ACADEMIC REGULATIONS

PROGRAM STRUCTURE AND

DETAILED SYLLABUS

DIGITAL ELECTRONICS AND COMMUNICATION SYSTEMS

(Applicable For Batches Admitted From 2021 – 2022)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY

(AUTONOMOUS)
DUVVADA - VISAKHAPATNAM – 530 049

(An Autonomous Institute, Accredited by NAAC, Affiliated to JNTUK, Kakinada, AP)

VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY

(AUTONOMOUS)

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ACADEMIC REGULATIONS

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VIGNAN'S INSTITUTE OF INFORMATION TECHNOLOGY (AUTONOMOUS)

VISAKHAPATNAM

ACADEMIC REGULATIONS for M. Tech. (Regular)

(Applicable for the batches admitted from 2021 onwards)

The selection for category A and B seats shall be as per Govt. of Andhra Pradesh rules.

1. Award of M. Tech. Degree

A student will be declared eligible for the award of the M. Tech. Degree if he/she fulfills the following academic regulations.

Pursued a course of study for not less than two academic years and not more than four academic years.

Candidate has to register for 68 credits and shall secure 68 credits with all courses.

Students who fail to register for their two years course of study within four years or fail to acquire the 68 credits for the award of the degree within four academic years from the year of their admission shall forfeit their seat in M. Tech course and their admission shall stand cancelled.

2. Programs of Study

The following programs of study are offered at present for specialization in the M. Tech. Course.

Specialization Code	Specialization	Department
15	Machine Design (MD)	Mechanical Engineering (ME)
22	Transportation Engineering (TE)	Civil Transportation (CE)
25	Software Engineering (SE)	Computer Science & Engineering (CSE)
38	Digital Electronics & Communication Systems (DECS)	Electronics & Communication Engineering (ECE)
40	Information Technology (IT)	Information Technology (IT)
42	Power & Industrial Drives (P & ID)	Electrical & Electronics Engineering (EEE)
58	Computer Science & Engineering (CSE)	Computer Science & Engineering (CSE)
70	Electronics & Communication Engineering (ECE)	Electronics & Communication Engineering (ECE)

*Code has to be released by University	Artificial Intelligence and Machine learning	Computer Science & Engineering (CSE)

And any other courses as approved by the Board of studies and Academic council from time to time.

3. Registration

A student shall register for courses in each semester as per the courses offered by the concerned department.

4. Curricular Program

The Curriculum of the two year M. Tech Course has been designed to achieve a healthy balance between theory & lab hours, industry experience and to develop technical skills required for a career in the industry or a career in research.

5. Distribution and Weightage of Marks

Theory Courses including electives (100Marks)

For the theory subjects 70 marks shall be awarded based on the performance in the End Semester Examination and 30 marks shall be awarded based on the Internal Evaluation. The internal evaluation shall be made based on the average of the marks secured in the two Mid Term-Examinations conducted-one in the middle of the Semester and the other immediately after the completion of instruction.

The semester end examinations will be conducted for 70 marks consist of five questions carrying 14 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

Laboratory Course (100Marks)

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

a) Internal 30 marks shall be awarded as follows:
i)Day to day assessment including record – 10 marks
ii) Internal examination – 20 marks
b) External examination shall be conducted for 70 marks.
i) Aim, theory and procedure – 15marks, ii) Execution – 25 marks
iii) Results/Program output – 15 marks, iv) Viva-voce – 15 marks

External Laboratory examinations for M. Tech courses must be conducted with two Examiners. Laboratory class teacher acts as internal examiner and external examiner shall be appointed by the Chief Superintendent of Examinations from the panel of experts recommended by the HOD.

Mini project with seminar (100 Marks)

For Mini Project with Seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee (PRC) consisting of Head of the Department, supervisor/mentor and two other senior faculty members of the department. For Mini Project with Seminar, there **will be only internal evaluation** of 100 marks. A candidate has to secure a minimum of 50% of marks to be declared successful.

Mini project report is evaluated for 100 marks.

a) Assessment by the supervisor /guide for 30 marks
b) Assessment by PRC for 40 marks (20 marks x 2 reviews)
c) Seminar presentations for 30 marks (department level committee assessment)

Audit courses: List of the audit courses will be notified from time to time. An indicative list of the courses is as shown below.

All audit courses will be "Pass/Fail" courses with no specific credit point allotted. The result of the student in the audit course will be notified in the marks memo. A student must pass all the audit courses registered to be eligible for the award of M.Tech. degree.
Note: Audit course will be totally internal evaluation. Mid and End semester examinations shall be conducted for all Audit courses. It is mandatory to pass all Audit Courses**.**

Project/Dissertation

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

i) Continuous assessment of Dissertation-I and Dissertation-II during the semester(s) will be monitored by the PRC.

ii) **Dissertation- I/Industrial project**: In Dissertation- I, literature review, design calculations and a prototype model are to be prepared within 16 weeks.

iii) In case of Industrial project, students have to complete coursework related to the particular semester through MOOCs

iv) The evaluation of Dissertation-I/Industrial project will be purely internal for 100 marks based on the presentation of literature review, design calculations and demonstration of prototype model.

v) In **Dissertation – II**, experimentation, analysis (analytically or using modern software tools), results & discussion and conclusions are to be prepared and submitted.

vi) A candidate shall submit his status report after each review. Minimum three reviews at PRC level shall be conducted in a gap of one month each for both Dissertation – I & II.

vii) Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who adjudicated the Thesis. The Board shall jointly evaluate the candidate's work for a maximum of 100 marks.

6. Attendance Requirements

Aggregate 75% of the attendance is required for promotion to next semester.

Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee based on genuine medical grounds. ***This privilege is given to any student only once during the entire program of study.***

A stipulated fee shall be payable towards condonation of shortage of attendance.

Shortage of attendance may be considered for the students who participate in prestigious sports, co-curricular and extra-curricular activities if their attendance is in the minimum prescribed limit.

Note: Shortage of Attendance below 65% in aggregate shall not be condoned in any case.

7. Academic Requirements

The following academic requirements have to be satisfied in addition to the attendance requirements.

For all courses**,** student is considered to be passed upon securing minimum 40% marks in the external examination alone and minimum 50% marks from both internal and external examination put together.

Note: For courses where there is no internal evaluation pass mark is 50% from external & vice-versa.

8. Supplementary Examinations

There is no supplementary examination for PG course.

9. Examinations and Evaluation

9.1. General guidelines

i. All the semester end examinations are conducted for duration of three hours under the supervision of the Chief Superintendent of Examinations.

ii. **Pattern of end examination paper (for theory courses):**

a. External examination shall be conducted for 70 marks.

b. The semester end examinations will be conducted for 70 marks consist of five questions carrying 14 marks each. Each of these questions is from one unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.

iii. Dean of Evaluation, who reports to the Chief Superintendent of Examinations is responsible for planning, conduct of the examinations and declaring results etc.,

iv. The Controller of the examinations ensures that all the four sets of question papers received from the external paper setters comply with the guide lines.

v. Chief Superintendent of Examinations picks up a question paper at random from a set of four papers submitted by the Controller of the Examinations, three hours before the commencement of the examinations.

vi. Moderation: Moderation is carried in order to verify whether all the questions given fall within the framework of prescribed syllabus and Unit wise distribution.

vii. Controller of the Examinations with the support of Additional Controller of Examinations gets the question papers printed course-wise in the required number.

viii. With the help of special invigilators, question papers are distributed to the examination halls five minutes prior to the commencement of Examination.

ix. Special Inspection Squad headed/nominated by Chief Superintendent of Examination makes surprise visit to the Examination Halls to ensure the proper conduct of Examination.

x. The spot valuation is completed within 15 days after the conduct of every examination by following the regular process of coding and decoding of the answer scripts.

xi. Chief Examiner / Evaluators for the respective courses are identified and nominated by the Head of the Department. Evaluators will comprise of internal and external course experts.

xii. Two level evaluation methodologies are adopted for the sake of paper evaluations with one internal and one external evaluator. If the difference of the marks from both the evaluations is more than 15%, then such papers are sent for third evaluation. If the difference of the marks awarded by the internal expert and the external expert is less than or equal to 15% then the highest mark among the two is awarded for the student.

xiii. For laboratory examinations, the evaluation is done by internal examiner and one external examiner.

xiv. Results shall be announced within 30 days after the completion of the last examination.

9.2. Revaluation

There is a provision for revaluation of theory courses if student fulfils the following norms.

The request for revaluation must be made in the prescribed format duly recommended by the Chief Superintendent of Examination through Additional Controller along with the prescribed revaluation fee.

9.3. Challenge Revaluation

If the student is very confident, there is a provision for challenge revaluation for the courses as per the following norms.

i. The challenge revaluation will be carried out by a three-member committee comprising of an external course expert nominated by Principal / Chief Superintendent of Examinations, the faculty member who taught the course chosen by student from the same institute and the third member is the Head of the respective department/faculty nominated by HOD.

ii. The candidate will forfeit the challenging revaluation fee if the difference in the marks awarded by the committee and the initial awarded marks is not more than or equals to 15%. If the difference in marks is more than 15%, the challenge fee will be returned to the candidate. The marks awarded in the Challenge revaluation will be the final.

10. Grading System

Absolute grading system shall be followed for the award of grades

Grade Point

It is a numerical weight allotted to each letter grade on a 10-point scale.

Grades and Grade Points

Marks Range (in %)	Letter Grade	Level	Grade Point
≥ 90	O	Outstanding	10
≥80 to <90	A	Excellent	9

≥70 to <80	B	Very Good	8
≥60 to <70	C	Good	7
≥50 to <60	D	Satisfactory	6
<50	F	Fail	0
		Absent	-1
		Withheld	-2
		Malpractice	-3

Computation of SGPA

The following procedure is to be adopted to compute the Semester Grade Point Average. (SGPA) and Cumulative Grade Point Average (CGPA):

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

$$SGPA\ (Si) = \Sigma(Ci \times Gi) / \Sigma Ci$$

Where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th}course.

Computation of 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 programme,i.e.

- $CGPA = \Sigma(Ci \times Si) / \Sigma Ci$
- Where Si is the SGPA of the i^{th} semester and Ci is the total number of credits in that

semester.

- Equivalent Percentage = (CGPA – 0.75) X10

11. Award of Class

After a student has satisfied the requirements 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 three classes:

Class Awarded	CGPA to be secured	

First Class with Distinction	≥ 7.75 with no subject failures	**Based on CGPA secured from 68 Credits**
First Class	≥ 6.75	
Second Class	≥ 5.75 to < 6.75	

12. General Instructions

Where the words 'he', 'him', 'his', occur they imply 'she', 'her', 'hers', also.

