3. PROGRAMS OFFERED

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

S. No	M.Tech Courses	Intake
1	Computer Science and Engineering	18
2	Digital Electronics and Communication Systems	18
3	Embedded Systems	18
4	Power Electronics and Electrical Drives	18

#### 4. ADMISSION

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

##### 4.1.1. Eligibility

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

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

#### 4.2. Admission Procedure:

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

- (a) Category - A seats are filled by the Convener, PG CET.
- (b) Category - B seats are filled by the Management.

#### 5. MEDIUM OF INSTRUCTION

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

#### 6. DURATION OF THE PROGRAMS

##### 6.1 Normal Duration

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

##### 6.2 Maximum Duration

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

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

#### 7. SEMESTER STRUCTURE

The College shall follow semester pattern. An academic year shall consist of a first semester and a second semester and the summer term. Each semester shall be of 21 weeks duration and this period includes time for course work, examination preparation, and conduct of examinations. Each semester shall have a minimum of 90 working days. The academic calendar is shown in Table 1 is declared at the start of the semester. The duration for each semester shall be a minimum of 16 weeks of instruction.

**Table 1: Academic Calendar**

<b>FIRST SEMESTER (21 weeks)</b>	Instruction Period :16 weeks	18 weeks
	Mid Semester Tests :2 weeks	
	Preparation & Practical Examinations	1 week
	External Examinations	2 weeks
<b>Semester Break</b>		2 weeks
<b>SECOND SEMESTER (21 weeks)</b>	Instruction Period :16 weeks	18 weeks
	Mid Semester Tests :2 weeks	
	Preparation & Practical Examinations	1 weeks
	External Examinations	2 weeks
<b>Summer Vacation</b>		4 weeks
<b>THIRD SEMESTER</b>	Project Work Phase – I	18 Weeks
<b>FOURTH SEMESTER</b>	Project Work Phase – II	18 Weeks

## 8. CHOICE BASED CREDIT SYSTEM

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

- 8.1.** The duration of each semester will normally be 21 weeks with 5 days a week. A working day shall have 6 periods each of 60 minutes duration.
- 1 credit per lecture period per week
  - 2 credits for three (or more) period hours of practical
  - 2 credits for technical seminar
  - 4 credits for comprehensive viva examination
  - 18 credits for project work phase – I
  - 22 credits for project work phase – II
- 8.2.** The two year curriculum of any M.Tech programme of study shall have total of 88 credits. The exact requirements of credits for each course will be as recommended by the Board of Studies concerned and approved by the Academic Council.
- 8.3.** For courses like technical seminar / comprehensive viva / Project Work Phases – I and II, where formal contact hours are not specified, credits are assigned based on the complexity of the work to be carried out.

## 9. METHOD OF EVALUATION

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

### 9.1. Theory

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

#### 9.1.1 Internal evaluation

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

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

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

#### 9.1.2 External Evaluation

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

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

## 9.2. Practical

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

## 9.3. Technical Seminar

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

## 9.4. Comprehensive Viva

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

## 9.5. Project Work

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

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

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

Student shall register for the Project work with the approval of 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 **100** internal marks at the end of Phase – I.

A candidate shall continue the Project Work in IV Semester (Phase – II) and submit a Project report at the end of Phase – II after approval of the Departmental Committee. During Phase – II, the student shall submit status report in two different phases, in addition to oral presentation before the DC. The DC shall evaluate the project for **60** internal marks based on the progress, presentations and quality of work.



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

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

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

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

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

- 10.1.** A student shall be eligible to appear for semester-end examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.
- 10.2.** Condonation of shortage of attendance in aggregate upto 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.
- 10.3.** Shortage of attendance below 65% in aggregate shall in no case be condoned.
- 10.4.** Students whose shortage of attendance is not condoned in any semester are not eligible to take their semester-end examination of that class and their registration shall stand cancelled.
- 10.5.** A student will not be promoted to the next semester unless he satisfies the attendance requirements of the current semester. The student may seek readmission for the semester when offered next. He will not be allowed to register for the subjects of the semester while he is in detention. A student detained due to shortage of attendance, will have to repeat that semester when offered next.
- 10.6.** A stipulated fee shall be payable towards condonation of shortage of attendance to the College.
- 10.7.** Attendance may also be condoned as per the recommendations of academic council for those who participate in prestigious sports, co-curricular and extra-curricular activities provided as per the Govt. of Telangana norms in vogue.

## **11. ACADEMIC REQUIREMENTS FOR PROMOTION / COMPLETION OF REGULAR M.TECH PROGRAMME OF STUDY**

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

- i.** A student shall be deemed to have satisfied the minimum academic requirements for each theory, and practical, if he secures not less than **50%** of marks in the semester-end examination and a minimum of **50%** of marks in the sum of the internal evaluation and semester - end examination taken together.
- ii.** In case of technical seminar and comprehensive viva a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each of them if he secures not less than **50%** of marks.

- iii. In case of project work, a student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted if he secures not less than **50%** of marks on the aggregate in the internal evaluation and external end-evaluation taken together.
- iv. A student shall register for all the **88** credits and earn all the **88** credits. Grades obtained in all the 88 credits shall be considered for the award of the class based on aggregate of grades (CGPA).
- v. A student who fails to earn **88** credits as indicated in the course structure within **FOUR** academic years from the year of their admission shall forfeit their seat in M. Tech. programme and their admission stands cancelled.
- vi. Students who are detained for want of attendance (or) who have not fulfilled academic requirements (or) who have failed after having undergone the course in earlier regulations (or) have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same (or) equivalent subjects as and when subjects are offered, and pursue the remaining course work with the academic regulations of the batch into which such students are readmitted. However, all such readmitted students shall earn all the credits of subjects they have pursued for completion of the course.

## 12. EVALUATION

Following procedure governs the evaluation.

- 12.1. Marks for components evaluated internally by the faculty should be submitted to the Controller of Examinations one week before the commencement of the semester-end examinations. The marks for the internal evaluation components will be added to the external evaluation marks secured in the semester-end examinations, to arrive at total marks for any subject in that semester.
- 12.2. Performance in all the courses is tabulated course-wise and will be scrutinized by the Examination Committee and moderation is applied if needed, based on the recommendations of moderation committee and course-wise marks lists are finalized.
- 12.3. Student-wise tabulation is done and student-wise memorandum of marks is generated which is issued to the student.

## 13. SUPPLEMENTARY EXAMINATION

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

## 14. RE-REGISTRATION FOR IMPROVEMENT OF INTERNAL

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

- 14.1. The candidate should have completed the course work and obtained examinations results for I & II semesters.
- 14.2. A candidate shall be given one chance for a maximum of Three Theory subjects for Improvement of Internal evaluation marks for which the candidate has to re-register for the chosen subjects and fulfill the academic requirements.
- 14.3. For each subject, the candidate has to pay a fee equivalent to one third of the semester tuition fee and the amount is to be remitted in the form of D.D. in favour of the Principal, Vardhaman College of Engineering payable at Hyderabad along with the requisition through the concerned Head of the Department.
- 14.4. In the event of availing the Improvement of Internal evaluation marks, the internal evaluation marks as well as the End Examinations marks secured in the previous attempt(s) for the re-registered subjects stand cancelled.

## 15. RE-EVALUATION

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

## 16. TRANSITORY REGULATIONS

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

## 17. TRANSCRIPTS

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

## 18. AWARD OF DEGREE

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

### 18.1. Eligibility

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

- i. Registered and successfully completed all the components prescribed in the programme of study to which he is admitted.
- ii. Successfully acquired the minimum required credits as specified in the curriculum corresponding to the branch of study within the stipulated time.
- iii. Obtained not less than 50% of marks (minimum requirement for declaring as passed).
- iv. Has no dues to the college, hostel, and library etc. and to any other amenities provided by the College.
- v. No disciplinary action is pending against him.

### 18.2. Award of Class

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

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

Class Awarded	Grades to be Secured	From the aggregate marks secured from 88 Credits
First Class with Distinction	$\geq 7.75.0$ CGPA	
First Class	$=6.75$ to $<7.75$ CGPA	
Pass Class	$=6.0$ to $<6.75$ CGPA	
Fail	Below 5.0 CGPA	

### 18.3. Letter Grade and Grade Point

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

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

Grade	Grade Points (GP)	Percentage of Marks
O ( Outstanding)	10	≥ 80 and above
A+ (Excellent)	9	≥ 70 and < 80
A (Very Good)	8	≥ 60 and < 70
B+ (Good)	7	≥ 55 and < 60
B (Above Average)	6	≥ 50 and < 55
F ( Fail)	0	Below 50
AB (Absent)	0	

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

$$\text{Percentage of marks} = (\text{CGPA} - 0.5) \times 10$$

#### Semester Grade Point Average (SGPA)

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

$$\text{SGPA} (S_i) = \frac{\sum (C_i \times G_i)}{\sum C_i}$$

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

#### Cumulative Grade Point Average (CGPA)

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

$$\text{CGPA} = \frac{\sum (C_i \times S_i)}{\sum C_i}$$

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

## 19. REGISTRATION

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

## 20. TERMINATION FROM THE PROGRAM

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

- i. The student fails to satisfy the requirements of the program within the maximum period stipulated for that program.
- ii. The student fails to satisfy the norms of discipline specified by the institute from time to time.

## 21. CURRICULUM

- 21.1. For each program being offered by the Institute, a Board of Studies (BOS) is constituted in accordance with AICTE / UGC / JNTUH statutes.
- 21.2. The BOS for a program is completely responsible for designing the curriculum once in three years for that program.

## 22. WITH-HOLDING OF RESULTS

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

## 23. GRIEVANCES REDRESSAL COMMITTEE

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

- Headed by Senior Faculty member
- Heads of all departments
- A senior lady staff member from each department (if available)

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

## 24. MALPRACTICE PREVENTION COMMITTEE

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

- Principal
- Subject expert of which the subject belongs to
- Head of the department of which the student belongs to
- The invigilator concerned
- In-charge Examination branch of the college

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

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

## 25. AMENDMENTS TO REGULATIONS

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

## 26. STUDENTS' FEEDBACK

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

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

## 27. GRADUATION DAY

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

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

## 28. AWARD OF A RANK UNDER AUTONOMOUS SCHEME

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

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

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

## 29. CONDUCT AND DISCIPLINE

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

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

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

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

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

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

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

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

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

### **30. OTHER ISSUES**

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

- i. Selective admission of students to a programme, so that merit and aptitude for the chosen technical branch or specialization are given due consideration.
- ii. Faculty recruitment and orientation, so that qualified teachers trained in good teaching methods, technical leadership and students' motivation are available.
- iii. Instructional/Laboratory facilities and related physical infrastructure, so that they are adequate and are at the contemporary level.
- iv. Access to good library resources and Information & Communication Technology (**ICT**) facilities, to develop the student's *mind* effectively.

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

- i. Teaching-learning process on modern lines, to provide *Add-On Courses for audit/credit* in a number of peripheral areas useful for students' self development.
- ii. Life-long learning opportunities for faculty, students and alumni, to facilitate their dynamic interaction with the society, industries and the world of work.
- iii. Generous use of ICT and other modern technologies in everyday activities.

### **31. GENERAL**

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

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

# **COURSE STRUCTURE**



**M. TECH - COMPUTER SCIENCE AND ENGINEERING**

REGULATIONS: VCE--R15

I SEMESTER							
Code	Subject	Periods per Week		Credits	Scheme of Examination Maximum Marks		
		L	P		Internal	External	Total
B3201	Advance Data Structure and Algorithms	3	-	3	30	70	100
B3202	Advanced Operating Systems	3	-	3	30	70	100
B3203	Computer Organization and Architecture	3	-	3	30	70	100
OPEN ELECTIVE - I		3	-	3	30	70	100
PROFESSIONAL ELECTIVE - I		3	-	3	30	70	100
PROFESSIONAL ELECTIVE - II		3	-	3	30	70	100
B3204	Advanced Data Structure and Algorithms Laboratory	-	3	2	30	70	100
B3205	Technical Seminar	-	-	2	100	-	100
<b>TOTAL</b>		<b>18</b>	<b>03</b>	<b>22</b>	<b>310</b>	<b>490</b>	<b>800</b>
II SEMESTER							
Code	Subject	Periods per week		Credits	Scheme of Examination Maximum Marks		
		L	P		Internal	External	Total
B3206	Advanced Computer Networks	3	-	3	30	70	100
B3207	Advanced Database Management Systems	3	-	3	30	70	100
B3208	Compiler Design	3	-	3	30	70	100
OPEN ELECTIVE - II		3	-	3	30	70	100
PROFESSIONAL ELECTIVE - III		3	-	3	30	70	100
PROFESSIONAL ELECTIVE - IV		3	-	3	30	70	100
B3209	Advanced Database Management Systems Lab	-	3	2	30	70	100
B3210	Technical Seminar	-	-	2	100	-	100
<b>TOTAL</b>		<b>18</b>	<b>03</b>	<b>22</b>	<b>310</b>	<b>490</b>	<b>800</b>
III SEMESTER							
Code	Subject	Periods per week		Credits	Scheme of Examination Maximum Marks		
		L	P		Internal	External	Total
B3211	Comprehensive Viva	-	-	4	-	100	100
B3212	Project Work Phase – I	-	-	18	100	-	100
<b>TOTAL</b>		<b>-</b>	<b>-</b>	<b>22</b>	<b>100</b>	<b>100</b>	<b>200</b>
IV SEMESTER							
Code	Subject	Periods per week		Credits	Scheme of Examination Maximum Marks		
		L	P		Internal	External	Total
B3213	Project Work Phase – II	-	-	22	60	140	200
<b>TOTAL</b>		<b>-</b>	<b>-</b>	<b>22</b>	<b>60</b>	<b>140</b>	<b>200</b>

