

## **ME (CE)**

### **R20:**

**Vision:** To emerge as a vibrant model of excellence in education, research and innovation in Electronics and Communication Engineering

#### **Mission:**

**M1:** To impart strong theoretical and practical knowledge of the state of art technologies to meet growing challenges in the industry.

**M2:** To carry out the advanced and need based research in consultation with the renowned research and industrial organizations.

**M3:** To create entrepreneurship environment including innovation, incubation and encourage to patent the work.

#### **Program Educational Objectives of M.E (Communication Engineering) Program**

**PEO1:** Graduates will Design & Develop Communication Systems either independently or in a group.

**PEO2:** Graduates will able to learn and adopt the emerging technologies in the area of Communication Engineering.

**PEO3:** Graduates will demonstrate the ability to do research and become a lifelong learner

**PEO4:** Graduates will Develop rational approach to solve real world problems with Self-confidence and ethical & Societal Responsibilities.

#### **Program Outcomes of M.E (Communication Engineering) Program**

**PO1:** An ability to independently carry out research /investigation and development work to solve practical problems.

**PO2:** An ability to write and present a substantial technical report/document.

**PO3:** Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program.

**PO4:** Students will be able to use modern engineering tools/software to design and develop advanced communication systems  
**PO5:** Students will be able to develop self-confidence, team work, skills for lifelong learning and committed to social responsibilities.

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Chaitanya Bharathi Institute of Technology  
Hyderabad-500 075

**CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)**

**Gandipet, Hyderabad -75**

**Department Of Electronics and Communication Engineering**

**Course Outcomes Statements for ME (CE)-R20**

SNo	Course		Course Outcomes Statements
	Code	Name	
1.	20EC C101	Advanced Communication Networks	Recall the concepts and Issues of Real Time Communications over Internet.
			Classify protocols and algorithms for Communication Networks.
			Identify the mechanisms for Quality of Service in networking.
			Analyze IP addressing challenges and services in Internet
			Explain the different versions of IP Protocols, IP switching and MPLS Protocols.
2.	20EC C102	Advanced Digital Signal Processing	Design digital filters for the given specifications.
			Interpret the concepts of Multirate digital signal processing.
			Understand the concepts of linear prediction filters.
			Analyze various Power Spectral Estimation methods for random signals
			Develop the various applications of Digital signal processing.
3.	20EC C103	Antennas and Radiating Systems	Understand the radiation parameters of an antenna
			Apply the concept of current distribution to analyze the antennas.
			Analyze the linear arrays for uniform distribution.
			Appraise the characteristics of broad side, end fire arrays and non-uniform arrays.
			Learn the aperture antennas using Huygen's principle, image theory and Microstrip antennas.
4.	20EC C104	Wireless and Mobile Communication	Understand and apply frequency-reuse concept in mobile communications, and to analyze its effects on interference, system capacity, handoff techniques.
			Analyze path loss and interference for wireless telephony and their influences on a mobile-communication system's performance.
			Distinguish various multiple-access techniques for mobile communications and their advantages and disadvantages.
			Evaluate GSM and CDMA systems by functioning with knowledge of forward and reverse channel details, advantages and disadvantages of using these technologies.
			Devising the higher generation Cellular standards 3G, 4G & 5G.
5.	20EC C105	Advanced Communication Networks Lab	Identify the different types of network devices and their functions within a network.
			Understand and build the skills of sub-netting and routing mechanisms.
			Understand basic protocols of computer networks, and how they can be used to assist in Network design and implementation.
			Configure a network using Linux and a mail server for IMAP/POP protocols
			Design and configure UDP Client Server
6.	20EC C106	Advanced Digital Signal Processing Lab	Implement FFT algorithms for linear filtering and correlation using MATLAB.
			Design and realize of the digital filters using MATLAB.
			Experiment with multirate techniques using MATLAB.
			Perform parametric and non-parametric estimation of PSD using MATLAB.
			Design and Implement the adaptive filters using MATLAB.