The academic regulations should be read as a whole for the purpose of any interpretation.

In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman, Academic Council is final.

The college may change or amend the academic regulations or syllabi from time to time and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the college.

13. Transitory Regulations

If a student is detained and has to get Re-admitted and follow the same regulation of year

of admission.

Transcripts

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

The Academic Calendar consisting of instruction period of the program is released for every academic year before the commencement of the class work.

There shall be no program transfers after the completion of the admission process. There shall be no transfer from one college/stream to another.

14. Withholding of Results

If the student has not paid the fee dues, if any, to the Institute or in any case of indiscipline is pending against him, the result of the student will be withheld. His degree will be withheld in such cases.

15. Disciplinary Action Guidelines for Malpractices

S.No	Nature of Malpractices/ Improper conduct	Punishment
1 (a)	If the candidate 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 course 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 course of the examination)	Expulsion from the examination hall and cancellation of the performance in that course only.
(b)	If the candidate 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 course 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	If the candidate has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the course of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the courses of that Semester/year. The Hall Ticket of the candidate is to be cancelled.

3	If the candidate 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 courses of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the remaining courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all 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	If the candidate 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 course and all the other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.

5	If the candidate 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 course.
6	If the candidate 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 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.	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that course and all other courses the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the courses 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.
7	If the candidate leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the	Expulsion from the examination hall and cancellation of performance in that course and all the other courses the candidate has already appeared

	examination hall.	including practical examinations and project work and shall not be permitted for the remaining examinations of the courses of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8	If the candidate possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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 college, expulsion from the examination hall and cancellation of the performance in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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	If the candidate comes in a drunken	Expulsion from the examination hall and cancellation of the performance

	condition to the examination hall.	in that course and all other courses the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the courses 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 course and all other courses 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 Academic committee of the Institute for further action to award suitable punishment.	

15.1. For Malpractices identified by squad or special invigilators

Punishments to the candidates will be given as per the above guidelines.

16. UGC recommended punishment for Ragging

i. Suspension from attending classes and academic privileges

ii. Withholding/withdrawing scholarships/fellowship and other benefits.

iii. Debarring from appearing in any test/examination or other evaluation process

iv. Withholding results

v. Debarring from representing the institution in any regional, national or international meet, tournament, youth festival etc.

vi. Suspension/expulsion from the hostel

vii. Cancellation of admission

viii. Rustication from the institution for period ranging from 1 to 4semesters.

ix. Expulsion from the institution and consequent debarring from admission to any other institution for a specified period.

x. Fine may extend up to Rs. 2.5lakh.

PROGRAM STRUCTURE & DETAILED SYLLABUS

M.Tech (ECE)

For

Digital Electronics and Communication Systems

(Applicable for batches admitted from 2021-2022)

PROGRAM STRUCTURE VR-21

M.Tech (ECE.Engg) for Digital Electronics and Communication Systems

I Semester							
S.No	**Code**	**Course**		**L**	**T**	**P**	**Credits**
1	2038211100	Digital System Design using VHDL		3	1*	0	3
2	2038211101	Digital Data Communication		3	1*	0	3
3	2038211150	**Programme Elective – I**	Transform Techniques	3	1*	0	3
	2038211151		VLSI Technology and Design				
	2038211152		Radar Signal Processing				
4	2038211153	**Programme Elective – II**	Statistical Signal Processing	3	0	0	3
	2038211154		Optical Communication Technology				
	2038211155		Network Security & Cryptography				
5	2038211110	System Design Using VHDL Lab		0	0	4	2
6	2038211111	Data Communications Lab		0	0	4	2
7	2000211100	Research Methodology and IPR		2	0	0	2
8	2000211130	Soft Skills (Audit course 1)		2	0	0	0
		Total					18

II Semester							
S.No	**Code**	**Course**		**L**	**T**	**P**	**Credits**
1	2038211200	Image and video processing		3	1*	0	3
2	2038211201	Wireless Communications and Networks		3	1*	0	3
3	2038211250	**Programme Elective – I**	Digital Controllers	3	1*	0	3
	2038211251		Advanced Computer Architecture				
	2038211252		Soft Computing Techniques				
	2038211253		Cyber Security				
4	2038211254	**Programme Elective – II**	DSP Processors and Architectures	3	0	0	3
	2038211255		EMI/EMC				
	2038211256		Object Oriented Programming				
5	2038211210	Advanced Communications Lab		0	0	4	2
6	2038211211	Advanced Image Processing Lab		0	0	4	2
7	2038211270	Mini Project(Seminar)		2	0	0	2
8	2000211230	Constitution of India (Audit course)		2	0	0	0
		Total					18

III Semester							
S.No.	**Code**	**Subject**		**L**	**T**	**P**	**Credits**
1	2038212150	**Programme Elective – III**	Detection & Estimation Theory	3	1*	0	3
	2038212151		Advanced Digital Signal Processing				
	2038212152		Coding Theory and Applications				
2	2038212160	**Open Elective/MOOCS**	MOOCs-2 (NPTEL/SWAYAM)- Any 12 Week Course on Engineering/ Management/ Mathematics offered by	3	0	0	3

			other than parent department (or)Course offered by other departments in the college				
3	2038212170	Dissertation Phase -I		0	0	20	10
Total							**16**

- ❖ Students going for Industrial Project/ Thesis will complete
- ❖ Programme open elective courses offered by other departments/through MOOCs.

IV Semester						
S.No.	**Code**	**Course**	**L**	**T**	**P**	**Credits**
1	2038212270	Dissertation Phase -II	0	0	32	16
Total						**16**

Open Electives offered by the Department of CSE for other Department students

Course Code	**Course Title**
2038211251	Advanced Computer Architecture
2038211252	Soft Computing Techniques
2038212152	Coding Theory and Applications

Total Credits:18+18+16+16=68

I Year – I Semester	**L**	**P**	**C**
Subject Code: 2038211100	**3+1**	**0**	**3**

DIGITAL SYSTEM DESIGN USING VHDL

COURSE OBJECTIVES:

1. To understand Basics of VHDL Programming
2. To understand how VHDL can be used to simulate and validate the circuit design
3. To understand and design combinational circuits using VHDL
4. To understand and design sequential circuits using VHDL
5. To understand and design memories using VHDL

COURSE OUTCOMES:

1. understand Basics of VHDL Programming
2. Use VHDL simulate and validate the circuit design
3. Design and analyze combinational circuits using VHDL
4. Design and analyze sequential circuits using VHDL

Unit - I

Digital Design Using HDL: Design flow, program structure, History of VHDL, VHDL requirements, Levels of Abstraction, Elements of VHDL, Concurrent and Sequential Statements, Packages, Libraries and Bindings, Objects and Classes, Subprograms, Comparison of VHDL and Verilog HDL.

Unit - II

VHDL Modelling : Simulation, Logic Synthesis, Inside a logic Synthesizer, Constraints, Technology Libraries, VHDL and Logic Synthesis, Functional Gate-Level verification, Place and Route, Post Layout Timing Simulation, Static Timing, Major Netlist formats for design representation, VHDL Synthesis-Programming Approach.

Unit - III

Combinational Logic Design using VHDL: Adders & Subtractors, Ripple Adder, Look Ahead Carry Generator, Binary Parallel Adder, Binary Adder-Subtractor, ALU, Decoders, encoders, three state devices, multiplexers and demultiplexers, parity circuits, comparators, multipliers, Barrel Shifter, Simple Floating-Point Encoder, Dual Priority Encoder, modeling of Circuits by using VHDL.

Unit - IV

Sequential Logic Design Using VHDL: SSI Latches and Flip-Flops, Counters, Design of Counters using Digital ICs, Ring Counter, Johnson Counter, Modulus N Synchronous Counters, Registers, Shift Registers, Universal Shift Registers, Design of FSM: Mealy and Moore machines, modelling of circuits by using VHDL.

Unit - V

Programmable Logic Devices (PLDs) & Memories: Programmable Read Only Memory, Programmable Logic Array, Programmable Array Logic Devices, ROM: Internal structure, 2D-Decoding, Commercial ROM types. Static RAM: Internal structure, SRAM timing, Dynamic RAM: Internal structure, timing. Design of ROM and RAM with VHDL

Text Books

1. Digital Design Principles & Practices – John F.Wakerly, PHI/ Pearson Education Asia, 3rd Edition, 2005.
2. Designing with TTL Integrated Circuits: Robert L. / John R. Morris & Miller.

Reference Books

1. "Fundamentals of Digital logic design with VHDL". Stephen Brown & Zvonko Vranesic, Tata McGraw Hill, 2nd edition.
2. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

I Year – I Semester	**L**	**P**	**C**
Subject Code: 2038211101	**3+1**	**0**	**3**

DIGITAL DATA COMMUNICATIONS

Course Objectives:

The main objectives of this subject are:

1. Different modulation techniques to improve the bandwidth and their properties.
2. Networking and different protocol systems.
3. Error estimation and correction, asynchronous and synchronous protocols.
4. Multiplexing techniques, different networking connections and interfacing devices and various multiple access techniques and analysis.

Course outcomes:

At the end of this course the student can able to:

1. Model digital communication system using appropriate mathematical techniques (error probability, constellation diagrams, pharos diagrams).
2. Understanding the basic concepts of how digital data is transferred across computer networks. Independently understand basic computer network technology.
3. Understand and explain Data Communications System and its components and identification of the different types of network topologies and protocols.
4. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer. Identify the different types of network devices and their functions within a network and finally network design and implementation.

UNIT -I:
Digital Modulation Schemes:
BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK – Methods, Band Width Efficiency, Carrier Recovery, Clock Recovery.

UNIT -II:
Basic Concepts of Data Communications, Interfaces and Modems:
Data Communication Networks, Protocols and Standards, UART, USB, Line Configuration, Topology, Transmission Modes, Digital Data Transmission, DTE-DCE interface, Categories of Networks – TCP/IP Protocol suite and Comparison with OSI model.

UNIT -III:
Error Correction: Types of Errors, Vertical Redundancy Check (VRC), LRC, CRC, Checksum, Error Correction using Hamming code
Data Link Control: Line Discipline, Flow Control, Error Control
Data Link Protocols: Asynchronous Protocols, Synchronous Protocols, Character Oriented Protocols, Bit-Oriented Protocol, Link Access Procedures.