<b>ELECTIVES</b>			
<b>PROFESSIONAL ELECTIVE - I</b>		<b>PROFESSIONAL ELECTIVE - II</b>	
<b>Code</b>	<b>Subject</b>	<b>Code</b>	<b>Subject</b>
<b>B3251</b>	Digital Image Processing	<b>B3254</b>	Data warehousing and Mining
<b>B3252</b>	Number Theory and Cryptography	<b>B3255</b>	Artificial Intelligence and Neural Networks
<b>B3253</b>	Distributed Computing	<b>B3256</b>	Object Oriented Analysis and Design
<b>PROFESSIONAL ELECTIVE - III</b>		<b>PROFESSIONAL ELECTIVE - IV</b>	
<b>Code</b>	<b>Subject</b>	<b>Code</b>	<b>Subject</b>
<b>B3257</b>	Computer Vision and Pattern Recognition	<b>B3260</b>	Information Retrieval Systems
<b>B3258</b>	Web Security	<b>B3261</b>	Machine Learning
<b>B3259</b>	Cloud Computing	<b>B3262</b>	Design Patterns
<b>OPEN ELECTIVES</b>			
<b>B3271</b>	Software Engineering Principles	<b>B3272</b>	Human Computer Interaction
<b>B3273</b>	Computer Graphics Concepts	<b>B3274</b>	Fundamentals Software Testing And Quality Assurance
<b>B3676</b>	System On Chip Architecture	<b>B3678</b>	Internetworking and Internet Protocols
<b>B3677</b>	Cryptography and Computer Security	<b>B3679</b>	Multimedia Communication and Networks
<b>B3476</b>	Telecommunication Switching Systems and Networks	<b>B3478</b>	High Performance Networks
<b>B3477</b>	Mobile Computing Technologies	<b>B3479</b>	Integrated Circuits Fabrication Technology
<b>B3371</b>	Nano Technology Applications to Electrical Engineering	<b>B3372</b>	Solar Energy and Applications
<b>B3373</b>	Industrial Electronics	<b>B3374</b>	Energy Management and Audit
<b>B3901</b>	National Service Scheme (NSS)	<b>B3902</b>	Intellectual Property Rights

# SYLLABI

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

I SEMESTER

## ADVANCE DATA STRUCTURES AND ALGORITHMS

Course Code: B3201

L	P	C
3	-	3

### UNIT - I

**OVERVIEW OF DATA STRUCTURES:** singly linked lists, doubly linked lists, circular list, representing stacks and queues using arrays and linked lists, infix to post fix conversion, postfix expression evaluation. Priority Queues – Realizing a Priority Queue using Heaps, Definition, insertion, Deletion.

### UNIT – II

**DICTIONARIES HASH TABLES:** Dictionaries, linear list representation, operations insertion, deletion and searching, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

### UNIT - III

**TREES AND GRAPHS:** Introduction, definition and basic terminologies of trees and binary trees, representation of trees and binary trees, binary tree traversals, binary search trees: definition, operations and applications. threaded binary trees; Graphs basic concepts, representation and traversals.

### UNIT - IV

**SEARCH TREES:** AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching, Red Black and Splay Trees, B- trees: definition, operations and applications. R-trees: Nearest neighbour Query, join and range queries

### UNIT - V

**ALGORITHM ANALYSIS:** Efficiency of algorithms, apriori analysis, asymptotic notations, time complexity of an algorithm using o notation, polynomial vs. exponential algorithms, average, best and worst case complexities, analyzing recursive programs.

### UNIT - VI

**DIVIDE AND CONQUER & GREEDY METHOD:** General method, binary search, finding maximum and minimum, quick sort, merge sort, strassen's matrix multiplication. Greedy method, general method, minimum cost spanning trees, single source shortest path.

### UNIT - VII

**DYNAMIC PROGRAMMING:** General method, all pairs shortest path, single source shortest path, 0/1 knapsack problem, reliability design, travelling sales person's problem.

### UNIT - VIII

**BACK TRACKING & BRANCH AND BOUND:** General method, 8 queen's problem, graph coloring. Branch and bound, the general method, LC search, control abstraction, bounding 0 / 1 knapsack problem.

### TEXT BOOKS:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran (2008), Fundamentals of Computer Algorithms, 2<sup>nd</sup> edition, University Press (India) Private Limited, India.
2. G. A. V. Pai (2009), Data Structures and Algorithms, Tata Mcgraw hill, New Delhi.

### REFERENCE BOOKS:

1. D. Samanta (2003), Classic Data Structures, Prentice Hall of India Private Limited.
2. Aho, Hopcraft, Ullman (1998), Design and Analysis of Computer Algorithms, Pearson Education India.
3. Goodman, Hedetniemi (2002), Introduction to the Design and Analysis of Algorithms, Tata Mcgraw Hill, New Delhi, India.
4. Adam Drozdek (2005), Data Structures and Algorithms in C++, 3rd Edition, Thomson Course Technology.

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

I SEMESTER

## ADVANCE OPERATING SYSTEMS

Course Code: B3202

L	P	C
3	-	3

### UNIT - I

**INTRODUCTION:** Operating system concept, processes and threads, process model, process creation, process termination, process hierarchies, and process states, implementation of processes, threads, thread model, thread usage, implementation of threads in user space and kernel, hybrid implementations.

### UNIT - II

**INTER PROCESS COMMUNICATION:** Race conditions, critical regions, mutual exclusion with busy waiting, sleep and wakeup, semaphores, mutexes, monitors, message passing; scheduling- scheduling in batch systems, interactive systems, real time systems, thread scheduling.

### UNIT - III

**DEADLOCKS:** Introduction, deadlock detection and recovery, deadlock detection with one resource of each type, with multiple resource of each type, recovery from deadlock; deadlock avoidance, deadlock prevention.

### UNIT - IV

**MEMORY MANAGEMENT:** Memory management and virtual memory, logical versus physical address space, swapping, contiguous allocation, paging, segmentation, segmentation with paging. Demand paging, performance of demanding paging, page replacement, page replacement algorithm, allocation of frames, thrashing.

### UNIT - V

**FILE SYSTEM MANAGEMENT :**File system interface and implementation, access methods, directory structure, protection, file system structure, file system management, organization of file system, file permissions, MS DOS and UNIX file system case studies, NTFS; device management- I/O channels, interrupts and interrupt handling, types of device allocation.

### UNIT - VI

**INTRODUCTION TO DISTRIBUTED SYSTEMS:** Goals of distributed system, hardware and software concepts, design issues. Communication in distributed systems- layered protocols, ATM networks, the client / server model, remote procedure call and group communication.

### UNIT - VII

**SYNCHRONIZATION IN DISTRIBUTED SYSTEMS:** Clock synchronization, mutual exclusion, e-tech algorithms, the bully algorithm, a ring algorithm, and atomic transactions.

### UNIT - VIII

**DEADLOCKS:** Deadlock in distributed systems, distributed deadlock prevention, and distributed dead lock detection.

### TEXT BOOKS:

1. Abraham Silberchatz, Peter B. Galvin, Greg Gagne (2008), *Operating System Principles*, 8th edition, John Wiley & Sons, Inc.
2. Andrew S. Tanenbaum (2001), *Distributed Operating Systems*, 2<sup>nd</sup> edition, Pearson Education, India.

### REFERENCE BOOKS:

1. Mukesh Singhal, Niranjana (2001), *Advanced Concepts in Operating Systems*, Tata Mcgraw Hill, New Delhi.
2. Andrew S. Tanenbaum (2006), *Modern Operating Systems*, 2<sup>nd</sup> edition, Pearson Education, India.
3. Pradeep K. Sinha (2002), *Distributed Operating Systems and concepts*, Prentice Hall of India.
4. William Stallings (2005), *Operating Systems: Internals and Design Principles*, 5th edition, Pearson Education

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

## I SEMESTER

### COMPUTER ORGANIZATION AND ARCHITECTURE

Course Code: B3203

L	P	C
3	-	3

#### UNIT - I

**DIGITAL LOGIC CIRCUITS AND COMPONENTS:** Digital computers, logic gates, Boolean algebra, map simplifications. Combinational circuits: half-adder, full-adder, decoders, encoders. Multiplexer's, sequential circuits, flip flops, registers, shift registers, binary counters, memory unit.

#### UNIT - II

**BASIC STRUCTURE OF COMPUTERS:** Functional units, basic operational concepts, bus structures, software performance, multiprocessors and multi-computers. Data types, complements, fixed point representation, floating point representation, error detection codes.

#### UNIT - III

**REGISTER TRANSFER LANGUAGE AND MICRO OPERATIONS:** Register transfer language, register transfer bus and memory transfers, arithmetic micro operations, logic micro operations, shift micro operations, arithmetic logic shift unit. Instruction codes, computer registers, computer instructions, instruction cycle, memory reference instructions. Input/output and interrupt, stack organization, instruction formats, addressing modes. Data transfer and manipulation, program control, reduced instruction set computer.

#### UNIT - IV

**DATA PATH DESIGN:** Fixed point arithmetic, addition, subtraction, multiplication and division, combinational and sequential ALUs, carry look ahead adder, Robertson algorithm, booth's algorithm, non-restoring division algorithm, floating point arithmetic, coprocessor, pipeline processing, pipeline design, modified booth's algorithm.

#### UNIT - V

**CONTROL DESIGN:** Hardwired control, micro programmed control, multiplier control unit, CPU control unit, pipeline control, instruction pipelines, pipeline performance, superscalar processing, nano programming.

#### UNIT - VI

**THE MEMORY SYSTEM:** Basic concepts, semiconductor RAM memories, read-only memories, cache memories, performance, considerations, virtual memories, secondary storage, introduction to RAID.

#### UNIT - VII

##### INPUT-OUTPUT ORGANIZATION:

**PERIPHERAL DEVICES:** Input-output interface, asynchronous data transfer modes of transfer, priority interrupt direct memory access, input/output processor (IOP) serial communication; introduction to peripheral component interconnect (PCI) bus. Introduction to standard serial communication protocols like RS232, USB and IEEE1394.

#### UNIT - VIII

**MULTI PROCESSORS:** Characteristics of multiprocessors, interconnection structures, inter processor arbitration. Inter processor communication and synchronization cache coherence, shared memory multiprocessors.

#### TEXT BOOKS:

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), *Computer Organization*, 5th edition, McGraw Hill, India.
2. M. Moris Mano (2008), *Computer Systems Architecture*, 3rd edition, Pearson Education, India.

#### REFERENCE BOOKS:

1. John P. Hayes (1998), *Computer architecture and Organisation*, 3rd edition, Tata McGraw-Hill, New Delhi.
2. William Stallings (2005), *Computer Organization and Architecture*, 6th edition, Prentice Hall of India.
3. Andrew S. Tanenbaum (1998), *Structured Computer Organization*, 4th edition, Prentice Hall of India.
4. Sivaraama Dandamudi (2003), *Fundamentals or Computer Organization and Design*, Springer Int. Edition, India.

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

## I SEMESTER

### DIGITAL IMAGE PROCESSING (Professional Elective - I)

Course Code: B3251

L	P	C
3	-	3

#### UNIT - I

**DIGITAL IMAGE FUNDAMENTALS:** Image acquisition, image model, sampling, quantization, relationship between pixels, distance measures, connectivity, imaging geometry.

#### UNIT - II

**IMAGE TRANSFORMS:** Two dimensional DFT, FFT- properties, Walsh transform, hadamard transform, discrete cosine transform, haar transform

#### UNIT - III

**IMAGE ENHANCEMENT:** Point processing, histogram processing, spatial filtering, enhancement in frequency domain, image smoothing, image sharpening.

#### UNIT - IV

**IMAGE RESTORATION:** Degradation model, algebraic approach to restoration, inverse filtering, least mean square filters, constrained least squares restoration, interactive restoration.

#### UNIT - V

**IMAGE SEGMENTATION:** Detection of discontinuities, edge linking and boundary detection, thresholding, region oriented segmentation, the use of motion in segmentation.

#### UNIT - VI

**IMAGE COMPRESSION:** Redundancies and their removal methods, fidelity criteria, image compression models, source encoder and decoder, error free compression, lossy compression.

#### UNIT - VII

**COLOR IMAGE PROCESSING:** Fundamentals, models, pseudocolor image, color transformation, smoothing, color segmentation, noise in color image.

#### UNIT - VIII

**MORPHOLOGY:** Dilation, erosion, opening, closing, hit-and-miss transform, boundary extraction, region filling, connected components, thinning, thickening, skeletons,

#### TEXT BOOKS:

1. R. C. Gonzalez, R. E. Woods (2002), Digital Image processing, 2nd edition, Addison Wesley, India.
2. Rafael C. Gonzalez and Richard E. Woods (2008), Digital Image Processing, Low Price Edition, Pearson Education, India.

#### REFERENCE BOOKS:

1. Anil K. Jain, Jain (1997), Fundamentals of Digital Image processing, Prentice Hall of India Private Limited.
2. Arthur R. Weeks, Jr. (PHI) (1996), Fundamentals of Electronic Image Processing, SPIE
3. Rafael C. Gonzalez, Richard E. Woods and Steven. L (2004), Digital Image processing using MAT LAB, Pearson Education Asia.