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7.	20EC C107	Antennas and Radiating Systems Lab	Determine specifications, design, construct and test antenna.
			Explore and use tools for designing, analyzing and testing antennas
			Apply the concept of current distribution to find the field patterns.
			Estimate the effect of the height of the monopole antenna on the radiation characteristics.
			Study the effect of the variation of phase difference 'beta' between the elements of the array and case studies.
8.	20EC C108	Wireless and Mobile Communication Lab	Appraising Cellular concepts, GSM and CDMA networks.
			Experimenting with GSM handset and fault insertion techniques.
			Illustrate 3G communication system by means of various AT commands usage in GSM.
			Testing on DSSS kit for implementing CDMA concept.
			Develop concepts of Software Radio in real time environment
9.	20EC C109	Mini Project with Seminar	Familiarize in searching the suitable literature in the chosen field.
			Develop skills to understand and summarize the contents from the literature.
			Ability to synthesize knowledge/ skills previously gained and applied in execution of a chosen technical problem.
			Enhance oral presentation skills through power point presentations.
			Learn and present the findings of their technical solution in a written report.
10.	20EC C110	Industrial Project /Dissertation Phase I	Survey the literature such as books, national/international refereed journals and contact resource persons for the selected topic of research/project field.
			Consolidate the literature survey and will be motivated to define the title of the project, able to decide the aim(s), objectives and design specifications of the project.
			Learn the required software/ computational/analytical tools for implementations.
			Document a report comprising of summary of literature survey, detailed objectives, project specifications, or computer aided design, proof of concept/functionality, part of results if any.
			Get aquatinted to work in a research environment or in an industrial environment
11.	20EC C111	Industrial Project /Dissertation Phase II	Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
			Plan experiments for a critical comparison of outputs or to verify the obtained analytical/simulation results with the experimental results available in the literature.
			Develop attitude of lifelong learning and will develop interpersonal skills to deal with people working in diversified field.
			Learn to write technical reports and research papers to publish at national and international level.
			Develop strong communication skills to defend their work in front of technically qualified audience.
12.	20EC E101	Data and Optical Networks	Identify design and performance trade-off issues in optical networks.
			Analyze the performance of end-to-end protocols in optical networks.
			Explain the architecture of SONET/SDM and measure the performance comparison between SONET and SDM networks.
			Understand the network survivability with different protection schemes.
			Design and implement simple WDM networks.

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13.	20EC E102	DSP Architecture	Explain the hardware modules of programmable DSP processor.
			2. Identify and formulate architectural level characterization of DSP hardware
			3. Understand the architecture of TMS320C67XX DSP Processor.
			4. Design, programming (assembly and C) and testing code on Code Composer Studio environment using TMS320C67XX DSP Processor.
			5. Develop DSP hardware on FPGA.
			6. Build DSP hardware for Signal and Image processing applications.
14.	20EC E103	Global Navigation Satellite Systems	Apply the concepts of satellite communications in understanding the principle of operation of various navigation systems and GPS fundamentals.
			Analyze GPS signal structure and receiver functioning and compare coordinate systems and datum.
			Interpret the effect of various error sources and satellite geometry on the performance of GNSS and explain the necessity of GPS modernization and importance of integration aspects.
			Develop data processing methods using observation and navigation data for GPS and DGPS.
			Compare other global and regional navigational systems and assess the performance of various augmentation systems.
15.	20EC E104	High Performance Networks	Understand and design the types of networks and apply the services
			Distinguish and analyze various VoIP Protocols.
			Design, implement, and analyze Protocols for the transport of voice media over IP networks
			Identify, formulate, traffic modeling and evaluate the network performance.
			Familiarize the various networks by apply the Network security principles.
16.	20EC E105	Information Theory and Coding Techniques	Illustrate the notion of information in the quantitative sense to construct compact codes for a given data ensemble.
			Describe the mathematical modelling and calculate the capacity of typical digital communication channels and interpret the result in terms of theoretical limits to channel coding performance.
			Recall the fundamental coding theorem for noisy channels (Shannon's Second Theorem) and relate its implications in coding mechanism.
			Apply the principles of abstract algebra to design error control codes.
			Make use of error control coding to achieve error detection and correction in digital transmission systems.
17.	20EC E106	Internet of Things	Understand the terminology, enabling technologies and applications of IoT
			Apply the concept of M2M and understand the basics of modern networking with the concepts of SDN and NFV.
			Understand the basics of Python Scripting Language which is used in many IoT devices.
			Describe the steps involved in IoT system design methodology.
			Design simple IoT systems using Raspberry Pi board with sensors, actuators and develop web applications using python-based framework called Django.
18.	20EC E107	Microwave and Satellite Communication	Understanding fundamental knowledge of CCITT modulation plans, power and noise calculations.
			Analyze LOS propagation system and calculate the path and link reliability.