UNIT -IV:

Multiplexing: Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM),Multiplexing Application, DSL.
Local Area Networks: Ethernet, Other Ether Networks, Token Bus, Token Ring, FDDI.
Metropolitan Area Networks: IEEE 802.6, SMDS
Switching: Circuit Switching, Packet Switching, Message Switching.
Networking and Interfacing Devices: Repeaters, Bridges, Routers, Gateway, Other Devices.

UNIT -V:
Multiple Access Techniques:
Frequency- Division Multiple Access (FDMA), Time - Division Multiple Access (TDMA), Code - Division Multiple Access (CDMA), OFDM and OFDMA. Random Access, Aloha- Carrier Sense Multiple Access (CSMA)- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Controlled Access- Reservation- Polling- Token Passing, Channelization.

TEXT BOOKS:
1. Data Communication and Computer Networking - B. A.Forouzan, 2nd Ed., 2003, TMH.
2. Advanced Electronic Communication Systems - W. Tomasi, 5th Ed., 2008, PEI.

REFERENCE BOOKS:
1. Data Communications and Computer Networks - Prakash C. Gupta, 2006, PHI.
2. Data and Computer Communications - William Stallings, 8th Ed., 2007, PHI.
3. Data Communication and Tele Processing Systems -T. Housely, 2nd Ed, 2008, BSP.
4. Data Communications and Computer Networks- Brijendra Singh, 2nd Ed., 2005, PHI.

I Year – I Semester	**L**	**P**	**C**
Subject Code: 2038211150	**3+1**	**0**	**3**

TRANSFORM TECHNIQUES
(ELECTIVE – I)

Course Objectives:

The main objectives of this subject are:

Express non periodic function to periodic function using Fourier series and Fourier transforms, Continuous Wavelet Transform, Multi Rate Analysis and DWT, Wavelet Packets and Lifting.

Course outcomes:

At the end of this course the student can able to:

1. The student will learn basics of two-dimensional transforms.
2. Understand the definition, properties and applications of various two-dimensional transform.
3. Understand the basic concepts of wavelet transform.
4. Understand the special topics such as wavelet packets, Bi-orthogonal wavelets etc.

UNIT -I:
Fourier analysis:
Fourier series, Examples, Fourier Transform, Properties of Fourier Transform, Examples of Fourier transform, sampling theorem, Partial sum and Gibbs phenomenon, Fourier analysis of Discrete time Signals, Discrete Fourier Transform.
Time – Frequency Analysis: Window function, Short Time Fourier Transform, Discrete Short Time Fourier Transform, Continuous wavelet transform, Discrete wavelet transform, wavelet series, Interpretations of the Time-Frequency plot.

UNIT -II:
Transforms:
Walsh, Hadamard, Haar and Slant Transforms, DCT, DST, KLT, Singular value Decomposition – definition, properties and applications

UNIT -III:
Continuous Wavelet Transform (CWT):
Short comings of STFT, Need for wavelets, Wavelet Basis- Concept of Scale and its relation with frequency, Continuous time wavelet Transform Equation- Series Expansion using Wavelets- CWT- Tiling of time scale plane for CWT. Important Wavelets: Haar, Mexican Hat, Meyer, Shannon, Daubechies.

UNIT -IV:
Multi Rate Analysis and DWT:
Need for Scaling function – Multi Resolution Analysis, Two-Channel Filter Banks, Perfect Reconstruction Condition, Relationship between Filter Banks and Wavelet Basis, DWT, Structure of DWT Filter Banks, Daubechies Wavelet Function, Applications of DWT.

UNIT -V:

Wavelet Packets and Lifting: Wavelet Packet Transform, Wavelet packet algorithms,Thresholding-Hard thresholding, Soft thresholding, Multidimensional Wavelets, Bi-orthogonal basis- B-Splines, Lifting Scheme of Wavelet Generation, Multi Wavelets

TEXT BOOKS:

1. A Wavelet Tour of Signal Processing theory and applications -RaghuveerM.Rao and Ajit S. Bopardikar, Pearson Edu, Asia, New Delhi, 2003.
2. K.P.Soman and K.I Ramachandran, " Insight into Wavelets – from theory to practice" PHI, Second edition,2008.

REFERENCE BOOKS:

1. Fundamentals of Wavelets- Theory, Algorithms and Applications -Jaideva C Goswami, Andrew K Chan, John Wiley & Sons, Inc, Singapore, 1999.
2. JaidevaC.Goswami and Andrew K.Chan, "Fundamentals of Wavelets" Wiley publishers, 2006.
3. A Wavelet Tour of Signal Processing-Stephen G. Mallat, Academic Press, 2 Ed
4. Digital Image Processing – S.Jayaraman, S.Esakkirajan, T.Veera Kumar – TMH,2009.

I Year – I Semester	**L**	**P**	**C**
Subject Code: 2038211151	**3+1**	**0**	**3**

VLSI TECHNOLOGY AND DESIGN

(ELECTIVE – I)

Course Objectives:

The main objectives of this subject are:

To learn basic CMOS Circuits, CMOS process technology, techniques of chip design using programmable devices, concepts of designing VLSI Subsystems.

Course outcomes:

At the end of this course the student can able to:

1. Review of FET fundamentals for VLSI design.
2. To acquires knowledge about stick diagrams and layouts.
3. Enable to design the subsystems based on VLSI concepts.
4. Analyse the floor planning methods

UNIT-I:

VLSI Technology: Fundamentals and applications, IC production process, semiconductor processes, design rules and process parameters, layout techniques and process parameters.

VLSI Design: Electronic design automation concept, ASIC and FPGA design flows, SOC designs, design technologies: combinational design techniques, sequential design techniques, state machine logic design techniques and design issues.

UNIT-II:

CMOS VLSI Design: MOS Technology and fabrication process of pMOS, nMOS, CMOS and Bi-CMOS technologies**,** comparison of different processes.

Building Blocks of a VLSI circuit: Computer architecture, memory architectures, communication interfaces, mixed signal interfaces.

VLSI Design Issues: Design process, design for testability, technology options, power calculations, package selection, clock mechanisms, mixed signal design.

UNIT-III:

Basic electrical properties of MOS and BiCMOS circuits, MOS and BiCMOS circuit design processes, Basic circuit concepts, scaling of MOS circuits-qualitatitive and quantitative analysis with proper illustrations and necessary derivations of expressions.

UNIT-IV:

Subsystem Design and Layout: Some architectural issues, switch logic, gate logic, examples of structured design (combinational logic), some clocked sequential circuits, other system considerations.

Subsystem Design Processes: Some general considerations and an illustration of design processes, design of an ALU subsystem.

UNIT-V:
Floor Planning: Introduction**,** Floor planning methods, off-chip connections.
Architecture Design: Introduction, Register-Transfer design, high-level synthesis, architectures for low power, architecture testing.
Chip Design: Introduction and design methodologies.

TEXT BOOKS:

1. Essentials of VLSI Circuits and Systems, K. Eshraghian, Douglas A. Pucknell, SholehEshraghian, 2005, PHI Publications.
2. Modern VLSI Design-Wayne Wolf, 3rd Ed., 1997, Pearson Education.
3. VLSI Design-Dr.K.V.K.K.Prasad, KattulaShyamala, Kogent Learning Solutions Inc., 2012.

REFERENCE BOOKS:

1. VLSI Design Technologies for Analog and Digital Circuits, Randall L.Geiger, Phillip E.Allen, Noel R.Strader, TMH Publications, 2010.
2. Introduction to VLSI Systems: A Logic, Circuit and System Perspective- Ming-BO Lin, CRC Press, 2011.
3. Principals of CMOS VLSI Design-N.H.E Weste, K. Eshraghian, 2nd Edition, Addison Wesley.

I Year – I Semester	**L**	**P**	**C**
Subject Code: 2038211152	**3+1**	**0**	**3**

RADAR SIGNAL PROCESSING

(ELECTIVE -I)

Course Objectives:

The main objectives of this subject are:

1. DerivationofRadarrangeandDesignofmatchedfilterfordifferentnoises.
2. Signal detection techniques at receiver.
3. OptimumRadarWaveformsforDetectionofsignalsinClutterandvariousFamilies.
4. The characteristics of a Linear pulse and digital compression to Radar signals as well as the principles of different phase coding techniques and analysis.

Course outcomes:

At the end of this course the student can able to:

1. Understand the operation of Radar and characteristics of Matched filter for non-white noise.
2. Understandthevariousdetectioncriterionandtypesofdetectorsthatcanbeusedtodetectthe Radarsignals in noise.
3. Understandthewaveformdesignrequirementsandoptimumwaveformsforthedetectionofsignalsin clutter.
4. Know the significance and types of pulse compression techniques for analog and digital signals and phase coding in Radar and various poly phase codes used for phase coding.

UNIT -I:

Introduction:

Radar Block Diagram, Bistatic Radar, Monostatic Radar, Radar Equation, Information Available from Radar Echo. Review of Radar Range Performance– General Radar Range Equation, Radar Detection with Noise Jamming, Beacon and Repeater Equations, MTI andPulse Doppler Radar. Matched Filter Receiver – Impulse Response, Frequency Response Characteristic and its Derivation, Matched Filter and Correlation Function, Correlation Detection and Cross-Correlation Receiver, Efficiency of Non-Matched Filters, Matched Filter for Non-White Noise.

UNIT -II:

Detection of Radar Signals in Noise:

Detection Criteria – Neyman-Pearson Observer, Likelihood-Ratio Receiver, Inverse Probability Receiver, Sequential Observer, Detectors–Envelope Detector, Logarithmic Detector, I/Q Detector. Automatic Detection-CFAR Receiver, Cell Averaging CFAR Receiver, CFAR Loss, CFAR Uses in Radar. Radar Signal Management–Schematics, Component Parts, Resources and Constraints.

UNIT -III:

Waveform Selection [3, 2]:
Radar Ambiguity Function and Ambiguity Diagram – Principles and Properties; Specific Cases – Ideal Case, Single Pulse of Sine Wave, Periodic Pulse Train, Single Linear FM Pulse, Noise Like Waveforms, Waveform Design Requirements, Optimum Waveforms for Detection in Clutter, Family of Radar Waveforms.

UNIT -IV:
Pulse Compression in Radar Signals:
Introduction, Significance, Types, Linear FM Pulse Compression – Block Diagram, Characteristics, Reduction of Time Side lobes, Stretch Techniques, Generation and Decoding of FM Waveforms – Block Schematic and Characteristics of Passive System, Digital Compression, SAW Pulse Compression.

