ANIL NEERUKONDA
INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)

Affiliated to Andhra University

M.Tech
(Electronics & Communication Engineering Department)

Academic Regulations
Curriculum &
Syllabi (First Year I-Sem)

ACCREDITED BY NBA & NAAC WITH 'A' GRADE

ACADEMIC REGULATIONS FOR M.TECH PROGRAMME UNDER AUTONOMOUS STATUS

W.E.F. THE ADMITTED BATCH OF 2015-16

I. Admissions:

Admissions into first year of M.Tech Programme of the Institute will be as per the norms stipulated by Andhra University & Andhra Pradesh State Council for Higher Education (APSCHE), Govt. of Andhra Pradesh.

II. Programmes Offered:

The following are the M.Tech. programmes offered by the Institute.

01. Control Systems Engineering – EEE Department
02. Computer Science and Technology – CSE Department
03. Communication Systems – ECE Department
04. Machine Design – Mech. Engg Department

III. Structure Of The M. Tech. Programme:

The normal duration of the course is 2 academic years for M.Tech Degree. Candidates should pursue a regular course of study, as detailed below, for not less than two academic years which consists of 4 semesters and should fulfil the academic requirements and pass all the prescribed examinations for the award of the degree.

The curriculum of M.Tech programme is designed to have a total of about 80 credits of which a student should acquire a minimum of 74 credits to get the degree awarded. If a student earns all the total credits, then the best 74 credits are considered to determine the final CGPA. However, the credits which a student can forego will be in accordance with the mandatory courses and electives offered by the individual departments.

IV. Duration of the Programme:

The duration of the programme is 2 academic years consisting of 2 semesters in each academic year. A student is permitted to complete the Programme in a stipulated time frame of 4 consecutive academic years from the date of initial admission and if fails will forfeit his seat in M. Tech Programme.

V. Medium of Instruction:

The medium of instruction and examination is English.

VI. Minimum Instruction Days:

Each semester normally consists of a minimum of 16 weeks of instruction.

VII. Academic Calendar:

The dates of all important events, such as commencement of class work, examinations, vacations, etc., during the academic year will be specified in the Academic Calendar of the Institute, as approved by the Academic Council.

VIII. Examinations & Evaluation Process:

The performance of a student in each semester shall be evaluated course-wise with a maximum of 100 marks each for theory and practical courses.

(a) Theory Course:

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

The sessional marks shall be awarded through internal evaluation by the teachers concerned based on the continuous assessment which includes class tests, quiz, viva-voce, assignments, student regularity, two mid-examinations etc., according to a scheme notified by the department at the beginning of the semester.

Out of the 40 internal evaluation marks, 20 marks are assigned for 2 internal-mid exams, 10 marks are assigned for assignments, 5 marks are assigned for projects/ case studies /quiz/tests and 5 marks are assigned for attendance. The average of 2 internal-mid exams is considered for the 20 marks allocated.

Under any circumstances, no re-examination shall be conducted for the internal mid examinations.

ii) External evaluation:

The question paper shall be set externally and the answer scripts are valued through a double valuation system.

The average of the two valuations will be taken for award of marks. In case, the difference of the marks obtained in the two valuations is more than 20% then a third examiner shall value the script. Out of the three valuations, the average of marks obtained in third valuation and the marks obtained nearer to third valuation out of first two valuations shall be considered. No revaluation for any subject/course shall be entertained as already double valuation system is in existence. However, recounting is allowed on the request of the candidate on payment of specified fee. Challenge valuation shall also be entertained on payment of specified fee.

(b) Laboratory Course:

Each student will perform about 10 to 12 experiments in each laboratory course. Laboratory course will be evaluated for 100 marks, out of which 50 marks are for external examination and 50 marks are for internal evaluation. The internal marks are awarded based on continuous assessment, record work, internal lab examination and student regularity. The external examination will be conducted by two examiners, one of them being laboratory class teacher as internal examiner (nominated by the Principal on recommendation of HOD) and an external examiner nominated by the Principal from the panel of experts recommended by the HOD.

A candidate shall be declared to have passed in any theory subject/course if he secures not less than 40% in external theory examination and also a minimum of 50% of total marks of that course which assures a minimum of 'E' grade.