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

## I SEMESTER

### Number Theory and Cryptography (Professional Elective - I)

Course Code: B3252

L	P	C
3	-	3

#### UNIT I

**NUMBER THEORY:** Prime and Relatively prime numbers, testing for primality.

**MODULAR ARITHMETIC:** Fermat's and Euler's theorems, Euclid's Algorithm, Extended Euclid's Algorithm, the Chinese remainder theorem, Discrete Logarithmic Problem. Random Number Generation Algorithms.

#### UNIT II

**CONVENTIONAL ENCRYPTION:** Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

#### UNIT III

**ALGORITHMS:** Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2, Characteristics of Advanced Symmetric block ciphers. Placement of Encryption function, Key distribution.

#### UNIT IV

**PUBLIC KEY CRYPTOGRAPHY:** Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography.

#### UNIT V

**MESSAGE AUTHENTICATION AND HASH FUNCTIONS:** Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

#### UNIT VI

**HASH AND MAC ALGORITHMS:** MD5, Message digest Algorithm, Secure Hash Algorithm, RIPEMD-160, HMAC.

#### UNIT VII

**DIGITAL SIGNATURES AND AUTHENTICATION PROTOCOLS:** Digital signatures, Authentication Protocols, Digital signature standards.

#### UNIT VIII

**AUTHENTICATION APPLICATIONS:** Kerberos, X.509 directory Authentication service.

#### TEXT BOOK

1. Cryptography and Network Security: Principles and Practice - William Stallings, Pearson Education., 2000.

#### RECOMMENDED BOOK

1. Network Security – Private Communication in a public world, 2nd ed., Kaufman, Perlman & speciner, PHI, 2003.



# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

I SEMESTER

## DISTRIBUTED COMPUTING (Professional Elective - I)

Course Code: B3253

L	P	C
3	-	3

### UNIT - I

**INTRODUCTION:** The different forms of computing, monolithic, distributed, parallel and cooperative computing, the meaning of distributed computing, examples of distributed systems, the strengths and weaknesses of distributed computing, operating system concepts relevant to distributed computing, the architecture of distributed applications.

### UNIT - II

**DISTRIBUTED COMPUTING PARADIGMS:** Paradigms for distributed applications, message passing paradigm, the client-server paradigm (java socket API), the peer-to-peer paradigm

**MESSAGE SYSTEM (MOM) PARADIGM:** The point-to-point message model and the publish/subscribe message model, RPC model.

### UNIT - III

**THE DISTRIBUTED OBJECTS PARADIGMS:** RMI, ORB, the object space paradigm, the mobile agent paradigm, the network services paradigm, the collaborative application (groupware paradigm), choosing a paradigm for an application.

### UNIT - IV

**DISTRIBUTED OBJECTS PARADIGM (RMI):** Message passing versus distributed objects, archetypal distributed object architecture, distributed object systems, RPC, RMI, the java RMI architecture, java RMI API, a sample RMI application, steps for building an RMI application, testing and debugging, comparison of RMI and socket API.

### UNIT - V

**DISTRIBUTED OBJECT PARADIGM(CORBA):** The basic architecture, the CORBA object interface, inter-ORB protocols, object servers and object clients, CORBA object references, CORBA naming service and the interoperable naming service, CORBA object services, object adapters, java IDL, an example CORBA application.

### UNIT - VI

**DISTRIBUTED DOCUMENT BASED SYSTEMS:** WWW, lotus notes, comparison of WWW and lotus notes.

**DISTRIBUTED COORDINATION BASED SYSTEMS:** Introduction to coordination models, TIB, JINI, comparison of TIB and JINI, software agents, agent technology, mobile agents.

**DISTRIBUTED MULTIMEDIA SYSTEMS:** Characteristics of multimedia data, QOS of service management, resource management, stream adaptation.

### UNIT - VII

**GRID COMPUTING:** Definition of grid, grid types, computational grid, data grid, grid benefits and applications, drawbacks of grid computing, grid components, grid architecture and its relation to various distributed technologies.

### UNIT - VIII

**CLUSTER COMPUTING:** Parallel computing overview, cluster computing – introduction, cluster architecture, parallel programming models and paradigms, applications of clusters.

### TEXT BOOKS:

1. M. L. Liu (2004), *Distributed Computing Principles and Applications*, 1st Edition, Pearson Education, India.
2. R. Orfali, Dan Harkey, Jeri Edwards (1999), *Client/Server Programming with Java and CORBA*, 3rd Edition, John Wiley, New York, USA.

### REFERENCE BOOKS:

1. J. Joseph, C. Fellenstein (2009), *Grid Computing*, 5th Edition, Pearson education, India.
2. Rajkumar Buyya (2008), *High Performance Cluster Computing*, 2nd Edition, Pearson education.
3. D. Minoli (2005), *A Networking Approach to Grid Computing*, 1st Edition, Wiley & sons, New Jersey, USA.
4. A. Abbas (2004), *Grid Computing: A Practical Guide to Technology and Applications*, 1st Edition, Firewall Media, India.
5. G. Coulouris, J. Dollimore and Tim Kindbirg (2005), *Distributed Systems Concepts and Design*, 4th Edition, Wiley & sons, New Jersey, USA.

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

## I SEMESTER

### DATA WAREHOUSING AND DATA MINING (Professional Elective - II)

Course Code: B3254

L	P	C
3	-	3

#### UNIT - I

**INTRODUCTION:** Data mining, kinds of data, data mining functionalities, classification of data mining systems, data mining primitives, major issues in data mining.

#### UNIT - II

**DATA PREPROCESSING:** Descriptive data summarization, data cleaning, data integration and transformation, data reduction, data discretization and concept hierarchy generation.

#### UNIT - III

**DATA WAREHOUSE AND OLAP TECHNOLOGY:** What is data warehouse, a multidimensional data model, data warehouse architecture, data warehouse implementation, from data warehouse to data mining.

#### UNIT - IV

**MINING FREQUENT PATTERNS AND ASSOCIATIONS:** Basic concepts, efficient and scalable frequent item set mining methods, mining various kinds of association rules.

#### UNIT - V

**CLASSIFICATION AND PREDICTION:** Issues regarding classification and prediction, classification by decision tree induction, bayesian classification, rule based classification, prediction, accuracy and error measures.

#### UNIT - VI

**CLUSTER ANALYSIS:** Types of data in cluster analysis, a categorization of major clustering methods, partitioning methods, hierarchical methods, density based methods, grid based methods, model based clustering methods, clustering high dimensional data, outlier analysis.

#### UNIT - VII

**MINING STREAM, TIME SERIES AND SEQUENCE DATA:** Mining data streams, mining time series data, mining sequence patterns in biological data.

#### UNIT - VIII

**MINING OBJECT, SPATIAL, MULTIMEDIA, TEXT AND WEB DATA:** Multidimensional analysis and descriptive mining of complex data objects, spatial data mining, multimedia data mining, text mining, mining the world wide web.

#### TEXT BOOKS:

1. Jiawei Han, Micheline Kamber, Jian Pei (2011), *Data Mining Concepts and Techniques*, 3rd edition, Elsevier, India.

#### REFERENCE BOOKS:

1. Margaret H Dunham (2006), *Data Mining Introductory and Advanced Topics*, 2nd edition, Pearson Education, India.
2. Amitesh Sinha (2007), *Data Warehousing*, Thomson Learning.
3. Arun K Pujari (2004), *Data Mining Techniques*, University Press (India) Private Limited, India.
4. W. H. Inmon (2005), *Building the Data Warehouse*, Wiley Dreamtech India Pvt. Ltd, India.

# VARDHAMAN COLLEGE OF ENGINEERING

## (AUTONOMOUS)

### I SEMESTER

#### ARTIFICIAL INTELLIGENCE AND NEURAL NETWORKS (Professional Elective - II)

Course Code: B3255

L	P	C
3	-	3

#### UNIT - I

**INTRODUCTION TO ARTIFICIAL INTELLIGENCE:** Problem and search, what is AI technique, criteria for success; problems, problem space and search, defining the problem as a state space search, production systems, problem characteristics, production system characteristics.

**HEURISTIC SEARCH TECHNIQUES:** Knowledge representation, knowledge representation issues, using predicate logic, resolution principle. Representing knowledge using rules, forward vs backward reasoning, symbolic reasoning under uncertainty, non monotonic reasoning, statistical reasoning.

#### UNIT - II

**DIFFERENT KNOWLEDGE REPRESENTATION SCHEMES:** Semantic nets, Marvin minsky's frames, conceptual dependency theory, scripts. Understanding, what is understanding, what makes understanding hard, understanding as constraint satisfaction, waltz's algorithm.

#### UNIT - III

**NATURAL LANGUAGE PROCESSING:** Overview of linguistics, grammars and languages, basic parsing techniques, transitional networks, semantic analysis and representation structures. Natural language generation, natural language systems, general concepts in knowledge acquisition. Types of learning, general learning model, performance measures, early work in machine learning, perceptrons, genetic algorithms, intelligent editors.

#### UNIT - IV

**EXPERT SYSTEM ARCHITECTURE:** Characteristic features of expert systems, history, applications. Rule based system architecture, expert system shells. Pattern recognition, the recognition and classification process, learning classification patterns, recognizing and understanding speech. Perception and action, features of AI programming language PROLOG.

#### UNIT - V

**INTRODUCTION TO NEURAL NETWORKS:** What is a neural network?, human brain, models of neuron, neural networks viewed as directed graphs, feedback, network architectures, knowledge representation, artificial intelligence and neural networks.

#### UNIT - VI

**LEARNING PROCESSES:** Introduction, error-correction learning, learning with a teacher, learning without a teacher, learning tasks, statistical nature of the learning process, statistical learning theory, probably approximately correct model of learning.

#### UNIT - VII

##### SINGLE LAYER PERCEPTRONS

Introduction, adaptive filtering problem, unconstrained optimization techniques, linear least-squares filters, leastmean square algorithm, learning curves, learning rate annealing techniques, perceptron, perceptron convergence theorem, relation between the perceptron and bayes classifier for a gaussian environment.

**MULTILAYER PERCEPTRONS:** Introduction, some preliminaries, back-propagation algorithm, summary of back-propagation algorithm, XOR problem.

#### UNIT - VIII

**HEURISTICS:** Heuristics for making the back propagation algorithm perform better, output representation and decision rule, computer experiment, feature detection, back-propagation and differentiation, hessian matrix generalization, approximation of functions, cross validation, network pruning techniques, virtues and limitations of back-propagation learning, accelerated convergence of back propagation learning, supervised learning viewed as an optimization problem, convolution networks.

#### TEXT BOOKS:

1. Elaine Rich, Kevin Knight (2002), *Artificial Intelligence*, 2nd edition, Tata McGraw Hill, New Delhi.
2. Simon Haykin (1999), *Neural Networks: a Comprehensive Foundation*, 2nd edition, Pearson Education, India.

#### REFERENCE BOOKS:

1. Patrick Henry Winston (2001), *Artificial Intelligence*, 3rd edition, Pearson Education Private Limited, India.
2. Dan W. Patterson (1999), *Introduction to Artificial Intelligence and Expert Systems*, Prentice Hall of India.
3. Satish Kumar (2004), *Neural Networks: A classroom approach*, Tata McGraw Hill, New Delhi.
4. N. J Nilsson (2005), *Principles of Artificial Intelligence*, Morgan Kaufmann.
5. B. Yegnanarayana (2001), *Artificial Neural Networks*, Prentice Hall of India.

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

## I SEMESTER

### OBJECT ORIENTED ANALYSIS AND DESIGN (Professional Elective - II)

Course Code: B3256

L	P	C
3	-	3

#### UNIT - I

**INTRODUCTION:** Object-Oriented Analysis and Design, Iterative Development and the Unified Process, Case Study: The NextGen POS System.

#### UNIT - II

**INCEPTION:** Inception, Understanding Requirements, Use-Case Model: Writing Requirements in Context, Identifying Other Requirements, From Inception to Elaboration.

#### UNIT – III

**ELABORATION ITERATION 1 (ANALYSIS):** Use-Case Model: Drawing System Sequence Diagrams, Domain Model: Visualizing Concepts, Domain Model: Adding Associations, Domain Model: Adding Attributes, Use-Case Model: Adding Detail with Operation Contracts, From Requirements to Design in this Iteration, Interaction Diagram Notation.

#### UNIT- IV

**ELABORATION ITERATION 1 (DESIGN):** GRASP: Designing Objects with Responsibilities, Design Model: Use-Case Realizations with GRASP Patterns, Design Model: Determining Visibility, Design Model: Creating Design Class Diagrams, Implementation Model: Mapping Designs to Code.

#### UNIT - V

**ELABORATION ITERATION 2:** Iteration 2 and its Requirements, GRASP: More Patterns for Assigning Responsibilities, Designing Use-Case Realizations with GoF Design Patterns.

#### UNIT- VI

**ELABORATION ITERATION 3:** Iteration 3 and Its Requirements, Relating Use Cases, Modeling Generalization, Refining the Domain Model, Adding New SSDs and Contracts, Modeling Behavior in State chart Diagrams.

#### UNIT- VII

**DESIGNING THE LOGICAL ARCHITECTURE WITH PATTERNS:** Organizing the Design and Implementation Model Packages, Introduction to Architectural Analysis and the SAD.