UNIT V:
Phase Coding Techniques:
Principles, Binary Phase Coding, Barker Codes, Maximal Length Sequences (MLS/LRS/PN), Block Diagram of a Phase Coded CW Radar.
Poly Phase Codes : Frank Codes, Costas Codes, Non-Linear FM Pulse Compression, Doppler Tolerant PC Waveforms – Short Pulse, Linear Period Modulation (LPM/HFM), Sidelobe Reduction for Phase Coded PC Signals.

TEXT BOOKS:
1. Radar Handbook - M.I. Skolnik, 2nd Ed., 1991, McGraw Hill.
2. Radar Design Principles: Signal Processing and The Environment - Fred E. Nathanson, 2nd Ed., 1999, PHI.
3. Introduction to Radar Systems - M.I. Skolnik, 3rd Ed., 2001, TMH.

REFERENCE BOOKS:
1. Radar Principles - Peyton Z. Peebles, Jr., 2004, John Wiley.
2. Radar Signal Processing and Adaptive Systems - R. Nitzberg, 1999, Artech House.

I Year – I Semester		**L**	**P**	**C**
Subject Code: 2038211153	**3+1**	**0**	**3**	

STATISTICAL SIGNAL PROCESSING

(ELECTIVE - II)

Course Objectives:

The main objectives of this subject are:

Course is designed to cover techniques for statistical signal processing, detection and parameter estimation. It will briefly review the preliminaries on linear algebra and statistics.

Course outcomes:

At the end of this course the student can able to:

1: Generalize the properties of statistical models in the analysis of signals using Stochastic processes.
2: Differentiate the prominence of various spectral estimation techniques for Achieving higher resolution in the estimation of power spectral density.
3: Outline various parametric estimation methods to accomplish the signal modeling even at higher order statistics.
4: Design and development of optimum filters using classical and adaptive algorithms.

UNIT I

Signal models and characterization: Types and properties of statistical models for signals and howthey relate to signal processing, Common second-order methods of characterizing signals including autocorrelation, partial correlation, cross-correlation, power spectral density and cross-power spectral density.

UNIT II

Spectral estimation: Nonparametric methods for estimation of power spectral density, auto correlation, cross-correlation, transfer functions, and coherence form finite signal samples.

UNIT III

Review of signal processing: A review on random processes, A review on filtering random processes, Examples.

Statistical parameter estimation: Maximum likehood estimation, maximum a posterior estimation, Cramer-Rao bound.

UNIT IV

Eigen structure based requency estimation: Pisarenko, MUSIC, ESPRIT their application sensorarray direction finding.

Spectrum estimation: Moving average (MA), Auto Regressive (AR), Auto Regressive MovingAverage (ARMA), Various non-parametirc approaches.

UNIT V

Wiener filtering: The finite impulse case, causal and non-causal infinite impulse responses cases,Least mean squares adaptation, recursive least squares adaptation, Kalman filtering.

TEXT BOOKS:

1. Steven M.Kay, fundamentals of statistical signal processing: estimation Theory,Pretice-Hall,1993.
2. Monsoon H. Hayes, Stastical digital signal processing and modeling, USA, Wiley,1996.

REFERENCE BOOKS:

1. DimitrisG.Manolakis, Vinay K. Ingle, and Stephen M. Kogon, Statistical and adaptive signal processing, Artech House, Inc,2005, ISBN 1580536107

I Year – I Semester	**L**	**P**	**C**
Subject Code: 2038211154	**3+1**	**0**	**3**

OPTICAL COMMUNICATIONS TECHNOLOGY

(ELECTIVE – II)

Course Objectives:

The main objectives of this course are:

1. Toexposethestudentstothebasicsofsignalpropagationthroughopticalfibers,fiberimpairments
2. studentsshouldbefamiliarwithcommonlyusedcomponentsandsubsystemsinopticalcommunication and network systems
3. ToknowtheOpticalModulationanddemodulationandErrorDetectionandCorrection codes.
4. LearnaboutopticalamplifierTransmissionsystemmodel,powerpenalty-transmitter,powerpenalty-transmitter,receiver Scope– receiver optical amplifiers, crosstalk, dispersion and also learn about necessity of wavelength division multiplexing(WDM),working principle and techniques of multiplexing, and Overall System Design considerations and optical networks

Course outcomes:

At the end of this course the student can able to:

1. Able to analyze characteristics of optical fiber and signal propagation through optical fibers
2. Know the commonly used components and subsystems in optical communication and network systems ,Working principle of optical communication components ,amplifiers, filters
3. Able to analyze Transmission system model
4. Understand the importance of wavelength division multiplexing (WDM) and de-multiplexing,

UNIT –I:
Signal propagation in Optical Fibers:
Geometrical Optics approach and Wave Theory approach, Loss and Bandwidth, Chromatic Dispersion, Non Linear effects- Stimulated Brillouin and Stimulated Raman Scattering, Propagation in a Non-Linear Medium, Self-Phase Modulation and Cross Phase Modulation, Four Wave Mixing, Principle of Solitons.

UNIT –II:
Fiber Optic Components for Communication & Networking:
Couplers, Isolators and Circulators, Multiplexers, Bragg Gratings, Fabry-Perot Filters, Mach Zender Interferometers, Arrayed Waveguide Grating, Tunable Filters, High Channel Count Multiplexer Architectures, Optical Amplifiers, Direct and External Modulation Transmitters, Pump Sources for Amplifiers, Optical Switches and Wavelength Converters.

UNIT –III:
Modulation and Demodulation:

Signal formats for Modulation, Subcarrier Modulation and Multiplexing, Optical Modulations – Duobinary, Single Side Band and Multilevel Schemes, Ideal and Practical receivers for Demodulation, Bit Error Rates, Timing Recovery and Equalization, Reed-Solomon Codes for Error Detection and Correction.

UNIT -IV:

Transmission System Engineering:

System Model, Power Penalty in Transmitter and Receiver, Optical Amplifiers, Crosstalk and Reduction of Crosstalk, Cascaded Filters, Dispersion Limitations and Compensation Techniques.

UNIT –V:

Fiber Non-linearities and System Design Considerations:

Limitation in High Speed and WDM Systems due to Non-linearities in Fibers, Wavelength Stabilization against Temperature Variations, Overall System Design considerations – Fiber Dispersion, Modulation, Non-Linear Effects, Wavelengths, All Optical Networks.

TEXT BOOKS:

1. Optical Networks: A Practical Perspective - Rajiv Ramaswami and Kumar N. Sivarajan, 2 Ed., 2004, Elsevier Morgan Kaufmann Publishers (An Imprint of Elsevier).
2. Optical Fiber Communications – Gerd Keiser, 3 Ed., 2000, McGraw Hill.

REFERENCE BOOKS:

1. Optical Fiber Communications: Principles and Practice – John.M.Senior, 2nd Ed., 2000, PE.
2. Fiber Optics Communication – Harold Kolimbris, 2nd Ed., 2004, PEI
3. Optical Networks: Third Generation Transport Systems – Uyless Black, 2nd Ed., 2009, PEI
4. Optical Fiber Communications – GovindAgarwal, 2nd Ed., 2004, TMH.
5. Optical Fiber Communications and Its Applications – S.C.Gupta, 2004, PHI.

I Year – I Semester	**L**	**P**	**C**
Subject Code: 2038211155	**3+1**	**0**	**3**

NETWORK SECURITY AND CRYPTOGRAPHY

(ELECTIVE -II)

Course Objectives:

The main objectives of this course are:

To make the student learn different encryption techniques along with hash functions, MAC, digital signatures and their use in various protocols for network security and system security.

Course outcomes:

At the end of this course the student can able to:

1. Identify and utilize different forms of cryptography techniques.
2. Incorporate authentication and security in the network applications.
3. Distinguish among different types of threats to the system and handle the same.
4. Analyze and design hash and MAC algorithms, and digital signatures.

UNIT -I:
Introduction:
Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security.Classical Techniques:Conventional Encryption model, Steganography, Classical Encryption Techniques.
Modern Techniques:
Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

UNIT -II:
Encryption Algorithms:
Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2, Characteristics of Advanced Symmetric block cifers.
Conventional Encryption: Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

UNIT -III:
Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography.
Number Theory: Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primarily, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

UNIT -IV:

Message Authentication and Hash Functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

Hash and MacAlgorithms

MD File, Message digest Algorithm, Secure Hash Algorithm, RIPEMD-160, HMAC. Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards.

Authentication Applications : Kerberos, X.509 directory Authentication service. Electronic Mail Security: Pretty Good Privacy, S/MIME.

UNIT –V:

IP Security:

Overview, Architecture, Authentication, Encapsulating Security Payload, Combining security Associations, Key Management. Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction.

Intruders, Viruses and Worms

Intruders, Viruses and Related threats.

Fire Walls: Fire wall Design Principles, Trusted systems.

TEXT BOOKS:

1. Cryptography and Network Security: Principles and Practice - William Stallings, Pearson Education.
2. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.

REFERENCE BOOKS:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Principles of Information Security, Whitman, Thomson.
4. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
5. Introduction to Cryptography, Buchmann, Springer.

I Year – I Semester	**L**	**P**	**C**
Subject Code: 2038211110	**0**	**3**	**2**

SYSTEM DESIGN USING VERILOG HDL LABORATORY

Course Objective:

The main objectives of this course are:

The basic language features of Verilog HDL and the role of HDL in digital logic design. the behavioural modeling of combinational and simple sequential circuits.

Course Outcomes:

At the end of the laboratory work, students will be able to:

1. Identify, formulate, solve and implement problems in signal processing, communication systematic using RTL design tools.
2. Use EDA tools like Cadence, Mentor Graphics and Xilinx.
3. Design different digital circuits and simulate using Xilinx
4. Apply verilog programming tools to implement different applications.

List of Experiments:

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

I Year – I Semester	**L**	**P**	**C**
Subject Code: 2038211111	**0**	**3**	**2**

DATA COMMUNICATIONS LAB

Course Objective:

The main objectives of this course are:

Provides basic concepts of data communications and networking. Explores hardware, connectivity, signaling, addressing, network topologies, communication protocols, network design, switching, management, security and standards with emphasis on the TCP/IP protocol suite.

Course Outcomes:

- Understand the basics of data communication, networking, internet and their importance.
- Analyze the services and features of various protocol layers in data networks.
- Differentiate wired and wireless computer networks
- Analyze TCP/IP and their protocols.