A candidate shall be declared to have passed in any practical course if he secures not less than 50% of total marks of that course which assures a minimum of 'E' grade.

Any student appearing for the semester-end practical examination is eligible only if he submits the bonafide record certified by the laboratory class teacher and the HOD.

(C) Thesis Work:

The thesis work shall be carried out in two semesters of one full academic year. The students will be allotted for thesis by the Department committee to various faculty members who act as guides. However, a student can carry-out his thesis work either in the Department or in any other industry / research institute. In any such request to carryout thesis work outside the college, the permission of the Principal and an internal guide is mandatory. Such students should report to the internal guide once in a week essentially through mail or other communication.

The progress report of such work is to be submitted by the guide/external guide every month to the HOD. If the work is not found satisfactory, the HOD has the right to call back the student with the permission of the Principal. In any case the time and conditions for submission of the thesis will be same as for the regular candidates working in the college.

The third semester work is evaluated internally by the committee nominated by the HOD consisting a minimum of four members (concerned in area of specialization) including the HOD. If the work is not satisfactory, the candidate has to improve to the satisfaction of the committee within one month from the end of the semester to carry on his fourth semester work. If he fails to satisfy the committee in the second attempt he has to get readmitted into the third semester as per college norms. The grades will be awarded just as in the case of laboratory work. An internal viva voce by a committee nominated by the HOD is a prerequisite for the submission of the thesis. The fourth semester evaluation will be done through the viva voce examination on the thesis by a board consisting of the following four examiners after submission of the thesis by the candidate duly certified by the Guide and the HOD.

1. The Head of the Department as Chairman
2. Senior Professor in the Department
3. Internal Guide and External Guide (if any)
4. External examiner nominated by the Principal from a panel recommended by the HOD.

The panel of the external subject experts shall be submitted to the Principal by the HOD in mutual consent with the guide and other subject experts of the Department.

The valuation of the thesis shall be as specified in the scheme of examination of the laboratory course.

If the candidate fails in the viva voce examination of the thesis he has to reappear for the viva voce. The candidate has to bear the charges for re-conducting the viva voce.

The prerequisite for submission of the M.Tech. thesis is that one should have published a paper in a reputed international journal/ proceedings of an annual conference.

(d) Supplementary Exam:

There will be **NO** Supplementary examination for M.Tech courses.

IX. Attendance Regulations:

Attendance of a student is computed by considering total number of periods conducted in all courses as the denominator and the total number of periods actually attended by the student in all courses, as the numerator. It is desirable for a student to put in 100% attendance in all the subjects. However, a candidate shall be permitted to appear for the semester end examination provided he/she maintains a minimum of 75% overall attendance in the semester.

The shortage of attendance on medical grounds can be condoned up to a maximum of 9% provided the student puts in at least 66% attendance and provided the Principal is satisfied with the genuineness of the reasons. The Medical Certificates are to be submitted to the Head of the Department when the candidate reports to the classes immediately after the leave. Certificates submitted afterwards shall not be entertained. Condonation fee as fixed by the college for those who put in attendance between ≥ 66% and <75% shall be charged before the semester-end examinations.

In the case of students who participate in co-curricular, extra-curricular activities like student seminars, N.S.S, N.C.C, Inter-collegiate tournaments and any such other activities involving the representation of the Institute, with the prior approval of the

Principal, the candidate may be deemed to have attended the classes during the actual period of such activity, solely for the purpose of attendance.

A student, who could not satisfy the minimum attendance requirement of 66% in any semester, shall be declared 'Detained'. He/she is not eligible to appear for the semester end examinations. He will not be promoted to the next semester and shall have to repeat that semester with the next batch(es) of students. Such students who are detained and seek readmission, should submit undertaking/declaration that they will abide by the regulations existing at the time of readmission.

X. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item No. IX.

- A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory subject if only he secures not less than 40% marks in the semester-end examination and a minimum of 50% marks in the sum of the internal evaluation and semester-end examination taken together. In the labs/projects, the student should secure a minimum of 50% marks in the external examination and a minimum of 50% marks in the sum of internal evaluation and external examination evaluation taken together.