#### UNIT -VIII

**SPECIAL TOPICS:** Introduction to Iterative Planning and Project Issues, Comments on Iterative Development and the UP.

#### TEXT BOOK

- 1 Larman, Craig, Applying UML and Patterns: An Introduction to Object-Oriented Analysis and Design and Iterative Development, Pearson Education, 3<sup>rd</sup> Ed., 2004.

#### REFERENCE BOOKS

1. Mark Priestley, Practical Object Oriented Design with UML, TMH, 2<sup>nd</sup> Ed., 2005.
2. Grady Booch et al., Unified Modeling Language User Guide, Pearson Education, 1999
3. Martin Fowler et al., UML Distilled, Pearson Education, 2000

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

I SEMESTER

## ADVANCED DATA STRUCTURES AND ALGORITHMS LAB

Course Code: B3204

L	P	C
-	3	2

### LIST OF EXERCISES:

#### Week 1:

- Write a C program that implement stack (its operations) using arrays
- Write a C program that uses Stack operations to convert infix expression into postfix expression

#### Week 2:

- Write C programs that implement Queue (its operations) using arrays
- Write C programs that implement Queue (its operations) using linked lists

#### Week 3:

- Write a C program that uses functions to create a singly linked list
- Write a C program that uses functions to perform insertion operation on a singly linked list
- Write a C program that uses functions to perform deletion operation on a singly linked list

#### Week 4:

Write a C program to perform the following operations:

- Insert an element into a binary search tree
- Delete an element from a binary search tree
- Search for a key element in a binary search tree

#### Week 5:

Write a C program to perform the following operations on B -Trees and AVL-trees:

- Insertion
- Deletion

#### Week 6:

Write C programs for the implementation of BFS and DFS for a given graph.

#### Week 7:

Write C programs to implement the following to generate a minimum cost spanning tree:

- Prim's algorithm
- Kruskal's algorithm.

#### Week 8:

Write a C program to solve the single source shortest path problem. (Note: Use Dijkstra's algorithm).

#### Week 9:

Write C program that uses non-recursive functions to traverse a binary tree in:

- Pre-order
- In-order
- Post-order

#### Week 10:

Write a C program to find optimal ordering of matrix multiplication. (Note: Use Dynamic programming method).

#### Week 11:

Consider the problem of eight queens on an (8x8) chessboard. Two queens are said to attack each other if they are on the same row, column, or diagonal. Write a C program that implements backtracking algorithm to solve the problem i.e. place eight non - attacking queens on the board.

#### Week 12:

Write a C program to implement dynamic programming algorithm to solve the all pairs shortest path problem.

#### Week 13:

Write a C program to solve 0/1 knapsack problem using the following:

- Greedy algorithm
- Dynamic programming algorithm
- Backtracking algorithm
- Branch and bound algorithm.

#### Week 14:

Write a C program that uses dynamic programming algorithm to solve the optimal binary search tree problem.

#### Week 15:

- Write a C program for solving traveling sales persons problem using the following:
- Dynamic programming algorithm
- The back tracking algorithm
- Branch and Bound

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

II SEMESTER

## ADVANCED COMPUTER NETWORKS

Course Code: B3206

L	P	C
3	-	3

### UNIT - I

**FOUNDATION OF NETWORKING PROTOCOLS:** 5-layer TCP/IP model, 7-layer OSI model, internet protocols and addressing, equal-sized packets model, ATM.

**REVIEW OF COMPUTER NETWORKS AND THE INTERNET:** What is the internet, the network edge, the network core, access networks and physical media, ISPs and internet backbones, delay and loss in packet-switched networks, history of computer networking and the internet.

### UNIT -II

**NETWORKING DEVICES:** Multiplexers, modems and internet access devices, switching and routing devices, router structure.

**THE LINK LAYER AND LOCAL AREA NETWORKS:** Link layer, introduction and services, error detection and error correction techniques, multiple access protocols, link layer addressing, ethernet, interconnections, hubs and switches, PPP - the point to point protocol, link virtualization.

### UNIT - III

**ROUTING AND INTERNETWORKING:** Network layer routing, least cost path algorithms, non least cost path algorithms, intradomain routing protocols, interdomain routing protocols, congestion control at network layer. Logical addressing, IPv4 addresses, IPv6 addresses. Internet protocol, internetworking, IPv4, IPv6, transition from IPv4 to IPv6.

**MULTICASTING TECHNIQUES AND PROTOCOLS:** Basic definitions and techniques, intradomain multicast protocols, interdomain multicast protocols, node level multicast algorithms.

### UNIT - IV

**TRANSPORT AND END-TO-END PROTOCOLS:** Transport layer, transport services, connection management, transmission control protocol (TCP), user datagram protocol (UDP), mobile transport protocols, TCP congestion control.

### UNIT -V

**APPLICATION LAYER:** Principles of network applications, the web and http. File transfer – FTP, electronic mail in the internet domain name system (DNS), P2P file sharing, socket programming with TCP and UDP, building a simple web server.

### UNIT - VI

**WIRELESS NETWORKS AND MOBILE IP:** Infrastructure of wireless networks, wireless LAN technologies- IEEE 802.11 wireless standard, cellular networks, mobile IP, wireless mesh networks (WMNs).

### UNIT -VII

**OPTICAL NETWORKS AND WDM SYSTEMS:** Overview of optical networks, basic optical networking devices, large scale optical switches, optical routers, wavelength allocation in networks, case study, an all optical switch.

### UNIT -VIII

**VPNS - TUNNELING AND OVERLAY NETWORKS:** Virtual Private Networks (VPNs), multiprotocol label switching (MPLS), overlay networks.

**VOIP AND MULTIMEDIA NETWORKING:** Overview of IP telephony, VOIP signaling protocols, real time media transport protocols, distributed multimedia networking, stream control transmission protocol.

**TEXT BOOKS:**

1. James F. Kurose, Keith W. Ross (2007), *Computer Networking: A Top down Approach Featuring the Internet*, 3<sup>rd</sup> edition, Pearson Education, India.
2. Nader F. Mir (2007), *Computer and Communication Networks*, Pearson Education, India.

**REFERENCE BOOKS:**

1. Behrouz A. Forouzan (2007), *Data Communications and Networking*, 4<sup>th</sup> edition, Tata McGraw Hill, India.
2. S. Keshav (2008), *An Engineering Approach to Computer Networking*, 3rd edition, Pearson Education, Asia.
3. Andrew S. Tanenbaum (2009), *Computer Networks*, 4<sup>th</sup> edition, Pearson Education, Asia.

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

## II SEMESTER

### ADVANCED DATABASE MANAGEMENT SYSTEMS

Course Code: B3207

L	P	C
3	-	3

#### UNIT - I

**INTRODUCTION:** Databases and database users, database system concepts and architecture, data modeling using the entity- relationship model, the enhanced entity-relationship model.

#### UNIT - II

**DATABASE DESIGN:** Theory and methodology, functional dependencies and normalization for relational databases, relational database design and algorithms and further dependencies.

#### UNIT - III

**THE RELATIONAL DATA MODEL AND RELATIONAL DATABASE CONSTRAINTS:** Relational algebra, relational calculus-tuple relational calculus, domain relational calculus. SQL-99 schema definitions, constraints.

#### UNIT - IV

**INTRODUCTION TO SQL PROGRAMMING TECHNIQUES:** Introduction to PL/SQL, more on PL/SQL. Database objects, stored procedures and functions, advantages of using a procedure or function, procedure versus functions, syntax for creating, deleting stored procedure and functions.

#### UNIT - V

**DISK STORAGE:** Basic file structures and hashing, indexing structures for files, algorithms for query processing and optimization.

#### UNIT - VI

**INTRODUCTION TO TRANSACTION PROCESSING CONCEPTS AND THEORY:** Concurrent control techniques, database recovery techniques.

#### UNIT - VII

**DISTRIBUTED DATABASE:** An overview, levels of distribution transparency, distributed database design, translation of global queries to fragment queries.

#### UNIT - VIII

**DATABASE SECURITY:** Concepts for object databases, enhanced data models for advanced applications, web database programming, emerging database technologies and applications.

#### TEXT BOOKS:

1. Abraham Silberchatz, Henry F. Korth, S. Sudarsan (2006), *Database System Concepts*, 5<sup>th</sup> edition, McGraw-Hill.
2. Stefano Ceri, Giuseppe Pelagatti(2008), *Distributed Databases Principles and Systems*, 2<sup>nd</sup> edition, Tata McGraw-Hill Education, New Delhi.
3. Ivan Bayross (2003), *SQL, PL/SQL: The Programming language of Oracle*, 3<sup>rd</sup> edition, BPB Publications, India.

#### REFERENCE BOOKS:

1. Ramez Elmasri, Shamkant B. Navathe (2008), *Fundamentals of Database Systems*, 5<sup>th</sup> edition, Pearson Education, India.
2. Thomas M. Connolly, Carolyn E. Begg(2003), *Database Systems - A Practical Approach to Design, Implementation and Management*, 3<sup>rd</sup> edition, Pearson Education.
3. Jeffrey D. Ullman, Jenifer Widom (2001), *A First Course in Database Systems*, Pearson Education Asia.
4. Rajesh Narang (2002), *Object Oriented Interfaces and Databases*, Prentice Hall of India.



# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

II SEMESTER

## COMPILER DESIGN

Course Code: B3208

L	P	C
3	-	3

### UNIT - I

**OVERVIEW OF COMPILATION:** Phases of compilation, lexical analysis, regular grammar and regular expression for common programming language features, pass and phases of translation, interpretation, bootstrapping, data structures in compilation, LEX lexical analyzer generator.

### UNIT - II

**PARSING:** Context free grammars, top down parsing - backtracking, LL (1), recursive descent parsing, predictive parsing, preprocessing steps required for predictive parsing.

### UNIT - III

**BOTTOM UP PARSING:** Shift reduce parsing, LR and LALR parsing, error recovery in parsing, handling ambiguous grammar, YACC - automatic parser generator.

### UNIT - IV

**SYNTAX DIRECTED TRANSLATION:** Syntax directed definition, construction of syntax trees, S-attributed and L-attributed definitions, translation schemes.

**INTERMEDIATE CODE GENERATION:** Intermediate forms of source programs, abstract syntax tree, polish notation and three address code, types of three address statements and its implementation, syntax directed translation into three address code, translation of simple statements, boolean expressions and flow of control statements.

### UNIT - V

**TYPE CHECKING:** Definition of type checking, type expressions, type systems, static and dynamic checking of types, specification of a simple type checker, equivalence of type expressions, type conversions, overloading of functions and operators.

**RUN TIME ENVIRONMENTS:** Source language issues, storage organization, storage allocation strategies, access to nonlocal names, parameter passing, symbol tables, language facilities for dynamic storage allocation.

### UNIT - VI

**CODE OPTIMIZATION:** Consideration for optimization, machine dependent and machine independent code optimization, scope of optimization, local optimization, frequency reduction, folding, DAG representation.

### UNIT - VII

**CODE GENERATOR:** Processing the intermediate code, interpretation, code generation, simple code generation, code generation for basic blocks, BURS code generation and dynamic programming, register allocation by graph coloring, evaluation of code generation techniques preprocessing the intermediate code, post processing the target code, machine code generation.

### UNIT - VIII

**DATA FLOW ANALYSIS:** Dataflow analysis, intermediate representation for flow analysis, various dataflow analyses. Transformations using dataflow analysis speeding up dataflow analysis, alias analysis.

**LOOP OPTIMIZATION:** Dominators, loop invariant computations, induction variables, array bounds checks, loop unrolling.

### TEXT BOOKS:

1. A. V. Aho, Ravi Sethi, J. D. Ullman(2008), *Compilers principles, techniques and tools* , 2<sup>nd</sup> edition, Pearson Education, India.
2. Kenneth C. Loudon (1997), *Compiler Construction Principles and Practice*, 1<sup>st</sup> edition, Course Technology, India.

### REFERENCE BOOKS:

1. Dick Grune, Henry E. Bal, Cariel J. H. Jacobs, Koen G. Langendoen(2003), *Modern compiler design*, wiley Dreamtech, India.
2. Keith D. Cooper, Linda Torczon (2003), *Engineering a Compiler*, Elsevier, USA.
3. K. L. P Mishra, N. Chandrashekar (2003), *Theory of computer science Automata Languages and computation*, 2<sup>nd</sup> edition, Prentice Hall of India.

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

II SEMESTER

## COMPUTER VISION AND PATTERN RECOGNITION (Professional Elective - III)

Course Code: B3257

L	P	C
3	-	3

### UNIT - I

**CAMERAS:** Pinhole cameras, camera with lenses, the human eye sensing. Radiometry, measuring light: light in space, light at surfaces, important special cases.

### UNIT - II

**SOURCES - SHADOWS AND SHADING:** Qualitative radiometry- sources and their effects- local shading models- application: photometric stereo- inter reflections: global shading models.

### UNIT - III

**LINEAR FILTERS:** Linear filters and convolution, shift invariant linear systems, spatial frequency and Fourier transforms, sampling and aliasing, filters as templates technique: normalized correlation and finding patterns technique: scale and image pyramids.

### UNIT - IV

**EDGE DETECTION:** Noise estimating derivatives, detecting edges.

**TEXTURE:** Representing texture, analysis using oriented pyramids and application: synthesizing textures for rendering shape for texture for planes.

### UNIT - V

**BASICS OF PATTERN RECOGNITION:** Introduction, features, feature vectors, and classifiers supervised, unsupervised, and semi-supervised learning, Bayesian decision theory, classifiers, discriminant functions, decision surfaces, normal density and discriminant functions, discrete features.