List of Experiments:

1. Study of serial interface RS – 232
2. Study of pc to pc communication using parallel port
3. To establish pc-pc communication using LAN
4. Study of LAN using star topology, bus topology and tree topology
5. Study and configure modem of a computer
6. To configure a hub/switch
7. To study the interconnections of cables for data communication
8. Study of a wireless communication system
9. Set up of time division multiplexing using fiber optics
10. Digital Fiber Optical Transmitter and Receiver

Subject Code	RESEARCH METHODOLOGY AND IPR	L	T	P	C
2000211100		2	0	0	2

Course Objective:

The main objectives of this course are:

Identify an appropriate research problem in their interesting domain. Understand ethical issues Understand the Preparation of a research project thesis report.

CourseOutcomes:

At the end of this course students will be able to

1. Understand research problem formulation and analyze research related information Follow research ethics
2. Understand that today‟s world is controlled by Computer, Information Technology, but tomorrow world will beruled by ideas, concept, and creativity.
3. Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
4. Understand that IPR protection provides an incentive to inventors for further researchworkandinvestmentinR&D,whichleadstocreationofnewandbetterproducts,andinturn brings about, economicgrowth andsocialbenefits.

UNIT 1:

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

UNIT 2:

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

UNIT 3:

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

UNIT 4:

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

UNIT 5:

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

References:

Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students"

Wayne Goddard and Stuart Melville, "Research Methodology: AnIntroduction"

Ranjit Kumar, 2nd Edition, "Research Methodology: A Step by Step Guide for beginners"

Halbert, "Resisting Intellectual Property", Taylor & Francis Ltd,2007.

Mayall, "Industrial Design", McGraw Hill,1992.

Niebel, "Product Design", McGraw Hill,1974.

Asimov, "Introduction to Design", Prentice Hall,1962.

Robert P. Merges, Peter S. Menell, Mark A. Lemley, " Intellectual Property in New Technological Age",2016.

T. Ramappa, "Intellectual Property Rights Under WTO", S. Chand,2008

Subject Code	SOFT SKILLS	L	T	P	C
2000211130		2	0	0	2

Course Objectives:

The student will be taught

1. To prepare project title.
2. To prepare a project report.
3. To identify gaps in literature.
4. To improve writing and presentation skills of the project .

Course Outcomes:

At the end of the course the student will be able to

1. **Teamwork** – learning to connect and work with others to achieve a set task.
2. **Leadership** – assessing the requirements of a task, identifying the strengths within the team, utilizing the diverse skills of the group to achieve the set objective, awareness of risk/safety.

Course Content:

Unit-I:

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

Unit-II:

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

Unit-III:

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

Unit-IV:

Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, useful phrases, how to ensure paper is as good as it could possibly be the first-time submission.

Unit-V:

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

Text Book:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on GoogleBooks)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge UniversityPress
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences, SIAM Highman‟s book.
4. Adrian Wall work, English for Writing Research Papers, Springer New York Dordrecht Heidelberg London,2011.

M.Tech.

I Year - II Semester

(Detailed Syllabus)

I Year – II Semester	**L**	**P**	**C**
Subject Code: 2038211200	**3+1**	**0**	**3**

IMAGE AND VIDEO PROCESSING

Course Objectives:

The main objectives of this course are:

1. The basic concepts and methods to develop foundation in digital image processing and video processing are introduced and the Importance of various image transforms ,image transform properties are discussed.
2. Understanding the image enhancement techniques in both spatial domain and frequency domain as well as the process of recovering image that has been degraded by noise or any other degradation phenomenon.
3. Understanding the importance of image segmentation and various methods used for segmentation, The importance of reducing the data for digital image representation by using various image compression techniques
4. To understand the importance of video processing in multimedia and the various video formation models, motion estimation techniques in video processing and applications of motion estimation in video processing.

Course outcomes:

At the end of this course the student can able to:

1. Know digital image, representation of digital image, importance of image resolution, applications in image processing, the advantages of representation of digital images in transform domain, application of various image transforms.
2. Understand and analyze the image enhancement and image degradation, image restoration techniques using spatial filters and frequency domain.
3. Understand and analyze the detection of point, line and edges in images, edge linking and various segmentation techniques and the redundancy in images, various image compression techniques.
4. Describe the video technology from analog color TV systems to digital video systems, how video signal is sampled and filtering operations in video processing as well as describing the general methodologies for 2D motion estimation, various coding used in video processing.

UNIT –I:

Fundamentals of Image Processing and Image Transforms:

Introduction, Image sampling, Quantization, Resolution, Image file formats, Elements of image processing system, Applications of Digital image processing

Introduction, Need for transform, image transforms, Fourier transform, 2 D Discrete Fourier transform and its transforms, Importance of phase, Walsh transform, Hadamard transform, Haar transform, slant transform Discrete cosine transform, KL transform, singular value decomposition, Radon transform, comparison of different image transforms.

UNIT –II:

Image Enhancement:
Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters.
Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering.
Image Restoration:
Introduction to Image restoration, Image degradation, Types of image blur, Classification of image restoration techniques, Image restoration model, Linear and Nonlinear image restoration techniques, Blind deconvolution

UNIT –III:
Image Segmentation:
Introduction to image segmentation, Point, Line and Edge Detection, Region based segmentation., Classification of segmentation techniques, Region approach to image segmentation, clustering techniques, Image segmentation based on thresholding, Edge based segmentation, Edge detection and linking, Hough transform, Active contour
Image Compression:
Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Fundamentals of information theory, Run length coding, Shannon – Fano coding, Huffman coding, Arithmetic coding, Predictive coding, Transformed based compression, Image compression standard, Wavelet-based image compression, JPEG Standards.

UNIT -IV:
Basic Steps of Video Processing:
Analog Video, Digital Video. Time-Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

UNIT –V:
2-D Motion Estimation:
Optical flow, General Methodologies, Pixel Based Motion Estimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding.

TEXT BOOKS:
1. Digital Image Processing – Gonzaleze and Woods, 3rd Ed., Pearson.
2. Video Processing and Communication – Yao Wang, JoemOstermann and Ya–quinZhang. 1st Ed., PH Int.
3. S.Jayaraman, S.Esakkirajan and T.VeeraKumar, "Digital Image processing, Tata McGraw Hill publishers, 2009

REFRENCE BOOKS:
1. Digital Image Processing and Analysis-Human and Computer Vision Application with CVIP Tools – ScotteUmbaugh, 2nd Ed, CRC Press, 2011.
2. Digital Video Processing – M. Tekalp, Prentice Hall International.

3. Digital Image Processing – S.Jayaraman, S.Esakkirajan, T.Veera Kumar – TMH, 2009.
4. Multidimentional Signal, Image and Video Processing and Coding – John Woods, 2nd Ed, Elsevier.
5. Digital Image Processing with MATLAB and Labview – Vipula Singh, Elsevier.
6. Video Demystified – A Hand Book for the Digital Engineer – Keith Jack, 5th Ed., Elsevier.

I Year – II Semester		**L**	**P**	**C**
Subject Code: 2038211201	**3+1**	**0**	**3**	

WIRELESS COMMUNICATIONS AND NETWORKS

Course Objectives:

The main objectives of this course are:

1. The Aim of this course is to introduce the fundamental technologies for wireless communications and networking.
2. It introduces the Key concepts of Cellular and Mobile communications.
3. Introducing the concepts of Multiple Access Schemes.
4. Introducing the important concepts of Wireless networking,WLAN,WLL,IEEE802standards.

Course outcomes:

At the end of this course the student can able to:

1. Understand Cellular communication concepts
2. Study the mobile radio propagation
3. Study the wireless network different type of MAC protocols
4. Determine the type and appropriate model of wireless fading channel based on the system parameters and the property of the wireless medium.

UNIT -I:

The Cellular Concept-System Design Fundamentals:
Introduction, Frequency Reuse, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference , Power Control for Reducing interference, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Trunking and Grade of Service

UNIT –II:
Mobile Radio Propagation: Large-Scale Path Loss:
Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, Basic Propagation Mechanisms, **Reflection**: Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, **Diffraction**: Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knife-edgeDiffraction, Scattering, Outdoor Propagation Models- Longley-Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

UNIT –III:

Mobile Radio Propagation: Small –Scale Fading and Multipath

Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT -IV:

Equalization and Diversity

Introduction, Fundamentals of Equalization, Training a Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non-linear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity -Derivation of selection Diversity improvement, Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver.

UNIT -V:

Wireless Networks

Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11, IEEE 802.11 Medium Access Control, Comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, HiperLan, WLL.

TEXT BOOKS:

1. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, 2nd Ed., 2002, PHI.
2. Wireless Communications-Andrea Goldsmith, 2005 Cambridge University Press.
3. Mobile Cellular Communication – GottapuSasibhushanaRao, Pearson Education, 2012.

REFERENCE BOOKS:

1. Principles of Wireless Networks – KavehPahLaven and P. Krishna Murthy, 2002, PE
2. Wireless Digital Communications – KamiloFeher, 1999, PHI.
3. Wireless Communication and Networking – William Stallings, 2003, PHI.
4. Wireless Communication – UpenDalal, Oxford Univ. Press
5. Wireless Communications and Networking – Vijay K. Gary, Elsevier.

I Year – II Semester	**L**	**P**	**C**
Subject Code: 2038211250	**3+1**	**0**	**3**

COURSE DESCRIPTION

This course introduces basic architecture and operation of a microprocessor and a microcontroller to the student. The course objective is to study the architecture and instruction set of 8086 Microprocessor and 8051Microcontrollers and to know the importance of different peripheral devices and their interfacing with Microcontrollers.

COURSE OBJECTIVES

1. To make the student to understand the architecture of 8086 Microprocessor and Microcontrollers and select them as per their requirement.
2. To create Programs using assembly language for solving simple problems.
3. Develop small embedded system.

COURSE OUTCOMES:

1. Explain the architecture of 8086 microprocessors
2. Explain the instruction set architecture of microprocessor and microcontrollers.
3. Write /create programming for the microprocessor and microcontrollers using assembly language.
4. Design interface between I/O devices and microcontrollers.

UNIT-I

8086 Microprocessor: Evaluation of microprocessors, Features of 8086, 8086 internal architecture, 8086 minimum mode, 8086 maximum mode, Pin description of 8086.

UNIT-II

8086 Programming: Addressing modes, data transfer instructions, arithmetic instructions, logical, shift, rotate instructions, branch program control transfer instructions, string instructions and simple programs for 8086.

UNIT-III

8051 Microcontrollers: Architecture of 8051, Memory organization, I/O port organization, Interrupts, Timer counters, Serial Communication.

UNIT-IV

8051 Microcontrollers Programming: Addressing modes, data transfer instructions set, arithmetic instruction set, logical and rotate instructions, branch program control transfer instructions, simple programs for 8051.