- A student will be promoted to the next semester, if only he satisfies the minimum attendance requirement.
- Students, who fail to complete their two year course study within Four academic years from the year of their admission or fail to acquire the credits stipulated for the course shall forfeit their seat in M. Tech course and their admission shall stand cancelled.

XI. Award Of Grades:

The absolute grading system is adopted as follows:

S.No.	Range of Marks {%}	Grade	Description	Grade Points
1	90-100	O	Outstanding	10
2	80-89	A	Excellent	9
3	70-79	B	Very Good	8
4	60-69	C	Good	7
5	55-59	D	Fair	6
6	50-54	E	Satisfactory	5
7	49 and below	F	Fail	0
8	The grade 'I' represents absent (subsequently changed into pass or higher grades.)	I	Absent	0

The performance of a student at the end of the each semester is indicated in terms of Semester Grade Point Average (SGPA). The SGPA is calculated as below:

$$SGPA = \frac{\Sigma \text{ (Credits of a course x Grade points awarded for a course)}}{\Sigma \text{ (Credits of a course)}}$$

SGPA is calculated for the candidates who have passed in all the courses in that semester.

Cumulative Grade Point Average (CGPA) will be calculated from II semester onwards up to the final semester and its calculation is similar to that of SGPA, considering all the courses offered from the first semester onwards.

CGPA is calculated for those who clear all the courses in all the previous semesters.

XII. Award of Class:

For the award of class, a total of best 74 credits are considered. A candidate, who becomes eligible for the award of M.Tech. Degree, shall be placed in one of the following classes.

S.No.	Class	CGPA
1	First Class with Distinction	7.5 or more*
2	First Class	6.5 or more but less than 7.5
3	Second Class/Pass	5.0 or more but less than 6.5

***First class with Distinction will be awarded only to those students who clear all the subjects of the program in first attempt of regular examinations.**

The CGPA can be converted to aggregate percentage by multiplying CGPA with 10, in case of requirement by any other university or for any other purpose.

XIII. Eligibility for Award of M.Tech. Degree:

A student shall be eligible for the award of the M.Tech degree if he/she fulfils all the following conditions:

1) Registered and successfully completed all the components prescribed for eligibility in the programme of study to which he/she is admitted within the stipulated period,
2) Obtained CGPA greater than or equal to 5.0 (Minimum requirement for Pass),
3) No disciplinary action is pending against him/her and
4) Has no dues to the Institute including hostels.

XIV. Malpractices:

The Controller of Examinations/Dean of Examinations shall refer the cases of suspected malpractices in mid examinations and semester-end examinations to Malpractice Enquiry Committee constituted by the Institute. Such committee shall follow the approved scales of punishment. The Principal shall take necessary final action against the erring students based on the recommendations of the committee.

XV. Amendments to Regulations:

The Institute may, from time to time, revise, amend, or change the Regulations, Schemes of Examinations, and / or Syllabi and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute.

XVI. General:

(i) Where the words 'he', 'him', 'his', occur in the regulations, they include 'she', 'her', 'hers'.

(ii) The academic regulation should be read as a whole for the purpose of any interpretation.

(iii) In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.

COURSE STRUCTURE FOR M TECH (CONTROL SYSTEMS ENGINEERING)

DEPT. OF ELECTRONICS AND COMMUNICATION ENGINEERING: ANITS

SEMESTER – I

CODE	*SUBJECT NAME*	*Instruction periods per Week*				*MAX MARKS*		CREDITS
		LECTURE	*TUTORIAL*	*PRACTICAL*	*TOTAL*	*SESSIONAL MARKS*	*SEMESTER END MARKS*	
PECECMS111	Advanced Digital signal processing	4	1	-	5	40	60	4
PECECMS112	Digital Communication Techniques	4	1	-	5	40	60	4
PECECMS113	Satellite Communication and Phased arrays	4	1	-	5	40	60	4
PECECMS114	Optical Fiber Communications	4	1	-	5	40	60	4
PECECMS115	Core Elective –I	4	1	-	5	40	60	4
PECECMS116	Core Elective-II	4	1	-	5	40	60	4
PECECMS117	Communication Engineering Lab	-	-	3	3	50	50	2
PECECMS118	Seminar - I	-	-	2	2	100	-	2
	Total	24	6	5	35	390	410	28