### UNIT - VI

**PARAMETER ESTIMATION METHODS:** Maximum-likelihood estimation, gaussian mixture models, expectation-maximization method, bayesian estimation, the nearest neighbor rule

### UNIT - VII

**LINEAR CLASSIFIERS:** the perceptron algorithm, linear discriminant functions and decision hyperplanes, support vector machines

### UNIT - VIII

**NONLINEAR CLASSIFIERS:** the XOR problem, the two-layer perceptron

**FEATURE SELECTION:** preprocessing, the peaking phenomenon, feature selection based on statistical hypothesis testing

### TEXT BOOKS:

1. David A. Forsyth, Jean Ponce (2003), Computer Vision: A Modern Approach, Prentice Hall of India.
2. S. Theodoridis, K. Koutroumbas (2009), Pattern Recognition, 4th edition, Academic Press.

### REFERENCE BOOKS:

1. Sommer (2001), Geometric Computing with Clifford Algebras: Theoretical Foundations and applications in Computer Vision and Robotics, 1st edition, Springer.
2. Sonka (2008), Digital Image Processing and Computer Vision, 1st edition, Thomson Learning.
3. Jack (2000), Computer Vision and Applications: Concise Edition (With CD), Academy Press.
4. R. O. Duda, P .E. Hart and D. G. Stork(2001), Pattern Classification, John Wiley, India.

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

## II SEMESTER

### WEB SECURITY (Professional Elective - III)

Course Code: B3258

L	P	C
3	-	3

#### Unit I:

**Introduction:** Overview of ISO's OSI model and TCP/IP model, Key Management, X.509 certificates, Public- Key Infrastructure (PKI), Remote user authentication using symmetric key encryption, Kerberos, Remote user authentication using asymmetric key encryption Federated Identity management, Biometrics

#### Unit II:

**Wireless Network Security** IEEE 802.11 Wireless LAN Overview: The Wi-Fi Alliance, IEEE 802 Protocol Architecture, IEEE 802.11 Network Components and Architectural Model, IEEE 802.11 Services, IEEE 802.11i

#### UNIT III

**Wireless LAN Security:** IEEE 802.11i Services, IEEE 802.11i Phases of Operation, Discovery Phase, Authentication Phase, Key Management Phase, Protected Data Transfer Phase, The IEEE 802.11i Pseudorandom Function,

#### Unit IV:

**WAP Security** :Wireless Application Protocol Overview: Operational Overview, WAP Architecture, Wireless Application environment, WAP Protocol Architecture, Wireless Transport Layer Security: WTLS Sessions and Connections, WTLS Protocol Architecture, Cryptographic Algorithms, WAP End-to-End Security

#### Unit V:

**Electronic Mail Security:** Pretty Good Privacy: Notation, Operational Description, Cryptographic Keys and Key Rings, Public-Key Management, S/MIME: RFC 5322, Multipurpose Internet Mail Extensions, S/MIME Functionality, S/MIME Messages, S/MIME Certificate Processing, Enhanced Security Services, Domain Keys Identified Mail : Internet Mail Architecture, E-mail Threats, DKIM Strategy, DKIM Functional Flow

#### Unit- VI:

**Web and IP Security Web security:** Web security requirements, Secure Sockets Layer (SSL), Transport Layer Security (TLS), and Secure Electronic Transaction (SET), HTTP S, Secure Shell (SSH),

#### UNIT VII

**IP Security:** IP Security overview, Architecture, Authentication, Encapsulating security payload, Combining security associations, Key management.

#### Unit –VIII:

**System Security Intruders,** Intrusion detection, Password management, malicious software, Viruses and related threats, Virus countermeasures, Distributed denial of service attacks, Firewalls: Firewall design principles, trusted systems.

#### Text books:

1. William Stallings "Cryptography and Network Security: Principles and Practice", 5<sup>th</sup> Edition, Pearson Education. (ISBN:978-81-317-6166-3)
2. Behrouz A. Forouzan, "Cryptography and Network Security", Tata McGraw-Hill. 2007, (ISBN:978-00-706-6046-5)

#### Reference Books:

1. Bernard Menezes, "Network Security And Cryptography", Cengage Learning, 2010 (ISBN : 978-81-315-1349)
2. Schneier B., "Applied Cryptography", 2nd Edition, Wiley & Sons. 2002, (ISBN: 0-471-11709-9)
3. Kaufman C., Perlman R. and Speciner M., "Network Security: Private communication in Public World", 2nd Edition, Prentice-Hall, 2002, (ISBN: 978-01-304-6019-6)

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

## II SEMESTER

### CLOUD COMPUTING (Professional Elective - III)

Course Code: B3259

L	P	C
3	-	3

#### UNIT - I

**CLOUD COMPUTING BASICS:** Cloud computing overview, applications, intranets and the cloud, first movers in the cloud.

#### UNIT - II

**YOUR ORGANIZATION AND CLOUD COMPUTING:** When you can use cloud computing, benefits, limitations, security concerns, regulatory issues.

**CLOUD COMPUTING WITH THE TITANS:** Google, EMC, netapp, Microsoft, Amazon, salesforce.com IBM, partnerships.

#### UNIT - III

**THE BUSINESS CASE FOR GOING TO THE CLOUD:** Cloud computing services, how those applications help your business, deleting your datacenter, salesforce.com and Thomson REUTERS.

#### UNIT - IV

**HARDWARE AND INFRASTRUCTURE:** Clients, security, network, services.

**ACCESSING THE CLOUD:** Platforms, web applications, web APIs, web browsers.

#### UNIT - V

**CLOUD STORAGE VENDORS:** Overview of cloud storage, cloud storage providers.

**STANDARDS:** Application, client, infrastructure, service.

#### UNIT - VI

**DEVELOPING CLOUD SERVICES:** Types of cloud service development, software as a service: overview, driving forces, company offerings, industries, software plus services: overview, mobile device integration, providers, microsoft online, platform as a service, web services, on-demand computing, discovering cloud services, development services and tools.

#### UNIT - VII

**DEVELOPING APPLICATIONS:** Google, Microsoft, intuit quick base, cast iron cloud, bungee connect development, troubleshooting, application management.

**LOCAL CLOUDS AND THIN CLIENTS:** Virtualization in your organization, server solutions, thin client's case study: Mcneilus steel.

#### UNIT - VIII

**MIGRATING TO THE CLOUD:** Cloud services for individuals, cloud services aimed at the mid-market, enterprise-class cloud offerings, migration.

**BEST PRACTICES AND THE FUTURE OF CLOUD COMPUTING:** Analyze your service, best practices, how cloud computing might evolve.

#### TEXT BOOKS:

1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter(2010), *Cloud Computing: A Practical Approach*, Mc Graw hill, New Delhi, India.
2. Michael Miller (2008), *Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online*, Que Publishing.

#### REFERENCE BOOKS:

1. Haley Beard (2008), *Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing*, Applications and Data Centers in the Cloud with SLAs, 2<sup>nd</sup> edition, Emereo Pty Limited, USA.
2. Tim Mather, Subra Kumaraswamy, Shahed Latif (2009), *Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance (Theory in Practice)*, 3<sup>rd</sup> edition, O'Reilly Media, Inc, India.

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

II SEMESTER

## INFORMATION RETRIVAL SYSTEMS (Professional Elective - IV)

Course Code: B3260

L	P	C
3	-	3

### UNIT - I

#### INTRODUCTION TO INFORMATION RETRIEVAL SYSTEMS:

Definition, Objectives, Functional Overview, Relationship to Database Management Systems, Digital Libraries and Data Warehouses.

**INFORMATION RETRIEVAL SYSTEM CAPABILITIES:** Search, Browse and Miscellaneous

### UNIT - II

**CATALOGING AND INDEXING:** Objectives, Indexing Process, Automatic Indexing, Information Extraction.

**DATA STRUCTURES:** Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hidden Markov Models.

### UNIT - III

**AUTOMATIC INDEXING:** Classes of Automatic Indexing, Statistical Indexing, Natural Language, Concept Indexing, Hypertext Linkages.

### UNIT - IV

**DOCUMENT AND TERM CLUSTERING:** Introduction, Thesaurus Generation, Item Clustering, Hierarchy of Clusters.

### UNIT - V

**USER SEARCH TECHNIQUES:** Search Statements and Binding, Similarity Measures and Ranking, Relevance Feedback, Selective Dissemination of Information Search, Weighted Searches of Boolean Systems, Searching the Internet and Hypertext.

### UNIT - VI

**INFORMATION VISUALIZATION:** Introduction, Cognition and Perception, Information Visualization Technologies.

**TEXT SEARCH ALGORITHMS:** Introduction, Software Text Search Algorithms, Hardware Text Search Systems.

### UNIT - VII

**INFORMATION SYSTEM EVALUATION:** Introduction, Measures used in System Evaluation, Measurement Example - TREC results.

### UNIT - VIII

**MULTIMEDIA INFORMATION RETRIEVAL:** Models and Languages, Data Modeling Query Languages, Indexing and Searching.

**LIBRARIES AND BIBLIOGRAPHICAL SYSTEMS:** Online IR Systems, OPACs, Digital Libraries.

#### TEXT BOOKS:

1. Gerald J. Kowalski, Mark T. Maybury (2000), Information Storage and Retrieval Systems: Theory and Implementation, 2<sup>nd</sup> edition, Springer International Edition, USA.
2. Ricardo Baeza Yates, Berthier Ribeiro Neto (2009), Modern Information Retrieval, Pearson Education, India.

#### REFERENCE BOOKS:

1. Robert R. Korfhage (1997), Information Storage and Retrieval, John Wiley & Sons, India Edition, India.
2. Frakes W. B, Ricardo Baeza Yates (1992), Information Retrieval Data Structures and Algorithms, Pearson Education / Prentice Hall of India, New Delhi, India.

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

II SEMESTER

## MACHINE LEARNING (Professional Elective - IV)

Course Code: B3261

L	P	C
3	-	3

### UNIT I

**INTRODUCTION:** Well- posed learning problems, Designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias

### UNIT II

**DECISION TREE LEARNING :** Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning

### UNIT III

**ARTIFICIAL NEURAL NETWORKS:** Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition Advanced topics in artificial neural networks

**EVALUATION HYPOTHESES:** Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

### UNIT IV

**BAYESIAN LEARNING:** Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm

### UNIT V

**COMPUTATIONAL LEARNING THEORY :** Introduction, Probability learning an approximately correct hypothesis, Sample complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The mistake bound model of learning

Instance Based Learning-Introduction, k -Nearest Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning Genetic Algorithms–Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

### UNIT VI

**LEARNING SETS OF RULES:** Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution Analytical Learning

Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation

Based Learning of Search Control Knowledge

### UNIT VII

**COMBINING INDUCTIVE AND ANALYTICAL LEARNING:** Motivation, Inductive Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators

### UNIT VIII

**REINFORCEMENT LEARNING:** Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming.

#### **TEXT BOOKS:**

1. Machine Learning Tom M. Mitchell, MGH 2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC)

#### **REFERENCE BOOKS:**

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William WHsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1999

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

II SEMESTER

## DESIGN PATTERNS (Professional Elective - IV)

Course Code: B3262

L	P	C
3	-	3

### UNIT-I

**Introduction** : What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

### UNIT-II

**A Case Study** : Designing a Document Editor : Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary .

### UNIT III

**Creational Patterns** : Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

### UNIT-IV

**Structural Pattern Part-I** : Adapter, Bridge, Composite.

### UNIT V

**Structural Pattern Part-II** : Decorator, façade, Flyweight, Proxy.

### UNIT-VI

**Behavioral Patterns Part-I** : Chain of Responsibility, Command, Interpreter, Iterator. Behavioral Patterns Part-II : Mediator, Memento, Observer.

### UNIT-V II

**Behavioral Patterns Part-II** (cont'd): State, Strategy, Template Method, Visitor, Discussion of Behavioral Patterns. What to Expect from Design Patterns,

### UNIT VIII

A Brief History, The Pattern Community An Invitation, A Parting Thought.

### TEXT BOOK :

1. Design Patterns By Erich Gamma, Pearson Education

### REFERENCES :

1. Pattern's in JAVA Vol-I By Mark Grand ,Wiley DreamTech.
2. Pattern's in JAVA Vol-II By Mark Grand ,Wiley DreamTech.
3. JAVA Enterprise Design Patterns Vol-III By Mark Grand ,Wiley DreamTech.
4. Head First Design Patterns By Eric Freeman-Oreilly-spd
5. Design Patterns Explained By Alan Shalloway, Pearson Education.
6. Pattern Oriented Software Architecture, F. Buschmann & others, John Wiley & Sons



# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

II SEMESTER

## ADVANCE DATABASE MANAGEMENT SYSTEMS AND CASE TOOLS LAB

Course Code: B3209

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### I. DATABASE MANAGEMENT SYSTEMS LAB

#### DESCRIPTION OF SALES DATABASE

ABC is a company operating in the country with a chain of shopping centers in various cities. Everyday large numbers of items are sold in different shopping centers. The Sales database comprises of various tables like CUST, PROD, SALES\_DETAIL, STATE\_NAME with the following schemas.