UNIT-V

8051 Microcontrollers Interfacing: LED Interfacing, Seven segment display interfacing, ADC Interfacing, DAC interfacing, Stepper motor interfacing.

Text Books:

1. Microprocessors and Interfacing–Programming and Hardware, Douglas V Hall, SSSP Rao, Tata McGraw Hill Education Private Limited, 3rdEdition.

2. Ray and bhurchandi, "Advanced microprocessors and interfacing", Tata McGraw-Hill.

Reference Books

1. Kenneth J Ayala, "The 8051 microcontroller architecture, programming and applications" Thomson publishers, 2nd edition.

I Year – II Semester	**L**	**P**	**C**
Subject Code: 2038211251	**3+1**	**0**	**3**

ADVANCED COMPUTER ARCHITECTURE

(ELECTIVE-I)

Course Objectives:

The main objectives of this course are:

Architecture and organization of high performance computers. Principles of instruction sets. Pipeline, instruction level parallelism and multi-processors. Memory, storage and interconnection. Quantitative analysis and evaluation of design alternatives. Historical developments. Architectural tradeoffs and innovations.

Course outcomes:

At the end of this course the student can able to:

1. Understand parallelism and pipelining concepts, the design aspects and challenges.
2. Evaluate the issues in vector and array processors.
3. Analyze the high performance scalable multithreaded and multiprocessor systems.
4. Interpret the different architecture models

UNIT-I: Fundamentals of Computer Design:

Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, measuring and reporting performance, Quantitative principles of computer design, Amdahl's law.

Instruction set principles and examples- Introduction, classifying instruction set- memory addressing- type and size of operands, Operations in the instruction set.

UNIT-II:

Pipelines:

Introduction, basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties.

Memory Hierarchy Design:

Introduction, review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT-III:

Instruction Level Parallelism (ILP)-The Hardware Approach:

Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, High performance instruction delivery- Hardware based speculation.

ILP Software Approach:

Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues - Hardware verses Software.

UNIT-IV: Multi Processors and Thread Level Parallelism:

Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – Memory architecture, Synchronization.

UNIT-V:

Inter Connection and Networks:

Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters.

Intel Architecture: Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

TEXT BOOKS:

1. John L. Hennessy, David A. Patterson - Computer Architecture: A Quantitative Approach, 3rd Edition, an Imprint of Elsevier.

REFERENCE BOOKS:

1. John P. Shen and Miikko H. Lipasti -, Modern Processor Design : Fundamentals of Super Scalar Processors
2. Computer Architecture and Parallel Processing - Kai Hwang, Faye A.Brigs., MC Graw Hill.
3. Advanced Computer Architecture - A Design Space Approach, DezsoSima, Terence Fountain, Peter Kacsuk, Pearson Ed.

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I Year – II Semester	**L**	**P**	**C**
Subject Code: 2038211252	**3+1**	**0**	**3**

SOFT COMPUTING TECHNIQUES
(ELECTIVE -III)

Course Objectives:

The main objectives of this course are:

The main objective of the course is to expose the students to soft computing, various types of soft computing techniques, and applications of soft computing.

Course outcomes:

At the end of this course the student can able to:

1. Understand the basic concepts of Artificial neural network systems as well as understand the McCulloch-Pitts neuron model, simple and multilayer Perception, Adeline and Madeline concepts.
2. Data processing, Hopfield and self-organizing network and difference between crisp sets to fuzzy sets, fuzzy models, fuzzification, inference, membership functions, rule based approaches and defuzzification and Self – organizing fuzzy logic control, non linear time delay systems.
3. Understand the concept of Genetic Algorithm steps. Tabu, anD-colony search techniques for solving optimization problems.
4. GA applications to power system optimization problems, identification and control of linear and nonlinear dynamic systems using MATLAB-Neural network toolbox and also know the application and importance stability analysis

UNIT –I:
Introduction:
Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach,Knowledge representation - Expert systems.

UNIT –II:
Artificial Neural Networks:
Concept of Artificial Neural Networks and its basic mathematical model, McCulloch-Pitts neuron model, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network, Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT –III:
Fuzzy Logic System:
Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control,Fuzzification, inferencing and defuzzification,

Fuzzy knowledge and rule bases, Fuzzy modeling and control schemes for nonlinear systems, Self-organizing fuzzy logic control, Fuzzy logic control for nonlinear timedelay system.

UNIT –IV:

Genetic Algorithm:

Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search and anD-colony search techniques for solving optimization problems.

UNIT –V:

Applications:

GA application to power system optimisation problem, Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB-Neural Network toolbox, Stability analysis of Neural-Network interconnection systems, Implementation of fuzzy logic controller using MATLAB fuzzy-logic toolbox, Stability analysis of fuzzy control systems.

TEXT BOOKS:

1. Introduction to Artificial Neural Systems - Jacek.M.Zurada, Jaico Publishing House, 1999.
2. Neural Networks and Fuzzy Systems - Kosko, B., Prentice-Hall of India Pvt. Ltd., 1994.

REFERENCE BOOKS:

1. Fuzzy Sets, Uncertainty and Information - Klir G.J. &Folger T.A., Prentice-Hall of India Pvt. Ltd., 1993.
2. Fuzzy Set Theory and Its Applications - Zimmerman H.J. Kluwer Academic Publishers, 1994.
3. Introduction to Fuzzy Control - Driankov, Hellendroon, Narosa Publishers.
4. Artificial Neural Networks - Dr. B. Yagananarayana, 1999, PHI, New Delhi.
5. Elements of Artificial Neural Networks - KishanMehrotra, Chelkuri K. Mohan, Sanjay Ranka, Penram International.
6. Artificial Neural Network –Simon Haykin, 2nd Ed., Pearson Education.
7. Introduction Neural Networks Using MATLAB 6.0 - S.N. Shivanandam, S. Sumati, S. N. Deepa,1/e, TMH, New Delhi.

I Year – II Semester	**L**	**P**	**C**
Subject Code: 2038211253	**3+1**	**0**	**3**

CYBER SECURITY
(ELECTIVE - II)

Course Objectives:

The main objectives of this course are:

Effectively communicate in a professional setting to address information security issues.

Course outcomes:

At the end of this course the student can able to:

1. Analyze and evaluate the cyber security needs of an organization.
2. Conduct a cyber security risk assessment.
3. Measure the performance and troubleshoot cyber security systems.
4. Implement cyber security solutions.

UNIT I:
Introduction:
Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services(Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow &format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT II :
Conventional Encryption:
Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication,Secure Hash Functions and HMAC

UNIT III :
Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms
Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT IV:
IP Security: IP Security Overview, IP Security Architecture, Authentication Header,Encapsulating Security Payload, Combining Security Associations and Key Management

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)
Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT V :
Intrusion Detection: Intruders, Intrusion Detection systems, Password Management.
Malicious Software: Viruses and related threats & Countermeasures.
Fire walls: Firewall Design principles, Trusted Systems.

TEXT BOOKS:
1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, Sixthedition.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:
1. Network Security & Cryptography, Bernard Menezes, Cengage,2010

I Year – II Semester	**L**	**P**	**C**
Subject Code: 2038211254	**3+1**	**0**	**3**

DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES

(ELECTIVE -IV)

Course Objectives:

The main objectives of this course are:

To make students familiar with the most important methods in DSP, including digital filter design, transform-domain processing and importance of Signal Processors. Implications of the properties of systems and signals.

Course outcomes:

At the end of this course the student can able to:

1. Understand the basics concepts of Digital Signal Processing (DSP) and transforms.
2. To distinguish between the architectural features of General purpose processors and Programmable DSP processors
3. Understand the architectures of TMS320C54xx devices.
4. Understand the architectures of ADSP 2100 DSP devices and Black fin Processor and interfacing various devices to DSP Processors as well as able to write simple assembly language programs using instruction set of TMS320C54xx.

UNIT –I:

Introduction to Digital Signal Processing:

Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

Computational Accuracy in DSP Implementations:

Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT –II:

Architectures for Programmable DSP Devices:

Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT -III:

Programmable Digital Signal Processors:

Commercial Digital signal-processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors.

UNIT –IV:

Analog Devices Family of DSP Devices:

Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor.

Introduction to Blackfin Processor - The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT –V:

Interfacing Memory and I/O Peripherals to Programmable DSP Devices:

Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

TEXT BOOKS:

1. Digital Signal Processing – Avtar Singh and S. Srinivasan, Thomson Publications, 2004.
2. A Practical Approach to Digital Signal Processing - K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, New Age International, 2006/2009
3. Embedded Signal Processing with the MicroSignal Architecture Publisher: Woon-SengGan, Sen M. Kuo, Wiley-IEEE Press, 2007

REFERENCE BOOKS:

1. Digital Signal Processors, Architecture, Programming and Applications – B. Venkataramani and M. Bhaskar, 2002, TMH.
2. Digital Signal Processing –Jonatham Stein, 2005, John Wiley.
3. DSP Processor Fundamentals, Architectures & Features – Lapsley et al. 2000, S. Chand & Co.
4. Digital Signal Processing Applications Using the ADSP-2100 Family by The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Amy Mar, PHI
5. *The Scientist and Engineer's Guide to Digital Signal Processing* by Steven W. Smith, Ph.D.,California Technical Publishing, ISBN 0-9660176-3-3, 1997
6. *Embedded Media Processing* by David J. Katz and Rick Gentile of Analog Devices,Newnes , ISBN 0750679123, 2005

I Year – II Semester	**L**	**P**	**C**
Subject Code: 2038211255	**3+1**	**0**	**3**

ELECTROMAGNETIC INTERFERENCE AND ELECTROMAGNETIC COMPATIBILITY (EMI / EMC)

(ELECTIVE-IV)

Course Objectives:

The main objectives of this course are:

1. To introduce enough knowledge regarding the Electromagnetic interference/ Electromagnetic compatibility, its practical experiences and concerns, and various sources both the natural and Nuclear sources of EMI.
2. To know the practical experiences due to EMI such as mains power supply, switches and relaysetc and Analyze EM Propagation and Crosstalk
3. To know various methods of the measurements radiated and conducted interference in open area test sites and in chambers.
4. To learn about the various methods of minimizing the EMI as well as to know the National/International EMC Standards.

Course outcomes:

At the end of this course the student can able to:

1. Understand the electromagnetic environment the definitions of EMI and EMC, history of EMI some examples of practical experiences due to EMI such as mains power supply, switches and relays etc.
2. Understand the celestial electromagnetic noise the occurrence of lightning discharge and their effects, the charge accumulation and discharge in an electrostatic discharge, model ESD wave form, the various cases of nuclear explosion and the transients.
3. Understand the methods to measure RE and RS in the open are test sites
4. Understand the measurement facilities and procedures using anechoic chamber, TEM cell, reverberating chamber GTEM cell.