Core Elective – I

a) Global Positioning System

b) Micro Controllers and Embedded Systems

c) Smart Antennas

Core Elective-II

a) Telecommunication Switching and Networks

b) Spread Spectrum Techniques & Multiple Access

c) Speech Signal Processing

SEMESTER – II

CODE	**SUBJECT NAME**	*Instruction periods per Week*				*MAX MARKS*		CREDITS
		LECTURE	*TUTORIAL*	*PRACTICAL*	*TOTAL*	*SESSIONAL MARKS*	*SEMESTER END MARKS*	
PECECMS121	Communication Networks	4	1	-	5	40	60	4
PECECMS122	Wireless Communications	4	1	-	5	40	60	4
PECECMS123	Multimedia and Communication Systems	4	1	-	5	40	60	4
PECECMS124	Elective - III	4	1	-	5	40	60	4
PECECMS125	Elective – IV	4	1	-	5	40	60	4
PECECMS126	Elective – V	4	1	-	5	40	60	4
PECECMS127	Signal Processing Lab	-	-	3	3	50	50	2
PECECMS128	Seminar - II	-	-	2	2	100	-	2
	Total	24	6	5	35	390	410	28

Core Elective-III

a) Software Defined Radio

b) Modern Radar Systems

c) Digital Image Processing

Core Elective- IV

a) RF and Microwave Engineering

b) Wavelet transforms and Its Applications

Core Elective -V

a) Statistical Signal Processing

b) CPLD and FPGA Architecture and Applications

c) AD-HOC Networks

SEMESTER – III

CODE	SUBJECT NAME	*MAX MARKS*		CREDITS
		SESSIONAL MARKS	*SEMESTER END MARKS*	
MTCS – 17	MOOC	100	-	4
MTCS – 18	Thesis (Part I)	50	50	6
Total		150	50	10

Project work to be submitted before the end of 3rd Semester and it will be evaluated by a committee consisting of Chairman, Board of Studies, Head of the Department and thesis guide.

SEMESTER – IV

CODE	SUBJECT NAME	MAX MARKS		CREDITS
		SESSIONAL MARKS	SEMESTER END MARKS	
MTCS – 19	Thesis (Part II)	50	50	14

Semester –IV project work will begin after completion of semester-III examination.
Thesis work is for a period of SIX months in Industry/Department. The students are required to submit their thesis two/three phases. Thesis will be evaluated by a committee consisting of an external member from reputed institution, HOD, Chairman BOS and thesis Guide.

I YEAR – I SEMESTER

ADVANCED DIGITAL SIGNAL PROCESSING

Course Code: PECECMS111

Credits	Instruction periods per Week			Exam Hrs.	SESSIONAL MARKS	SEMESTER END MARKS	Total Marks
	LECTURE	TUTORIAL	PRACTICAL				
4	4	1	-	3	40	60	100

Pre-requisites: Prior to this, an apt knowledge of signal & systems and digital signal processsing subjects should be known.

Course Objectives:

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

a) Various optimization techniques used in designing the digital filters.
b) Sampling rate requirement in the digital signal applications
c) Need for prediction, filtering & smoothening of the signals to minimize the mean-square error(MSE).
d) Different DSP algorithms used for DFT computation procedures.
e) Applications of DSP in real time.