#### CUST TABLE

Name	Type	Remark
CID	VARCHAR2(6)	PRIMARY KEY
CNAME	VARCHAR2(10)	
CCITY	VARCHAR2(8)	

#### PROD TABLE

Name	Type	Remark
PID	VARCHAR2(6)	PRIMARY KEY
PNAME	VARCHAR2(6)	
PCOST	NUMBER(4,2)	
PPROFIT	NUMBER(3)	

#### SALES\_DETAIL

Name	Type	Remark
CID	VARCHAR2(6)	COMPOSITE PRIMARY KEY
PID	VARCHAR2(6)	COMPOSITE PRIMARY KEY
SALE	NUMBER(3)	
SALEDT	DATE	COMPOSITE PRIMARY KEY

#### STATE\_NAME

Name	Type	Remark
CCITY	VARCHAR2(8)	PRIMARY KEY
STATE	VARCHAR2(15)	

#### 1. DATA RETRIEVAL

- Write a query to display all columns of CUST table.
- Write a query to display pname of all records. Sort all records by pname. (use order by clause)
- Write a query to display cname and ccity of all records. Sort by ccity in descending order.
- Write a query to display cname, ccity who lives in mysore.
- Write a query to display cname, pname, sale, saledt for all customers.
- Write a query to display cname who have purchased Pen.
- Write a query to display saledt and total sale on the date labeled as sale of all items sold after 01-sep-2010.
- Write a query to display saledt and total sale on the date labeled as sale of all items other than DVD.
- Write a query to display cname and ccity of all customers who live in Kolkata or Chennai.

#### 2. USE OF DISTINCT, BETWEEN, IN CLAUSE, LIKE OPERATOR, DUAL

- Write a query to display the pname and pcost of all the customers where pcost lies between 5 and 25.
- Find the product ids in sale\_detail table(eliminating duplicates).
- Write a query to display distinct customer id where product id is p3 or sale date is '18-mar-2011'.
- Write a query to display cname, pid and saledt of those customers whose cid is in c1 or c2 or c4 or c5.
- Write a query to display cname, pid, saledt of those customers whose pid is p3 or sale date is '20-dec-2009'.
- Write a query to display system date.
- Write a query to display all records of prod table in which first and third character of pname is any character and second character is 'E'.

- h) Write a query to display all cname which includes two 'A' in the name.

### 3. CONSTRAINTS

- a) Implement table level and Column level constraints like NOT NULL, UNIQUE, PRIMARY KEY, FOREIGN KEY, CHECK.

### 4. SINGLE ROW FUNCTIONS: DATE FUNCTION

- a) Write a query to display the system date by rounding it to next month.
- b) Write a query to display the system date by rounding it to next year.
- c) Write a query to display the last date of the system date.
- d) Write a query to display the next date of system date which is Friday.
- e) Write a query to display sale date and date after 02 months from sale date.
- f) Write a query to display system date, sale date and months between two dates.
- g) Write a query to display the greatest date between sale date and system date, name it as BIG, also display sale date and SYSDATE.
- h) Write a query to display the least date between sale date and system date name it as SMALL, also display sale date and SYSDATE.

### 5. SINGLE ROW FUNCTIONS: NUMERIC AND CHARACTER FUNCTION

- a) Write a query to display the product name along with the rounded value of product cost for product name is "Pencil".
- b) Write a query to display product cost along with MOD value if divided by 5.
- c) Write a query to display cname in uppercase, lowercase, titlecase from cust table where customer name is "rohan".
- d) Write a query to display all concatenated value of cname, ccity by converting cname into titlecase and ccity into uppercase.
- e) Write a query to display the first 3 characters of cname.
- f) Write a query to display the position of 'M' in the cname of the customer whose name is "SAMHITA".
- g) Write a query to display the length of all customer names.
- h) PAD # character in left of product cost to a total width of 5 character position.

### 6. GROUP FUNCTIONS AND SET FUNCTIONS

- a) Write a query to display the total count of customer.
- b) Write a query to display the minimum cost of product.
- c) Write a query to display average value of product cost rounded to 2<sup>nd</sup> decimal places.
- d) Write a query to display product name with total sale detail in descending order.
- e) Write a query to display product name, sale date and total amount collected for the product.
- f) Write a query to display sale date and total sale date wise which was sold after "14-jul-08".
- g) Write a query to display the customer name who belongs to those places whose name is having I or P.
- h) Write a query to display customer name who belongs to a city whose name contains characters 'C' and whose name contains character 'A'.
- i) Write a query to display the customer name who does not belong to PUNE.

### 7. PL/SQL

- a) Write a PL/SQL program to find largest number among three. (Hint: Use Conditional Statement)
- b) Write a PL/SQL program to display the sum of numbers from 1 to N using for loop, loop...end and while...loop.

### 8. TRIGGERS

- a) Develop a PL/SQL program using BEFORE and AFTER triggers.

### 9. CURSORS

- a) Declare a cursor that defines a result set. Open the cursor to establish the result set. Fetch the data into local variables as needed from the cursor, one row at a time. Close the cursor when done.

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

## SOFTWARE ENGINEERING PRINCIPLES (OPEN ELECTIVE)

Course Code: B3271

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### UNIT - I

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

### UNIT - II

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

### UNIT - III

**SOFTWARE REQUIREMENTS:** Introduction to functional and non-functional requirements, requirements engineering activities, eliciting requirements, requirements modeling, requirements validation, software requirements specification (SRS), requirements management, requirements modeling.

**STRUCTURED VIEW:** Data modeling (ERD), functional modeling (DFD) and behavioral modeling.

**OBJECT ORIENTED VIEW:** Use cases, CRC modeling, analysis classes, collaborations, responsibilities, object relationship model, object behavior model.

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

### UNIT - IV

**DESIGN CONCEPTS:** Software design quality guidelines and attributes - design concepts.

**SOFTWARE ARCHITECTURE:** Architecture and its importance - architectural styles - data design - architectural design.

**DESIGN: STRUCTURED VIEW (TRADITIONAL VIEW):** Architectural mapping using data flow (call and return architecture), interface design, function based component design.

**OBJECT ORIENTED VIEW:** Object oriented architecture, class hierarchies, message design, class based component design.

### UNIT - V

**PERFORMING USER INTERFACE DESIGN:** Golden rules, user interface analysis and design, interface analysis, interface design steps.

**PATTERN BASED DESIGN:** Design patterns, pattern based software design, architectural patterns, component level design patterns, user interface design patterns.

### UNIT - VI

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

### UNIT - VII

**TESTING CONVENTIONAL APPLICATIONS:** Software testing fundamentals.

**WHITE-BOX TESTING:** Basis path testing, condition (predicate) testing, data flow testing, loop testing.

**BLACK BOX TESTING:** Equivalence partitioning, boundary value analysis, graph based testing methods.

**TESTING OBJECT ORIENTED APPLICATIONS:** Object oriented testing methods, testing methods applicable at class level, interclass test case design.

### UNIT - VIII

**UMBRELLA ACTIVITIES:** Risk management, software quality assurance, software configuration management.

**MEASUREMENT AND METRICS:** Size oriented metrics, function oriented metrics, metrics for software quality

**PRODUCT METRICS:** Metrics for the requirements model, metrics for the design model, metrics for source code, metrics for testing, metrics for maintenance.

**SOFTWARE REENGINEERING:** A software reengineering process model, software reengineering activities.

### TEXT BOOKS:

1. Roger S. Pressman (2009), *Software Engineering: A practitioner's Approach*, 7<sup>th</sup> edition, McGraw Hill, India.
2. Lan Sommerville (2004), *Software Engineering*, 7<sup>th</sup> edition, Addison Wesley, India.

### REFERENCE BOOKS:

1. K.K. Agarwal , Yogesh Singh(2008), *Software Engineering*, 1<sup>st</sup> edition, New Age International Private Limited, New Delhi, India.
2. James F. Peters, Witold Pedrycz (2000), *Software Engineering: An Engineering Approach*, John Wiley & Sons.
3. Gary B. Shelly, Thomas J. Cashman, Harry J. Rosenblatt (2007), *Systems Analysis and Design*, 7<sup>th</sup> edition, Cengage Learning, India..
4. Waman S. Jawadekar (2008), *Software Engineering: Principles and practice*, Tata McGraw Hill Publishing Company Limited, New Delhi.

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

**HUMAN COMPUTER INTERACTION**  
(OPEN ELECTIVE)

Course Code: B3272

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**UNIT I**

**INTRODUCTION:** Importance of user Interface – definition, importance of good design. Benefits of good design. A brief history of Screen design,

**UNIT II**

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

**UNIT III**

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

**UNIT IV**

**SCREEN DESIGNING:** Design goals – Screen planning and purpose, organizing screen elements, ordering of screen data and content – screen navigation and flow – Visually pleasing composition – amount of information – focus and emphasis – presentation information simply and meaningfully – information retrieval on web – statistical graphics – Technological consideration in interface design.

**UNIT V**

**WINDOWS:** New and Navigation schemes selection of window, selection of devices based and screen based controls.

**UNIT VI**

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

**UNIT VII**

**SOFTWARE TOOLS :** Specification methods, interface – Building Tools.

**UNIT VIII**

**INTERACTION DEVICES:** Keyboard and function keys – pointing devices – speech recognition digitization and generation – image and video displays – drivers.

**TEXT BOOKS:**

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

**REFERENCE BOOKS:**

1. Human – Computer Interaction. Alan Dix, Janet Fincay, Gre Goryd, Abowd, Russell Bealg, Pearson Education
2. Interaction Design Prece, Rogers, Sharps. Wiley Dreamtech.
3. User Interface Design, Soren Lauesen, Pearson Education.
4. Human –Computer Interaction, D.R.Olsen, Cengage Learning.
5. Human –Computer Interaction, Smith - Atakan, Cengage Learning.

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

**COMPUTER GRAPHICS CONCEPTS**  
(OPEN ELECTIVE)

Course Code: B3273

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3	-	3

**UNIT - I**

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

**UNIT - II**

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

**UNIT - III**

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

**UNIT - IV**

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

**UNIT - V**

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

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

**UNIT - VI**

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

**UNIT - VII**

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

**UNIT - VIII**

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

**TEXT BOOKS:**

1. Donald Hearn, M. Pauline Baker (2011), *Computer Graphics with Open GL*, 3<sup>rd</sup> edition, Pearson Education, India.

**REFERENCE BOOKS:**

1. David F. Rogers (1998), *Procedural elements for Computer Graphics*, 2<sup>nd</sup> edition, Tata Mc Graw Hill, New Delhi, India.
2. Steven Harrington (1987), *Computer Graphics*, 2<sup>nd</sup> edition, Schaum's outlines, Tata Mc Graw Hill Edition, USA.
3. Zhigand xiang, Roy Plastock (2000), *Computer Graphics*, 2 edition, Tata Mc Graw Hill, New Delhi, India.

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

**FUNDAMENTALS OF SOFTWARE TESTING AND QUALITY ASSURANCE**  
(OPEN ELECTIVE)

Course Code: B3274

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**UNIT - I**

**INTRODUCTION AND THE TAXONOMY OF BUGS:** Purpose of testing, some dichotomies, a model for testing, the consequences of bugs, taxonomy for bugs, some bug statistics.

**UNIT - II**

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

**UNIT - III**

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

**UNIT - IV**

**DOMAIN TESTING:** Domains and paths, nice and ugly domains, domain testing, domains and interfaces testing, domains and testability.

**UNIT - V**

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

**UNIT - VI**

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

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

**UNIT - VII**

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

**UNIT - VIII**

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

**TEXT BOOKS:**

1. Boris Beizer (2004), *Software Testing Techniques*, 2<sup>nd</sup> edition, Dreamtech Press, New Delhi, India.
2. Dr. K. V. K. K. Prasad (2005), *Software Testing Tools*, Dreamtech Press, India.

**REFERENCE BOOKS:**

1. William E. Perry (2006), *Effective methods of Software Testing*, 3<sup>rd</sup> edition, John Wiley Edition, USA.
2. Meyers (2004), *Art of Software Testing*, 2<sup>nd</sup> edition, John Wiley, New Jersey, USA.

**UNIT - I**

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

**UNIT - II**

**ARM PROCESSOR AS SYSTEM-ON-CHIP:** Acron RISC Machine-Architecture Inherence-Arm Programming Model-ARM Development Tools-3 and 5 Stage Pipeline ARM Organization-ARM Instruction Execution and Implementation-ARM Co-Processor Interface.

**UNIT - III**

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

**UNIT - IV**

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

**UNIT - V**

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

**UNIT - VI**

**ARCHITECTURAL SUPPORT FOR SYSTEM DEVELOPMENT:** Advanced Microcontroller Bus Architecture (AMBA), ARM Memory Interface, ARM Reference Peripheral Specification, Hardware System Prototyping Tools, Armulator, Debug Architecture.

**UNIT - VII**

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

**UNIT - VIII**

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

**TEXT BOOKS:**

1. Steve Furber (2000), *ARM System on Chip Architecture*, 2<sup>nd</sup> edition, Addison Wesley Professional, England
2. Ricardo Reis (2004), *Design of System on a Chip: Devices and Components*, 1<sup>st</sup> edition, Springer, Netherlands.

**REFERENCE BOOKS:**

1. Jason Andrews (2004), *Co Verification of Hardware and Software for ARM System on Chip Design Embedded Technology*, Newnes Publications, USA.
2. Prakash Rashinkar, Peter Paterson, Leena Sing L (2001), *System on Chip Verification-Methodologies and Techniques*, Kluwer Academic Publishers, USA.