UNIT -I:

Introduction, Natural and Nuclear Sources of EMI / EMC:

Electromagnetic environment, History, Concepts, Practical experiences and concerns, frequency spectrum conservations, An overview of EMI / EMC, Natural and Nuclear sources of EMI.

UNIT -II:

EMI from Apparatus, Circuits and Open Area Test Sites:

Electromagnetic emissions, Noise from relays and switches, Non-linearities in circuits, passive inter modulation, Cross talk in transmission lines, Transients in power supply lines, Electromagnetic interference (EMI), Open area test sites and measurements.

UNIT -III:

Radiated and Conducted Interference Measurements and ESD:

Anechoic chamber, TEM cell, GH TEM Cell, Characterization of conduction currents / voltages, Conducted EM noise on power lines, Conducted EMI from equipment, Immunity to conducted EMI detectors and measurements, ESD, Electrical fast transients / bursts, Electrical surges.

UNIT -IV:

Grounding, Shielding, Bonding and EMI filters:

Principles and types of grounding, Shielding and bonding, Characterization of filters, Power lines filter design.

UNIT -V:

Cables, Connectors, Components and EMC Standards:

EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, opto isolators, National / International EMC standards.

TEXT BOOKS:

1. Engineering Electromagnetic Compatibility - Dr. V.P. Kodali, IEEE Publication, Printed in India by S. Chand & Co. Ltd., New Delhi, 2000.
2. Electromagnetic Interference and Compatibility IMPACT series, IIT – Delhi, Modules 1 – 9.

REFERENCE BOOKS:

1. Introduction to Electromagnetic Compatibility - Ny, John Wiley, 1992, by C.R. Pal.

I Year – II Semester	**L**	**P**	**C**
Subject Code: 2038211256	**3+1**	**0**	**3**

OBJECT ORIENTED PROGRAMMING

(ELECTIVE IV)

Course Objectives:

The main objectives of this course are:

Implementing programs for user interface and application development using core java principles

Course outcomes:

At the end of this course the student can able to:

1. The model of object oriented programming: abstract data types, encapsulation, inheritance and polymorphism
2. Fundamental features of an object oriented language like Java: object classes and interfaces, exceptions and libraries of object collections
3. How to take the statement of a business problem and from this determine suitable logic for solving the problem; then be able to proceed to code that logic as a program written in Java.
4. How to test, document and prepare a professional looking package for each business project using java doc.

UNIT I:

Objective: Focus on object oriented concepts and java program structure and its installation

Introduction to OOP

Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Installation of JDK1.6

UNIT II:

Objective: Comprehension of java programming constructs, control structures in Java

Programming Constructs

Variables , Primitive Data types, Identifiers- Naming Coventions, Keywords, Literals, Operators-Binary, Unary and ternary, Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of control-Branching, Conditional, loops.,

Classes and Objects- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments

UNIT III:

Objective: Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling

Inheritance: Types of Inheritance, Deriving classes using extends keyword, Methodoverloading, super keyword, final keyword, Abstract class

Interfaces, Packages and Enumeration: Interface-Extending interface, Interface Vs Abstractclasses, Packages-Creating packages , using Packages, Access protection, java.lang package **Exceptions & Assertions** - Introduction, Exception handling techniques-try...catch, throw,throws, finally block, user defined exception, Assertions

UNIT IV:

Objective: Understanding of Thread concepts and I/O in Java

MultiThreading :java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading, Syncronization, suspending and Resuming threads, Communication between Threads

Input/Output: reading and writing data, java.io package

UNIT V:

Objective: Being able to build dynamic user interfaces using applets and Event handling in java

Applets- Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint(),update() and repaint()

Event Handling -Introduction, Event Delegation Model, java.awt.event Description, Event Listeners, Adapter classes, Inner classes

UNIT VI:

Objective: Understanding of various components of Java AWT and Swing and writing code snippets using them

Abstract Window Toolkit

Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar

Swing:

Introduction , JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box

Text Books:

1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabhchoudhary, Oxford.
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH
5. Introduction to Java rogramming, 7th ed, Y Daniel Liang, Pearson

Reference Books:

1. JAVA Programming, K.Rajkumar.Pearson
2. Core JAVA, Black Book, NageswaraRao, Wiley, Dream Tech
3. Core JAVA for Beginners, RashmiKanta Das, Vikas.
4. Object Oriented Programming through JAVA , P Radha Krishna , University Press.

I Year – II Semester	**L**	**P**	**C**
Subject Code: 2038211210	**0**	**4**	**2**

ADVANCED COMMUNICATIONS LAB

Course Objectives:

The main objectives of this course are:

The student should be made to:

- Understand the working principle of optical sources, detector, fibers
- Develop understanding of simple optical communication link
- Understand the measurement of BER, Pulse broadening
- Understand and capture an experimental approach to digital wireless communication

Course Outcomes:

At the end of this course, students will be able to

1. Identify the different types of network devices and their functions within a network.
2. Understand and build the skills of sub-netting and routing mechanisms.
3. Understand basic protocols of computer networks, and how they can be used to assist in network design an d implementation.
4. Implement the digital filters using DSP Trainer kit

Note:

Minimum of 10 Experiments have to be conducted

All Experiments may be Simulated using MATLAB and to be verified using related training kits.

1. Measurement of Bit Error Rate using Binary Data
2. Verification of minimum distance in Hamming code
3. Determination of output of Convolutional Encoder for a given sequence
4. Determination of output of Convolutional Decoder for a given sequence
5. Efficiency of DS Spread- Spectrum Technique
6. Simulation of Frequency Hopping (FH) system
7. Effect of Sampling and Quantization of Digital Image
8. Verification of Various Transforms (FT / DCT/ Walsh / Hadamard) on a given Image (Finding Transform and Inverse Transform)
9. Point, Line and Edge detection techniques using derivative operators.
10. Implementation of FIR filter using DSP Trainer Kit (C-Code/ Assembly code)
11. Implementation of IIR filter using DSP Trainer Kit (C-Code/ Assembly code)
12. Determination of Losses in Optical Fiber
13. Observing the Waveforms at various test points of a mobile phone using
14. Study of Direct Sequence Spread Spectrum Modulation & Demodulation using CDMA-DSS-BER Trainer
15. Study of ISDN Training System with Protocol Analyzer
16. Characteristics of LASER Diode.

I Year – II Semester	**L**	**P**	**C**
Subject Code: 2038211211	**0**	**4**	**2**

Advanced Image Processing lab

Course Objectives:

The main objectives of this course are:

The main objective of image processing is to transform an image into digital form and perform certain operations on it in order to obtain specific models or to extract useful information from the image.

Course Outcomes:

At the end of this course, students will be able to

1. Perform and analyze image and video enhancement and restoration
2. Perform and analyze image and video segmentation and compression
3. work and process viz., detection, extraction on the image/video
4. Extract the information from the image using boundary and regional features.

List of Experiments:

1. Perform basic operations on images like addition, subtraction etc.
2. Plot the histogram of an image and perform histogram equalization
3. Implement segmentation algorithms
4. Perform video enhancement
5. Perform video segmentation
6. Perform image compression using lossy technique
7. Perform image compression using lossless technique
8. Perform image restoration
9. Convert a colour model into another
10. Calculate boundary features of an image
11. Calculate regional features of an image
12. Detect an object in an image/video using template matching/Bayes classifier

Course code	CONSTITUTION OF INDIA	L	T	P	C
2000211230		3	0	0	0

Course Overview:

This course introduces students to the Constitution of India. It begins by providing an overview of the history of the making of Indian Constitution. It then discusses the preamble and the basic structures of the Constitution. The fundamental rights, duties and the directive principles of state policy will be discussed thoroughly, followed by a discussion of the legislature, the executive and the judiciary. Some of the important sections of the Constitution that have influenced the history of India since independence will also be taken up for study. These include emergency powers and special provisions.

Course Objectives:

1. To Enable the student to understand the importance of constitution
2. To understand the structure of executive, legislature and judiciary
3. To understand philosophy of fundamental rights and duties
4. To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
5. To understand the central and state relation financial and administrative

	Course outcome	**Bloom's cognitive level**	**PO**
CO1	Have general knowledge and legal literacy and thereby to take up competitive examinations.	Understanding	PO-6 PO-8 PO-9
CO2	Understand state and central policies, fundamental duties.	Understanding	PO-6 PO-8 PO-9
CO3	Understand Electoral Process, special provisions.	Understanding	PO-6 PO-8 PO-9
CO4	Understand powers and functions of Municipalities, Panchayats and Cooperative Societies	Understanding	PO-6 PO-8 PO-9

Unit-I: **No. of lecture hours: 6**

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties

Outcome: After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History, features of Indian constitution
- Evaluate Preamble Fundamental Rights and Duties

UNIT II:No. of lecture hours: 6

Union Government and its Administration Structure of the Indian Union. President: Role, power and position, PM and Council of ministers, LokSabha, RajyaSabha, The Supreme Court and High Court: Powers and Functions

Outcome: After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

Activity: role play of model parliament

Unit-III: No. of lecture hours: 6

State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organization, Structure and Functions

Outcome: After completion of this unit student will
- Understand the structure of state government
- Analyze the role Governor and Chief Minister
- Explain the role of state Secretariat
- Differentiate between structure and functions of state secrateriate

Activity: Quiz role play of model assembly.

Unit-IV: No. of lecture hours: 6

A.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role - CEO of Municipal Corporation PachayatiRaj: Functions ZilaPanchayat, CEO ZilaPanchayat

Outcome: After completion of this unit student will
- Understand the local Administration
- Compare and contrast district administration role and importance
- Analyze the role of Myer and elected representatives of Municipalities
- Evaluate Zillapanchayat block level organisation

Activity: Debate on pros and cons of local governance

Unit-V: No. of lecture hours: 6

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate State Election Commission:,

Outcome: After completion of this unit student will
- Know the role of Election Commission apply knowledge
- Contrast and compare the role of Chief Election commissioner and Commissiononerate
- Analyze role of state election commission
- Evaluate various commissions of viz SC/ST/OBC and women

Activity: Debate on election system in India

Text Books:

1. Civics, Telugu Academy

References:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. SubashKashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government andPolitics Hans
7. J. Raj IndianGovernment and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012

Course code	Mini project with seminar	L	T	P	C
2038211270		2	0	0	2

Course Outcomes:

1. Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.
2. Reproduce, improve and refine technical aspects for engineering projects.
3. Work as an individual or in a team in development of technical projects.
4. Communicate and report effectively project related activities and findings.