Unit– I: Advanced digital filter design techniques: Design of optimum equi-ripple FIR filters, Remez Algorithm, Parks-McClellan Algorithm, Differentiators, BPF, Hilbert transformer filters multiple band optimal FIR filters, Design of filters with simultaneous constraints in time and frequency response, Optimization methods for designing IIR filters, Comparison of optimum FIR filters and delay equalized elliptic filters. **(12hrs)**

Unit – II: Multirate DSP: The basic sample rate alteration – time – domain characterization, frequency – domain characterization: Cascade equivalences, filters in sampling rate alteration systems, digital filter banks and their analysis and applications, Multi-level filter banks.**(10hrs)**

Unit – III: Linear prediction and optimum linear filters: forward and backward linear prediction, AR Lattice and ARMA lattice – ladder filters, Wieners filters for filtering on prediction. **(7hrs)**

Unit – IV: DSP Algorithms: Levinson – Durbin algorithm, the Schur algorithm, The Goertzel algorithm, the chirp – z transform algorithm, Bluestein algorithm, computations of the DFT, concept of tunable digital filters**.** **(8hrs)**

Unit – V: Applications of DSP: Speech Model of speech production, speech analysis – synthesis system vocoder analyzers and synthesizers, convolvers,Linear Prediction of speech, DTMF System, DTTR, MUSIC, TDM to FDM translator. **(8hrs)**

Course Outcomes:

a) Using filter optimization techniques students will be able to design a filter with Least Mean Square error.(UNIT-I)
b) Students will be able to solve research papers related to multirate signal processing—Data Acquisition, Bandwidth reduction in a system etc. (UNIT-II)
c) Apply methods for prediction of real world signals, based on signal modeling and advanced filtering techniques, such as Linear Predictive Filters and Optimal Linear Filters.(UNIT-I,III,V)
d) Apply fundamental principles, methodologies and techniques of the course to analyze and design various problems encountered in both academic research ,industry and R&D practice. (UNIT-IV)
e) This course is basis for understanding Adaptive signal processing, statistical signal processing and wavelet transform subjects.

Prescribed Text Books:

1. Lawrence R. Rabiner and Bernard Gold ,"Theory and applications of digital signal processing" PHI,4th edition.**(UNIT 1,5)**
2. J. G. Proakis and D. G. Manolakis, Introduction to Digital Signal Processing, 4td Edition. Prentice Hall, 1996, ISBN No. 0-13-373762-4. **(UNIT 2,3 4)**

References:

1. Multi Rate Systems and Filter Banks – P.P.Vaidyanathan – Prentice Hall,1st edition
2. DSP – A Practical Approach – Emmanuel C. Ifeacher, Barrie. W. Jervis, 2nd Ed., Prentice Hall.
3. Sanjit K. Mitra,"Digital Signal Processing, A Computer – Based approach,Tata Mc Graw-Hill, 1998,$th edition **(UNIT 2)**

I YEAR – I SEMESTER

DIGITAL COMMUNICATION TECHNIQUES

Course Code: PECECMS112

Credits	Instruction periods per Week			Exam Hrs.	SESSIONAL MARKS	SEMESTER END MARKS	Total Marks
	LECTURE	TUTORIAL	PRACTICAL				
4	4	1	-	3	40	60	100

Course Objectives

1. To enable student to Design a channel coder for different channels for obtaining optimum error probablitiy.
2. To enable student to analyze the synchronizing circuits for different modulation schemes.
3. To familiarize Student with the concepts of spread spectrum and jammer considerations

UNIT – I

DIGITAL MODULATION SCHEMES: Detection using matched filter – Optimum receivers for arbitrary binary signals and M'ary orthogonal signals – Analysis of coherent detection schemes for ASK, PSK and DPSK – M'ary signaling schemes – QPSK and QAM – MSK – Performance of the data transmission schemes under AWGN. Trellis coded Modulation.

UNIT – II

CHANNEL CODING: Waveform coding and structured sequences-Types of error control, structured sequences, Linear block codes –soft/hard decision decoding of linear block codes – Non binary block codes and concatenated block codes – Polynomial representation of codes – Cyclic codes

UNIT – III

CHANNEL CODING-II: Convolution codes Lattice type Trellis codes. Geometrically uniform trellis codes,– viterbi decoding algorithm. Decoding of modulation codes – Reed Solomon codes – Turbo codes(elementary treatment).

BASEBAND SIGNALLING CONCEPTS:
Signaling formats – RZ/NRZ, Duobinarysplitphase (Manchester) and high density bipolar coding – scrambling & unscrambling – channel equalization – tapped delay line and transversal filters.