**UNIT – I**

**INTRODUCTION SECURITY ATTACKS:** Interruption, interception, modification and fabrication.

**SECURITY SERVICES:** Confidentiality, authentication, integrity, non repudiation, access control and availability.

**SECURITY MECHANISMS:** A model for internetwork security, internet standards and RFCs, conventional encryption principles, ceaser cipher, hill cipher, poly and mono alphabetic cipher.

**UNIT - II**

**ENCRYPTION PRINCIPLES:** Conventional encryption algorithms: Feistel structure, DES algorithm, S: Boxes, Triple DES, advanced data encryption standard (AES), cipher block modes of operation, location of encryption devices, Key distribution Approaches.

**UNIT – III**

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

**UNIT – IV**

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

**UNIT – V**

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

**UNIT – VI**

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

**UNIT – VII**

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

**UNIT – VIII**

**MALICIOUS SOFTWARE:** Viruses and related threats, virus counter measures, distributed denial of service attacks.

**FIREWALLS:** Firewall design principles, trusted systems, common criteria for information technology security evolution.

**TEXT BOOKS:**

1. William Stallings (2007), *Network Security Essentials (Applications and Standards)*, 3<sup>rd</sup> Edition, Pearson Education, New Delhi, India.
2. William Stallings (1998), *Cryptography and network Security*, 3<sup>rd</sup> Edition, Prentice Hall of India, New Delhi, India.

**REFERENCE BOOKS:**

1. Eric Maiwald (2004), *Fundamentals of Network Security*, Dreamtech press, India.
2. Charlie Kaufman, Radia Perlman, Mike Speciner (2002), *Network Security: Private Communication in a Public World*, 2<sup>nd</sup> Edition, Pearson Education, India.
3. Robert Bragg, Mark Rhodes (2004), *Network Security: The Complete Reference*, Tata Mcgraw Hill, New Delhi.
4. Buchmann (2004), *Introduction to Cryptography*, 2<sup>nd</sup> Edition, Springer, USA.



**UNIT – I**

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

**UNIT – II**

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

**UNIT – III**

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

**UNIT – IV**

**INTRA-DOMAIN ROUTING:** RIP, EIGRP, OSPF, PNNI, IS-IS, QoS routing, Traffic engineering and routing

**INTER-DOMAIN ROUTING:** Autonomous systems, Policy routing, EGP, BGP, CIDR.

**UNIT – V**

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

**UNIT – VI**

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

**UNIT – VII**

**MULTICAST, GROUPS, SCOPES & TREES:** Multicast addresses, Group management: IGMP, Multicast routing and forwarding, MBONE, PIM, Multicast transport protocols: reliability, congestion, Application-layer multicast.

**UNIT – VIII**

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

**TEXT BOOKS:**

1. Douglas Comer, (2006) Internetworking with TCP/IP Vol. I: Principles, Protocols, and Architecture; 5th edition, Prentice Hall, ISBN #: 0131876716.

**REFERENCES:**

1. Radia Perlman, (2011) Inter connections, Bridges, Router, Switches and internetworking protocols, 2<sup>nd</sup> Edition

**UNIT I**

**IP NETWORKS:** Open Data Network Model – Narrow Waist Model of the Internet - Success and Limitations of the Internet – Suggested Improvements for IP and TCP – Significance of UDP in modern Communication – Network level Solutions – End to End Solutions - Best Effort service model – Scheduling and dropping policies for Best Effort Service model.

**UNIT II**

**ADVANCED ROUTING:** Intra AS routing – Inter AS routing – Router Architecture – Switch Fabric – Active Queue Management – Head of Line blocking – Transition from IPv4 to IPv6.

**UNIT III**

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

**UNIT IV**

**GUARANTEED SERVICE MODEL:** Best Effort service model – Scheduling and Dropping policies – Network Performance Parameters – Quality of Service and metrics – WFQ and its variants – Random Early Detection.

**UNIT V**

**QoS AWARE ROUTING:** Admission Control, Resource Reservation, RSVP, Traffic Shaping Algorithms, Caching, Laissez Faire Approach, Possible Architectures, An Overview of QoS Architectures.

**UNIT VI**

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

**UNIT-VII**

**STREAMING OF AUDIO AND VIDEO:** JITTER – Fixed playout and Adaptive play out, Recovering from packet loss, RTSP, Multimedia Communication Standards, RTP/RTCP – SIP and H.263.

**UNIT VIII**

**WIRELESS MULTIMEDIA COMMUNICATION:** End to End QoS provisioning in Wireless Multimedia Networks – Adaptive Framework – MAC layer QoS enhancements in Wireless Networks – A.

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

**TEXT BOOKS:**

1. Jean Warland and Pravin Vareya, 'High Performance Networks', Morgan Kauffman Publishers, 2002
2. Mahbub Hassan and Raj Jain, 'High Performance TC P/IP Networking', Pearson Education, 2004.
3. William Stallings, 'High Speed Networks: Performance and Quality of Service', 2<sup>nd</sup> Edition, Pearson Education, 2002.

**REFERENCES:**

1. Kurose and Ross, 'Computer Networks : A top down Approach', Pearson Education, 2002
2. Nalin K Sharda, 'Multimedia Information Networking', Prentice Hall of India, 1999
3. Aura Ganz, Zvi Ganz and Kitti Wongthawaravat, 'Multimedia Wireless Networks: Technologies, Standards and QoS', Prentice Hall, 2003.
4. Ellen Kayata Wesel, 'Wireless Multimedia Communications: Networking Video, Voice and Data', Addison Wesley, 1998.

**UNIT - I**

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

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

**UNIT - II**

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

**UNIT - III**

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

**UNIT - IV**

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

**UNIT - V**

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

**UNIT - VI**

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

**SWITCHING NETWORKS:** Single-state networks, grading, link systems, grades of service of link systems, application of graph theory to link systems, use of expansion, call packing, rearrangeable networks, strict-sense non-blocking networks, sectionalized switching networks.

**UNIT - VII**

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

**UNIT - VIII**

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

**TEXT BOOKS:**

1. Thyagarajan Viswanath (2000), *Tele communication switching system and networks*, Prentice Hall of India, New Delhi, India.
2. J. E. Flood (2006), *Telecommunication switching, Traffic and Networks*, Pearson Education, India.

**REFERENCE BOOKS:**

1. J. Bellamy (2001), *Digital telephony*, 2<sup>nd</sup> edition, John Wiley and Sons, India.
  2. Achyut S. Godbole (2004), *Data Communications & Networks*, Tata McGraw Hill, India.
  3. H. Taub, D. Schilling (2003), *Principles of Communication Systems*, 2<sup>nd</sup> Edition, Tata McGraw Hill, India.
  4. B.A. Forouzan (2004), *Data Communications & Networking*, 3<sup>rd</sup> Edition, Tata McGraw Hill, India.
- Roger L. Freeman (2004), *Telecommunication System Engineering*, 4<sup>th</sup> edition, Wiley-Inters, India.

**UNIT - I**

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

**UNIT - II**

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

**UNIT - III**

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

**UNIT - IV**

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

**UNIT - V**

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

**UNIT - VI**

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

**UNIT - VII**

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

**UNIT - VIII**

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

**TEXT BOOKS:**

1. Asoke K. Talukder, Roopa R Yavagal (2009), *Mobile computing – Technology, Applications and Service Creation*, Tata McGraw Hill, New Delhi.
2. Jochen Schiller (2008), *Mobile Communications*, 2<sup>nd</sup> Edition, Pearson Education, New Delhi.

**REFERENCE BOOKS:**

1. Vieri Vaughni, Alexander Damn Jaonvic (2007), *The CDMA 2000 system for Mobile Communications*, Pearson Education, New Delhi.
2. Adalestein (2008), *Fundamentals of Mobile & Pervasive Computing*, Tata McGraw Hill, New Delhi.

**UNIT I**

**INTRODUCTION:** A Brief Networking History, The Need for Speed and Quality of Service, Advanced TCP/IP and ATM Networks.

**HIGH SPEED NETWORKS:** Frame Relay Networks – Asynchronous transfer mode – ATM Protocol Architecture, ATM logical Connection, ATM Cell – ATM Service Categories – AAL.

**UNIT II**

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

**UNIT III**

**CONGESTION:** Queuing Analysis- Queuing Models – Single Server Queues – Effects of Congestion – Congestion Control.

**UNIT IV**

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

**UNIT V**

**TCP CONGESTION CONTROL:** TCP Flow control – TCP Congestion Control – Retransmission – Timer Management – Exponential RTO backoff – KARN's Algorithm – Window management – Performance of TCP over ATM.

**UNIT VI**

**ATM CONGESTION CONTROL:** Traffic and Congestion control in ATM – Requirements – Attributes –90, Traffic Management Frame work, Traffic Control – ABR traffic Management – ABR rate control, RM cell formats, ABR Capacity allocations – GFR traffic management.

**UNIT VII**

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

**UNIT VIII**

**PROTOCOLS FOR QOS SUPPORT 9:** RSVP – Goals & Characteristics, Data Flow, RSVP operations, Protocol Mechanisms – Multiprotocol Label Switching – Operations, Label Stacking, Protocol details – RTP – Protocol Architecture, Data Transfer Protocol, RTCP.

**TEXT BOOKS:**

1. William Stallings, "HIGH SPEED NETWORKS AND INTERNET", Pearson Education, Second Edition, 2002.

**REFERENCES:**

1. Warland, Pravin Varaiya, "High performance communication networks", Second Edition, Jean Harcourt Asia Pvt. Ltd., , 2001.
2. Irvan Pepelnjk, Jim Guichard, Jeff Aparcar, "MPLS and VPN architecture", Cisco Press, Volume 1 and 2, 2003.
3. Abhijit S. Pandya, Ercan Sea, "ATM Technology for Broad Band Telecommunication Networks", CRC Press, New York, 2004.

**UNIT – I**

**Overview of Metal-Oxide-Semiconductor (MOS) Transistors:** Introduction, Moore's law, Feature sizes of a transistors and a chip, Physics of silicon, Silicon Devices, MOS transistors.

**UNIT – II**

**Silicon Wafer Preparation for MOS Transistor Fabrication:** Introduction, Silicon Crystal Structure, Defects in a Silicon crystal, Single Crystalline Silicon – Wafer fabrication for MOS transistors applications, Fabrication and specifications of the silicon wafer, defects and impurities in the silicon wafer, wafer contaminations.

**UNIT – III**

**MOS Transistor Process Flow:** Introduction, MOS Transistor fabrication, Device Isolation, CMOS Fabrication.

**UNIT – IV**

**Oxidation:** Introduction, Structure of Silicon Dioxide, Oxidation equipment and process, Kinetics of Oxidation, Silicon Oxide Characterisation, Electrical Characterization of MOS capacitance.

**Mask:** Introduction, Properties of Mask, Types of masks and mask fabrication techniques.

**UNIT – V**

**Lithography:** Introduction, Photolithography Process, Photo-resist, Non-photo-resist, Ion – Beam Lithography.

**Etching:** Introduction, Etching Techniques, Wet Etching, Dry Etching.

**UNIT – VI**

**Diffusion:** Introduction, Diffusion Equipment and Process, Diffusion Models, Modification of Fick's Law, Oxidation Effects on Diffusion.

**UNIT – VII**

**Ion – Implantation:** Introduction, Ion – Implantation Equipment and parameters, Advantages and Disadvantages.

**UNIT – VIII**

**Thin Film Deposition:** Introduction, Film-Deposition Techniques, Metal Wirings and Contacts, Metal Film Deposition Techniques, Film thickness Measurements.

**TEXT BOOKS:**

1. Gouranga Bose, "IC Fabrication Tech", McGraw Hill Education (India) Edition 2014.
2. S. M. SZE, "VLSI Technology", Second Edition, Tata McGraw Hill Publishing Company Limited 2008.

**REFERENCE BOOKS:**

1. S. M. SZE, "Semiconductor Devices – Physics and Technology", 2<sup>nd</sup> Edition, Gurukripa Enterprises, Delhi, 2009

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

M. Tech. CSE II SEMESTER

**NANO TECHNOLOGY APPLICATIONS TO ELECTRICAL ENGINEERING**  
(Open Elective)

Course Code: B3371

L P C  
3 0 3

**UNIT – I**

**INTRODUCTION**

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

**UNIT – II**

**RENEWABLE ENERGY TECHNOLOGY**

Energy challenges - Development and implementation of renewable energy technologies - Nanotechnology enabled renewable energy technologies -Energy transport.

**UNIT – III**

**RENEWABLE ENERGY CONVERSION AND STORAGE**

Energy conversion and storage - Nano, micro, poly crystalline Silicon and amorphous Silicon for solar cells, Silicon-composite structure, Techniques for Si deposition.

**UNIT – IV**

**MICRO FUEL-CELL TECHNOLOGY**

Micro-fuel cell technologies, integration and performance of micro-fuel cell systems - Thin film and micro fabrication methods - Design methodologies - Micro-fuel cell power sources.

**UNIT – V**

**MICROFLUIDIC SYSTEMS-I**

Nano-electromechanical systems and novel micro fluidic devices - Nano engines – Driving mechanisms.

**UNIT – VI**

**MICROFLUIDIC SYSTEMS-II**

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

**UNIT – VII**

**HYDROGEN STORAGE METHODS-I**

Hydrogen storage methods - Metal hydrides and size effects - Hydrogen storage capacity -Hydrogen reaction kinetics - Carbon-free cycle.