For Mini Project with Seminar, a student under the supervision of a faculty member, shall collect the literature on a topic and critically review the literature and submit it to the department in a report form and shall make an oral presentation before the Project Review Committee (PRC) consisting of Head of the Department, supervisor/mentor and two other senior faculty members of the department. For Mini Project with Seminar, there **will be onlyinternal evaluation** of 100 marks. A candidate has to secure a minimum of 50% of marks tobe declared successful.

Mini project report is evaluated for 100 marks.

a) Assessment by the supervisor /guide for 30 marks
b) Assessment by PRC for 40 marks (20 marks x 2 reviews)
c) Seminar presentations for 30 marks (department level committee assessment)

M.Tech. - II Year

(Detailed Syllabus)

II Year – I Semester	**L**	**P**	**C**
Subject Code: 2038212150	**3+1**	**0**	**3**

DETECTION AND ESTIMATION THEORY

Course Objectives:

The main objectives of this course are:

Students will be able to solve problems that involve estimation of signal parameters or detection of signals or problems where joint detection and estimation is required.

Course outcomes:

At the end of this course the student can able to:

1. Understand the mathematical background of signal detection an destination
2. Use classical and Bayesian approaches to formulate and solve problems for signal detection and parameter estimation from noisy signals.
3. Derive and apply filtering methods for parameter estimation.
4. Estimate the Parameters of Random Processes from Data

UNIT –I:
Random Processes:
Discrete Linear Models, Markov Sequences and Processes, Point Processes, and Gaussian Processes.

UNIT –II:
Detection Theory:
Basic Detection Problem, Maximum A posteriori Decision Rule, Minimum Probability of Error Classifier, Bayes Decision Rule, Multiple-Class Problem (Bayes)- minimum probability error with and without equal a priori probabilities, Neyman-Pearson Classifier, General Calculation of Probability of Error, General Gaussian Problem, Composite Hypotheses.

UNIT –III:
Linear Minimum Mean-Square Error Filtering:
Linear Minimum Mean Squared Error Estimators, Nonlinear Minimum Mean Squared Error Estimators. Innovations, Digital Wiener Filters with Stored Data, Real-time Digital Wiener Filters, Kalman Filters.

UNIT –IV:
Statistics:
Measurements, Nonparametric Estimators of Probability Distribution and Density Functions, Point Estimators of Parameters, Measures of the Quality of Estimators, Introduction to Interval Estimates, Distribution of Estimators, Tests of Hypotheses, Simple Linear Regression, Multiple Linear Regression.

UNIT –V:
Estimating the Parameters of Random Processes from Data:

Tests for Stationarity and Ergodicity, Model-free Estimation, Model-based Estimation of Autocorrelation Functions, Power Special Density Functions.

TEXT BOOKS:

1. Random Signals: Detection, Estimation and Data Analysis - K. Sam Shanmugan& A.M. Breipohl, Wiley India Pvt. Ltd, 2011.
2. Random Processes: Filtering, Estimation and Detection - Lonnie C. Ludeman, Wiley India Pvt. Ltd., 2010.

REFERENCE BOOKS:

1. Fundamentals of Statistical Signal Processing: Volume I Estimation Theory– Steven.M.Kay, Prentice Hall, USA, 1998.
2. Fundamentals of Statistical Signal Processing: Volume I Detection Theory– Steven.M.Kay, Prentice Hall, USA, 1998.
3. Introduction to Statistical Signal Processing with Applications - Srinath, Rajasekaran, Viswanathan, 2003, PHI.
4. Statistical Signal Processing: Detection, Estimation and Time Series Analysis – Louis L.Scharf, 1991, Addison Wesley.
5. Detection, Estimation and Modulation Theory: Part – I – Harry L. Van Trees, 2001, John Wiley & Sons, USA.
6. Signal Processing: Discrete Spectral Analysis – Detection & Estimation – Mischa Schwartz, Leonard Shaw, 1975, McGraw Hill.

II Year – I Semester	**L**	**P**	**C**
Subject Code: 2038212151	**3+1**	**0**	**3**

ADVANCED DIGITAL SIGNAL PROCESSING

Course Objectives:

The main objectives of this course are:

Analyze multirate DSP systems. Determine coefficients for perfect reproduction filter banks and wavelets.

Course outcomes:

At the end of this course the student can able to:

1. Understand theory of different filters and algorithms
2. Understand theory of multirate DSP, solve numerical problems and write algorithms
3. Understand theory of prediction and solution of normal equations
4. Estimate the Parametric Methods of Power Spectrum

UNIT –I:

Review of DFT, FFT, IIR Filters and FIR Filters:

Multi Rate Signal Processing: Introduction, Decimation by a factor D, Interpolation by afactor I, Sampling rate conversion by a rational factor I/D, Multistage Implementation of Sampling Rate Conversion, Filter design & Implementation for sampling rate conversion.

UNIT –II:

Applications of Multi Rate Signal Processing:

Design of Phase Shifters, Interfacing of Digital Systems with Different Sampling Rates, Implementation of Narrow Band Low Pass Filters, Implementation of Digital Filter Banks, Sub-band Coding of Speech Signals, Quadrature Mirror Filters, Trans-multiplexers, Over Sampling A/D and D/A Conversion.

UNIT -III:

Non-Parametric Methods of Power Spectral Estimation: Estimation of spectra from finite duration observation of signals, Non-parametric Methods: Bartlett, Welch & Blackman-Tukey methods, Comparison of all Non-Parametric methods

UNIT –IV:

Implementation of Digital Filters:

Introduction to filter structures (IIR & FIR), Frequency sampling structures of FIR, Lattice structures, Forward prediction error, Backward prediction error, Reflection coefficients for lattice realization, Implementation of lattice structures for IIR filters, Advantages of lattice structures.

UNIT –V:

Parametric Methods of Power Spectrum Estimation: Autocorrelation & Its Properties, Relation between auto correlation & model parameters, AR Models - Yule-Walker & Burg Methods, MA & ARMA models for power spectrum estimation, Finite word length effect in IIR digital Filters – Finite word-length effects in FFT algorithms.

TEXT BOOKS:

1. Digital Signal Processing: Principles, Algorithms & Applications - J.G.Proakis& D. G. Manolakis, 4th Ed., PHI.
2. Discrete Time Signal Processing - Alan V Oppenheim & R. W Schaffer, PHI.
3. DSP – A Practical Approach – Emmanuel C. Ifeacher, Barrie. W. Jervis, 2 Ed., Pearson Education.

REFERENCE BOOKS:

1. Modern Spectral Estimation: Theory & Application – S. M .Kay, 1988, PHI.
2. Multi Rate Systems and Filter Banks – P.P.Vaidyanathan – Pearson Education.
3. Digital Signal Processing – S.Salivahanan, A.Vallavaraj, C.Gnanapriya, 2000,TMH
4. Digital Spectral Analysis – Jr. Marple

II Year – I Semester	**L**	**P**	**C**
Subject Code: 2038212152	**3+1**	**0**	**3**

CODING THEORY AND APPLICATIONS

Course Objectives:

The main objectives of this course are:

To develop systems and methods that allow detect/correct errors caused when information is transmitted through noisy channels.

Course outcomes:

At the end of this course the student can able to:

1. Learning the measurement of information and errors.
2. Obtain knowledge in designing Linear Block Codes and Cyclic codes.
3. Construct tree and trellies diagrams for convolution codes
4. Design the Turbo codes and Space time codes and also their applications

UNIT –I:

Coding for Reliable Digital Transmission and Storage:

Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.

Linear Block Codes:

Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT –II:

Cyclic Codes:

Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding ,Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT –III:

Convolutional Codes:

Encoding of Convolutional Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

UNIT –IV:

Burst –Error-Correcting Codes:

Decoding of Single-Burst error Correcting Cyclic codes, Single-Burst-Error-Correcting Cyclic codes, Burst-Error-Correcting Convolutional Codes, Bounds on Burst Error-Correcting

Capability, Interleaved Cyclic and Convolutional Codes, Phased-Burst –Error-Correcting Cyclic and Convolutional codes.

UNIT -V:

BCH – Codes:

BCH code- Definition, Minimum distance and BCH Bounds, Decoding Procedure for BCH Codes- Syndrome Computation and Iterative Algorithms, Error Location Polynomials and Numbers for single and double error correction

TEXT BOOKS:

1. Error Control Coding- Fundamentals and Applications –Shu Lin, Daniel J.Costello,Jr, Prentice Hall, Inc.
2. Error Correcting Coding Theory-Man Young Rhee- 1989, McGraw-Hill Publishing.

REFERENCE BOOKS:

1. Digital Communications-Fundamental and Application - Bernard Sklar, PE.
2. Digital Communications- John G. Proakis, 5th Ed., 2008, TMH.
3. Introduction to Error Control Codes-Salvatore Gravano-oxford
4. Error Correction Coding – Mathematical Methods and Algorithms – Todd K.Moon, 2006, Wiley India.
5. Information Theory, Coding and Cryptography – Ranjan Bose, 2nd Ed, 2009, TMH.

II Year – I & II Semester

(DISSERTATION)

PHASE – I & PHASE – II

Course Outcomes:

1. Apply knowledge of Electronics and communication engineering fundamentals to solve the complex Engineering problems
2. Design prototypes and solutions to solve the specific needs related with public health, safety, society and environment leading to sustainable development following ethical values
3. Adapt appropriate techniques, resources and modern engineering tools during the implementation of project
4. Develop a multidisciplinary project leading to the ability of engagement in lifelong learning and self-development

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

Continuous assessment of Dissertation-I and Dissertation-II during the semester(s) will be monitored by the PRC.

DISSERTATION – I:

Dissertation- I/Industrial project: In Dissertation- I, literature review, design calculations and a prototype model are to be prepared within 16 weeks.

In case of Industrial project, students have to complete coursework related to the particular semester through MOOCs

The evaluation of Dissertation-I/Industrial project will be purely internal for **100 marks** based on the presentation of literature review, design calculations and demonstration of prototype model.

DISSERTATION– II:

In **Dissertation – II**, experimentation, analysis (analytically or using modern software tools), results & discussion and conclusions are to be prepared and submitted.

A candidate shall submit his status report after each review. Minimum three reviews at PRC level shall be conducted in a gap of one month each for both Dissertation – I & II.

Viva-Voce examination shall be conducted by a board consisting of the Supervisor, Head of the Department and the external examiner who adjudicated the Thesis. The Board shall jointly evaluate the candidate's work for a maximum of **100 marks.**