UNIT – IV

SYNCHRONISATION: Receiver synchronization, costas loop, symbol synchronization, synchronization with CPM – Data aided and Non aided synchronization- synchronization methods based on properties of wide sense cyclo-stationary random process – Carrier recovery circuits – Symbol clock estimation schemes.

UNIT – V

SPREAD SPECTRUM SYSTEMS: PN sequences, DS spread spectrum systems; FH spread spectrum systems and performance of FHSS in AWGN – Synchronization – Jamming considerations – Commercial Applications – Cellular subsystems.

PRESCRIBED :

1. Bernard sklar, " Digital communications", Pearson Education Asia,2001.

2.Fundamentals of Communication Systems, Proakis and Salehi, Prentice Hall

REFERENCES:

1.Das,J Etal, " Principles of Digital Communications and Spread spectrum Systems", Willey Eastern Limited,1985.
2.Ziemer R E & Peterson R L, "Digital Communication and Spread spectrum Systems", McMillan publishing co.,1985.

I YEAR – I SEMESTER

SATELLITE COMMUNICATION AND PHASED ARRAYS

Course Code: PECECMS113

Course code	Credits	Periods			Exam Hours	Sessional Marks	Exam Marks	Total Marks
		Lectures	Tutorials	Practicals				
MTCS-3	4	3	1	-	3	40	60	100

Course Objectives:

1. To learn about the science behind the orbiting satellites, various multiplexing schemes and earth station parameters used for satellite communication.
2. In-depth understanding of specialist bodies of knowledge within the engineering discipline.
3. Application of established engineering methods to complex engineering problem solving.

Unit 1: **Orbits, Propagation impairments and space link**:

Introduction, Satellite orbits, Kepler's three laws, Orbital Elements, Eclipse effect, Orbit determination, Look angle determination. Satellite sub systems: Attitude and Orbital Control System (AOCS), Telemetry Tracking and Command (TT&C), Power System, Communications System, Satellite transponder, Space Craft Antennas, Frequency Reuse Antennas. Communication link design: Basic transmission theory, EIRP, Completion Link design with and without frequency reuse, System noise temperature G/T ratio, Noise figure and Noise temperature.

Unit 2: **Satellite Multiple Accesses**: **Satellite mobile and specialized services**

Frequency Division Multiple Access (FDMA),Intermodulation, Calculation of C/N, Time Division Multiple Access (TDMA),Satellite Switched TDMA, Demand Assignment Multiple Access (DAMA), CDMA Spread Spectrum Transmission and Reception.
Message Transmission by FDMA: M/G/1 Queue, Message Transmission by TDMA, PURE ALOHA, Satellite Packet Switching, Slotted Aloha, Packet Reservation, Tree Algorithm, VSAT Technologies, Network Configurations, Polling VSAT Networks, Mobile Satellite Networks, CDMA MSAT Network.

Unit 3: **Earth Station Technology**:

Transmitters, Receivers, Antennas, Tracking Systems, Transponders, Small earth station Antennas, Equipment for earth station, Lower Orbit Considerations, Coverage and frequency considerations, Direct broadcasting satellite Television and Radio, Satellite Navigation.

Unit 4**: Introduction of Phased Arrays**

System Requirements for Radar and Communication Antennas : Directive Properties of Arrays, Array Noise Characterization, The Receiving Antenna in a Polarized Plane Wave Field, System Considerations, Monopulse Beam Splitting.

Unit 5: **Phased Arrays in Radar and Communication Systems**:

Array Characterization for Radar and Communication Systems and Fundamental Results from Array Theory: Phase Scanning in One Dimension ($ø_o$=0), Two-Dimensional Scanning of Planar Arrays, Beam width and Directivity of Scanning Arrays, Array Size Determination: EIRP and G/T for Large, Two-Dimensional Passive or Active Arrays.

TEXT BOOKS:

1. Satellite Communications –Timothy Pratt, Charles Bostian, Jeremy Allnutt, 2nd Edition, 2003, John Wiley & Sons.
2. Digital Satellite Communications-Tri.T.Ha, 2nd Edition, 1990, Mc.Graw Hill.
3. Phased Array Antenna Hand Book – Robert J. Mailloux, Artech House, Boston, London, 1994.