**UNIT – VIII**

**HYDROGEN STORAGE METHODS-II**

Gravimetric and volumetric storage capacities – Hydriding / Dehydriding kinetics - High enthalpy of formation and thermal management during the hydriding reaction.

**TEXT BOOKS:**

1. J. Twidell and T. Weir, *Renewable Energy Resources*, E & F N Spon Ltd, London, (1986).
2. Martin A Green, *Solar cells: Operating principles, technology and system applications*, Prentice Hall Inc, Englewood Cliffs, NJ, USA, (1981).
3. H J Moller, *Semiconductor for solar cells*, Artech House Inc, MA, USA, (1993).
4. Ben G Streetman, *Solis state electronic device*, Prentice Hall of India Pvt Ltd., New Delhi (1995).

**REFERENCE BOOKS:**

1. M.A. Kettani , *Direct energy conversion*, Addison Wesley Reading, (1970).
2. Linden , *Hand book of Batteries and fuel cells*, Mc Graw Hill, (1984).
3. Hoogers , *Fuel cell technology handbook*. CRC Press, (2003).
4. Vielstich, *Handbook of fuel cells: Fuel cell technology and applications*, Wiley, CRC Press, (2003).

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

M. Tech. CSE II SEMESTER

**SOLAR ENERGY AND APPLICATIONS**  
(Open Elective)

Course Code: B3372

L	P	C
3	0	3

**UNIT - I**

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

**UNIT - II**

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

**UNIT - III**

**STORAGE AND APPLICATIONS:** Different methods of solar energy storage, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating /cooling technique, solar distillation and drying.

**UNIT - IV**

**PHOTO VOLTAICS (PV):** Fundamentals of solar cells, types of solar cells, semiconducting materials, band gap theory, absorption of photons, excitations and photo emission of electrons, band engineering.

**UNIT - V**

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

**UNIT - VI**

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

**UNIT - VII**

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

**UNIT - VIII**

**ALTERNATIVE ENERGY SOURCES:** Solar Energy: Types of devices for Solar Energy Collection, Thermal Storage System. Control Systems, Wind Energy, Availability, Wind Devices, Wind Characteristics, Performance of Turbines and systems.

**TEXT BOOKS:**

1. G. D. Rai (2009), *Non-Conventional Energy Sources*, 4<sup>th</sup> edition, Khanna Publishers, New Delhi.
2. Martin A. Green (2008), *Solar Cells: Operating Principles, Technology and system Applications*, 1<sup>st</sup> edition, Prentice Hall, New Delhi.

**REFERENCES BOOKS:**

1. Sukatme (2008), *Solar Energy*, 3<sup>rd</sup> Edition, McGraw Hill Companies, New Delhi.
2. D. Yogi gosuami, Frank Kreith, Jan F. Kreider (2000), *Principles of Solar Engineering*, 2<sup>nd</sup> edition, Taylor & Francis, USA.



**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

M. Tech. CSE II SEMESTER

**INDUSTRIAL ELECTRONICS**  
(Open Elective)

Course Code: B3373

L P C  
3 0 3

**UNIT - I**

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

**UNIT – II**

**SIGNAL CONDITIONING** : Introduction – Hardware - Digital I/O , Analog input – ADC , resolution , speed channels Filtering Noise using passive components – Resistors, capacitors - Amplifying signals using OP amps –Software - Digital Signal Processing – Low pass , high pass , notch filtering

**UNIT – III**

**PRECISION MECHANICAL SYSTEMS** : Pneumatic Actuation Systems - Electro-pneumatic Actuation Systems - Hydraulic Actuation Systems - Electro-hydraulic Actuation Systems - Timing Belts – Ball Screw and Nut - Linear Motion Guides - Linear Bearings - Harmonic Transmission - Bearings- Motor / Drive Selection.

**UNIT – IV**

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

**UNIT – V**

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

**UNIT – VI**

**MICROCONTROLLERS OVERVIEW** : 8051 Microcontroller , micro processor structure – Digital Interfacing - Analog Interfacing - Digital to Analog Convertors - Analog to Digital Convertors - Applications. Programming –Assembly , C ( LED Blinking , Voltage measurement using ADC).

**UNIT – VII**

**PROGRAMMABLE LOGIC CONTROLLERS** : Basic Structure - Programming : Ladder diagram - Timers, Internal Relays and Counters - Shift Registers - Master and Jump Controls - Data Handling -Analog input / output - PLC Selection - Application.

**Unit – VIII**

**PROGRAMMABLE MOTION CONTROLLERS** : Introduction - System Transfer Function – Laplace transform and its application in analysing differential equation of a control system - Feedback Devices : Position , Velocity Sensors - Optical Incremental encoders - Proximity Sensors : Inductive , Capacitive ,Infrared - Continuous and discrete processes - Control System Performance & tuning - Digital Controllers - P , PI , PID Control - Control modes – Position , Velocity and Torque - Velocity Profiles – Trapezoidal - S. Curve - Electronic Gearing - Controlled Velocity Profile - Multi axis Interpolation , PTP , Linear , Circular - Core functionalities – Home , Record position , Go to Position - Applications : SPM, Robotics.

**TEXT BOOKS :**

1. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering by W Bolton, Pearson Education Press, 3rd edition, 2005.
2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

**REFERENCES :**

1. Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.
2. Mechatronics – N. Shanmugam / Anuradha Agencies Publishers.
3. Mechatronics System Design / Devdas shetty/Richard/Thomson.

# VARDHAMAN COLLEGE OF ENGINEERING (AUTONOMOUS)

M. Tech. CSE II SEMESTER

## ENERGY MANAGEMENT AND AUDIT

(Open Elective)

Course Code: B3374

L	P	C
3	0	3

### UNIT - I

**INTRODUCTION:** Principles of Energy Management, Managerial Organization. Functional Areas for Manufacturing Industry, Process Industry, Commerce, Government. Role of Energy Manager in each of the organization. Initiating, Organizing and Managing Energy Management Programs.

### UNIT - II

**ENERGY AUDIT:** Definition and Concepts, Types of Energy Audits, Basic Energy Concepts. Resources for Plant Energy Studies, Data Gathering, Analytical Techniques. Energy Conservation: Technologies for Energy Conservation, Design for Conservation of Energy materials, energy flow networks, critical assessment of energy usage, formulation of objectives and constraints, synthesis of alternative options and technical analysis of options, process integration.

### UNIT - III

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

### UNIT - IV

**METHODS OF EVALUATION OF PROJECTS:** Payback, Annualized Costs, Investor's Rate of return, Present worth, Internal Rate of Return. Pros and Cons of the common methods of analysis, replacement analysis. Energy Consultant: Need of Energy Consultant, Consultant Selection Criteria.

### UNIT - V

**DEMAND SIDE MANAGEMENT:** Concept and Scope of Demand Side Management, Evolution of Demand Side Management, DSM Strategy, Planning, Implementation and its application. Customer Acceptance & its implementation issues. National and International Experiences with DSM.

### UNIT - VI

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

### UNIT - VII

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

### UNIT - VIII

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

### TEXT BOOKS:

1. W. R. Murphy, G. McKay (2008), *Energy Management*, 1<sup>st</sup> edition, B.S. Publications, New Delhi.
2. Tripathy S. C., "Electric Energy Utilization and conservation", Tata McGraw Hill.
3. Industrial Energy Conservation Manuals, MIT Press, Mass, 1982.

### REFERENCE BOOKS:

1. B. Smith (2007), *Energy Management Principles*, 1<sup>st</sup> edition, Pergamon Press, Inc., England.
2. Energy Management Handbook, Edited by W.C.Turner, Wiley, New York, 1982.
3. IEEE Bronze Book, 'Recommended Practice for Energy Conservation and cost effective planning in Industrial facilities, IEEE Press

**VARDHAMAN COLLEGE OF ENGINEERING**  
(AUTONOMOUS)

M. Tech. CSE II SEMESTER

NSS SYLLABUS FOR HONOURS/PASS/GENERAL COURSES  
(Open Elective)

Course Code: B3901

L	P	C
2	2	3

**Unit-01: Introduction and Basic Concepts of NSS**

- a) History, philosophy, aims & objectives of NSS
- b) Emblem, flag, motto, song, badge etc.
- c) Organizational structure, roles and responsibilities of various NSS functionaries

**Unit-02: NSS Programmes and Activities**

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

**Unit-03: Understanding Youth**

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

**Unit-04: Community Mobilisation**

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

**Unit-05: Volunteerism and Shramdan**

- a) Indian Tradition of volunteerism
- b) Needs & importance of volunteerism
- c) Motivation and Constraints of Volunteerism
- d) Shramdan as a part of volunteerism

# VARDHAMAN COLLEGE OF ENGINEERING

(AUTONOMOUS)

M. Tech. CSE II SEMESTER

## INTELLECTUAL PROPERTY RIGHTS (Open Elective)

Course Code: B3902

L P C  
4 - 4

### UNIT - I

**INTRODUCTION TO INTELLECTUAL PROPERTY:** Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

### UNIT - II

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

### UNIT - III

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

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

### UNIT - IV

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

**UNFAIR COMPETITION:** Misappropriation right of publicity, false advertising.

### UNIT -V

**GEOGRAPHICAL INDICATIONS:** Introduction to geographical indication, Geographical indication protection, Importance to protect geographical indications.

### UNIT - VI

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

### UNIT - VII

**OVERVIEW OF BIOTECHNOLOGY AND INTELLECTUAL PROPERTY:** Biotechnology Research and Intellectual Property Rights Management, Licensing and Enforcing Intellectual Property, Commercializing Biotechnology Invention.

### UNIT - VIII

**NEW DEVELOPMENT OF IPR:** New developments in Intellectual Property at International and National level. Intellectual property audits.

### TEXT BOOKS:

1. Deborah. E. Bouchoux 4<sup>th</sup> Edition (2012), *Intellectual property*, Cengage learning, India.
2. T. M Murray and M.J. Mehlman, *Encyclopedia of Ethical, Legal and Policy issues in Biotechnology*, John Wiley & Sons 2000

### REFERENCE BOOKS:

1. Prabudda ganguli (2003), *Intellectual property right*, Tata McGraw Hill Publishing company Ltd., India.
2. P.N. Cheremisinoff, R.P. Ouellette and R.M. Bartholomew, *Biotechnology Applications and Research*, Technomic Publishing Co., Inc. USA, 1985
3. P. Narayanan; *Law of Copyright and Industrial Designs*; Eastern law House, Delhi, 2010

**1. OBJECTIVE:**

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

**2. PERIODICITY / FREQUENCY OF EVALUATION: Twice****3. PARAMETERS OF EVALUATION:**

- i. The seminar shall have two components, one chosen by the student from the course-work without repetition and approved by the faculty supervisor. The other component is suggested by the supervisor and can be a reproduction of the concept in any standard research paper or an extension of concept from earlier course work.
- ii. The two components of the seminar are distributed between two halves of the semester and are evaluated for 100 marks each. The average of the two components shall be taken as the final score.
- iii. The students shall be required to submit the rough drafts of the seminar outputs within one week of the commencement of the class work.
- iv. Supervisor shall make suggestions for modification in the rough draft. The final draft shall be presented by the student within a week thereafter.
- v. Presentation schedules will be prepared by different Departments in line with the academic calendar.

The Seminars shall be evaluated in two stages as follows:

**A. Rough Draft**

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

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

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	4 Marks
3.	Report	6 Marks
4.	Lay out, and content of Presentation	6 Marks
5.	Depth of the students knowledge in the subject	10 Marks
<b>Total</b>		<b>30 Marks</b>

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	20 Marks
2.	Delivery	20 Marks
3.	Relevance and interest the topic creates	10 Marks
4.	Ability to involve the spectators	10 Marks
5.	Question answer session	10 Marks
<b>Total</b>		<b>70 Marks</b>

**4. WHO WILL EVALUATE?**

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

**1. OBJECTIVE:**

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

**2. PARAMETERS OF EVALUATION:**

Subject Knowledge	Current Awareness	Career Orientation	Communication Skills	Total
40	20	20	20	100

**3. WHO WILL EVALUATE?**

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

**4. PERIODICITY / FREQUENCY OF EVALUATION: Once****5. PEDAGOGY:**

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

**PROJECT WORK**

Course Code: B3212/B3213

**1. OBJECTIVE:**

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

**2. EXPECTED OUTCOME:**

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

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

**3. PROJECT SELECTION:**

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

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 140 marks by committee comprising of the Head of the Department, project supervisor and an external examiner.

**5. EVALUATION:**

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

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

Semester III	Semester IV
Preliminary Evaluation - 100 marks	Design Evaluation I - 30 marks
	Design Evaluation II - 30 marks
	Final Evaluation – 140 marks

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

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

6.2 The total number of reports to be prepared are:

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

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

6.4 For making copies dry tone Xerox is suggested.

6.5 Every copy of the report must contain

- Inner title page (White)
- 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

- 1.
- 2.

Signature with date

## 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	15
2	Literature Survey	15
3	Problem formulation	15
4	Experimental observation / theoretical modeling	15
5	Results – Presentation & Discussion	25
6	Conclusions and scope for future work	15
7	Overall presentation of the Thesis / Oral presentation	25
8	Project Report Writing	15
<b>Total Marks</b>		<b>140</b>

**MALPRACTICES RULES**  
**DISCIPLINARY ACTION FOR / IMPROPER CONDUCT IN EXAMINATIONS**

	Nature of Malpractices/Improper conduct	Punishment
	<i>If the candidate:</i>	
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 practical 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 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	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	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.	
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.