REFERENCE BOOKS:

1. Satellite Communications - by Dr.D.C.Agarwal
2. Satellite Communications: Design Principles – M. Richcharia, 2nd Ed., BSP, 2003.
3. Fundamentals of Satellite Communications – K. N. Raja Rao, PHI, 2004.

I YEAR – I SEMESTER

OPTICAL FIBER COMMUNICATIONS

Course Code: PECECMS114

Credits	Instruction periods per Week			Exam Hrs.	SESSIONAL MARKS	SEMESTER END MARKS	Total Marks
	LECTURE	TUTORIAL	PRACTICAL				
4	4	1	-	3	40	60	100

Course Objectives:

1. To expose the students to the modulation formats used in fiber optic communications

2. To impart the understanding and modeling of optical amplifiers

3. To understand the various multiplexing schemes

4. To understand the working of optical networks

5. To understand the nonlinear effects of optical communication systems

UNIT-I
Advanced Modulation Formats for Fiber Optic Communication Systems: Fiber Optic Coupler, Coherent Optical Communication, BER performance, Differential Phase Modulation Schemes with Direct Detection

UNIT-II
Semiconductor optical amplifiers. EDFA and Raman amplifiers , Wideband Optical amplifiers, Amplifier Noise, Optical SNR, modeling and analysis. Analysis and digital transmission with high power fiber amplifiers

UNIT-III
Multichannel systems: WDM lightwave systems. TDM and code division multiplexing. Advances in wavelength division multiplexing / demultiplexing technologies

UNIT-IV
SONET/SDH, ATM, IP, storage area networks, Wavelength routed networks, Next generation optical Internets

UNIT-V
Soliton systems: Nonlinear effects. Soliton – based communication. High speed and WDM soliton systems

Text Books:

1.G.P.Agrawal, Fiber Optic Communication Systems (3/e), Wiley, 2002
2.M.Satish Kumar, Fundamentals of Optical Fiber Communication(2/e), PHI, 2014
3.C.S.Murthy & M.Gurusamy, WDM Optical Networks, PHI, 2002

References:

1.Gerd Keiser, Optical Fiber Communications(4/e), TMH, 2008
2.B.P.Pal , Guided Wave Optical Components and Devices, Elsevier , 2006
3.Keang P. Ho Phase-modulated Optical Communication Systems, Springer, 2005

I YEAR – I SEMESTER

GLOBAL POSITIONING SYSTEM AND APPLICATIONS (ELECTIVE-I)

Course Code: PECECMS115

Credits	Instruction periods per Week			Exam Hrs.	SESSIONAL MARKS	SEMESTER END MARKS	Total Marks
	LECTURE	TUTORIAL	PRACTICAL				
4	4	1	-	3	40	60	100

COURSE OBJECTIVES:

1. To enable student to understand the basic principle of GPS
2. To enable student to understand the difference between GPS, GALILEO and GLONASS
3. To familiarize the student with the concepts of different co-ordinates system used in GPS
4. To enable student to know about the effect of ionosphere and troposphere on GPS position determination

UNIT I

Introduction to GPS: Basic concept, system architecture, space segment, user segment, GPS aided Geo-augmented navigation (GAGAN) architecture.

UNIT II

GPS Signals: Signal structure, anti spoofing (AS), selective availability, Difference between GPS, GALILEO and GLONASS satellite construction, GPS Receiver Concepts and main receiver components.

UNIT III

GPS coordinate frames & Time references: Geoid and Ellipsoid of rotation, Geodetic and Geo centric coordinate systems, ECEF coordinate world geodetic 1984 (WGS 84), GPS & GALILEO time.

UNIT IV

GPS orbits and position determination: GPS orbital parameters, GPS position determination, Positioning methods- point positioning, relative positioning, and description of receiver independent exchange format (RINEX).

UNIT V

GPS Errors & Future of GPS: GPS error sources- clock error, ionospheric error, tropospheric error, multipath, ionospheric error estimation using dual frequency GPS receiver, DGPS concepts, Future of GPS- Modernization plans of navigational satellites, Hardware and software improvements.

PRESCRIBED :

1. B. Hoffman – Wellenhof, H. Liehtenegger and J. Collins, ‘GPS – Theory and Practice’, Springer – Wien, New York (2001).
2. G S RAO, Global Navigation Satellite Systems, McGraw-Hill publications, New Delhi, 2010

REFERENCES:

1. James Ba – Yen Tsui, ‘Fundamentals of GPS receivers – A software approach’, John Wiley & Sons (2001).

Gunter Seeber., Satellite Geodesy Foundations-Methods and Applications,2003

I YEAR – I SEMESTER

TELECOMMUNICATION SWITCHING AND NETWORKS (ELECTIVE-II)

Course Code: PECECMS116

Credits	Instruction periods per Week			Exam hrs	Sessional Marks	Exam Marks	Total Marks
	Lectures	Tutorials	Practicals				
4	3	1	-----	3	40	60	100

Course Objectives

1. To understand the working principles of switching systems from manual and electromechanical systems to stored program control systems.
2. The students will be able to apply the knowledge and principles leant to analyze, design, install and manage typical wired and wireless communication systems and networks.

UNIT-I

Resource sharing and need for switching; Circuit switching, Store and forward switching, Packet switching, electronic space division switching, Need for networks, Two stage networks, Three stage networks and n-stage networks.

UNIT-II

Time division switching: Time switching, space switching, Three stage combination switching, n-stage combination switching; Traffic engineering: Hybrid switching, Two/Four wire transmission, Erlang formula and signaling.

UNIT-III

High speed digital access: DSL technology, Cable Modem, SONET.

UNIT-IV

Local area networks: Traditional ETHERNET, fast ETHERNET, Gigabit ETHERNET, Wireless LAN, Bluetooth, Connecting LAN's, Backbone networks.

UNIT-V

Integrated Services Digital Network: Network & protocol architecture, user network interfaces, signaling, inter networking, ISDN standards, expert systems in ISDN, Broadband ISDN.

PRESCRIBED Text Books:

1. Telecommunication Switching Systems and Networks- ThiagarajanViswanathan, Prentice Hall, New Delhi, 2001.
2. Data Communications and Networking- B.A. Forouzan, TataMcGrawhill, Third Edn., 2004.

Reference:

1. Telecommunication Switching,Traffic and Networks-Flood, Pearson Education India,2001
Telecommunication Switching and Networks-P.Gnanasivam, New Age International,2005.

I YEAR – I SEMESTER

COMMUNICATION ENGINEEERING LABORATORY

Course Code: PECECMS117

Credits	Instruction periods per Week			Exam Hrs.	SESSIONAL MARKS	SEMESTER END MARKS	Total Marks
	LECTURE	TUTORIAL	PRACTICAL				
2	-	-	3	3	50	50	100

Course objectives:

- To provide basic working of optical fiber communication.
- To familiarize with various line coding and channel coding techniques.
- To observe the performance of a digital communication system in presence of noise.
- To understand the concept of Spread Spectrum communication

List of experiments (Select at least 5 experiments from each cycle)

Cycle: 1

1. Study of Spectrum Analyzer
2. Setting of fiber optics Analog and Digital Link
3. Measurement of Numerical Aperture and Bending Loss of an optical link
4. PC to PC communication using optical fiber and RS232 interface
5. Study of Manchester coder and Decoder
6. Study of Time Division Multiplexing

Cycle: 2

1. Perform monte-carlo simulation to estimate and plot P_e vs SNR for a binary communication system that employs matched filter
2. Perform monte-carlo simulation of a digital communication system that employs M=4 orthogonal signal
3. Compare the performance of PSK and DPSK using monte-carlo simulation
4. Perform monte-carlo simulation of a 16-QAM system using rectangular signal constellation
5. Plot the message error probability of Linear block code when hard/soft decision decoding of orthogonal signal is employed
6. Generation of PN sequence
7. Generation of convolutional code
8. Simulation of DS spread spectrum transmitter and receiver

Books:

1. Communication engineering laboratory manual prepared by department of ECE, ANITS.
   John G. Proakis, Masoud Salehi, Contemporary Communication Systems Using MATLAB, 2nd Edition, PWS Pub.