			Evaluate the Tropospheric communication system and also the concepts of Earth station Technology
			Design and calculate G/T and C/N ratios of a path link.
			Explain the basic concepts of VSAT, GIS, GPS and payload engineering.
19.	20EC E108	MIMO Wireless Communications	Recall Concepts of MIMO, Diversity, generic MIMO problem and Channel Estimation in wireless communication system.
			Compare the diversity techniques, Propagation channels, Channel dispersion and Channel Estimation techniques.
			Apply Diversity Techniques and Pre-Coding techniques in MIMO
			Analyze channel modeling and propagation, MIMO Capacity, space-time coding.
			Explain the MIMO in LTE and Channel Estimation techniques.
20.	20EC E207	Network Security and Cryptography	Identify and utilize different forms of cryptography techniques.
			Analyze solutions for effective key management and distribution and conduct cryptanalysis
			Predict Encrypt and decrypt data using Symmetric key and Asymmetric ciphers
			Assess authentication and security in the network applications.
			Interpret different types of threats to the system and handle the same.
21.	20EC E109	Pattern Recognition and Machine Learning	Understand the concepts of pattern recognition.
			Apply the parametric and linear models for classification.
			Design algorithms using neural networks for machine learning problems.
			Implementation of Support Vector Machines (SVM) algorithm for real time applications.
			Evaluate various unsupervised clustering techniques.
22.	20EC E110	Remote Sensing	Demonstrate the understanding of basic concepts of remote sensing and interpret energy interactions.
			Choose an appropriate technique for a given scenario by understanding multispectral, thermal and hyper spectral remote sensing.
			Distinguish the principle behind the working of microwave and LiDAR sensing.
			Apply the techniques of radiometric and geometric correction, Image enhancement and classification.
			Explain the procedure for data integration and data analysis and list out remote sensing applications.
23.	20EC E111	Signal Intelligence Systems	Apply the knowledge of Communication and Antenna concepts in understanding the operating principles of Radar and Drones.
			Discuss the salient features of EW Systems and identify the type of Electronic Jamming.
			Analyze the intricacies of ELINT Systems.
			Estimate the DF and position of ELINT/COMINT Systems for simple cases.
			Interpret the type of modulation of COMINT systems.
24.	20EC E112	Software Defined and Cognitive Radio	Explain the difference between the super-heterodyne receiver, Software Defined Radio and Cognitive Radio.
			Analyze the different architectures of SDR and CR used for real time systems.
			Evaluate and choose the various spectrum sensing methods based on application.
			Implement various signal processing techniques for CR networks.
			Choose the USRP and WARP boards based on the facilities required for a CR application.
25.	20EC E113	Statistical Decision and Estimation Theory	Apply random variables and random process concepts in communications.
			Demonstrate mathematical modeling of random processes such as noise.
			Analyze various random processes modeling's such as AR processes, MA processes, ARMA processes and including

			Markov chains.
			Understand binary hypothesis techniques.
			Compare parameter estimation techniques.
26.	20EC E114	WIRELESS SENSOR NETWORKS	Recall the Network Architecture, hardware details, programming tools, Protocols and Special feature of WSN.
			Demonstrate hardware and Programming Tools for Performance comparison of wireless sensor networks simulation and experimental platforms
			Analyze Sensor Network Protocols and Security Challenges, Sensor deployment mechanisms.
			Identify open issues for future research, and enabling technologies in wireless sensor network
			Design wireless sensor network system for different applications under consideration.
27.	20ME M103	Research Methodology and IPR	Define research problem, review and assess the quality of literature from various sources
			Improve the style and format of writing a report for technical paper/ Journal report, understand and develop various research designs
			Collect the data by various methods: observation, interview, questionnaires
			Analyze problem by statistical techniques: ANOVA, F-test, Chi-square
			Understand apply for patent and copyrights
28.	20CE A101	Disaster Management	Ability to analyze and critically examine existing programs in disaster management regarding vulnerability, risk and capacity at different levels
			Ability to understand and choose the appropriate activities and tools and set up priorities to build a coherent and adapted disaster management plan
			Ability to understand various mechanisms and consequences of human induced disasters for the participatory role of engineers in disaster management
			Understand the impact on various elements affected by the disaster and to suggest and apply appropriate measures for the same
			Develop an awareness of the chronological phases of disaster preparedness, response and relief operations for formulating effective disaster management plans and ability to understand various participatory approaches/strategies and their application in disaster management
29.	20EG A101	English for Research Paper Writing	Illustrate the nuances of research paper writing and draw conclusions about the benefits and limitations of research.
			Classify different types of research papers and organize the format and citation of sources.
			Review the literature and categorize between different types of research.
			Draft paragraphs and write thesis statement in a scientific manner.
			Develop an original research paper while acquiring the knowledge of how and where to publish their papers.
30.	20EG A102	Indian Constitution and Fundamental Rights	Understand the making of the Indian Constitution and its features.
			Understand the Rights of equality, the Right of freedom and the Right to constitutional remedies.
			Have an insight into various Organs of Governance - composition and functions.
			Understand powers and functions of Municipalities, Panchayats and Co-operative Societies.
			Understand Electoral Process, special provisions.
31.	20IT A101	Pedagogy Studies	Illustrate the pedagogical practices followed by teachers in developing countries both in formal and informal classrooms.
			Examine the effectiveness of pedagogical practices.
			Understand the concept, characteristics and types of educational

			research and perspectives of research.
			Describe the role of classroom practices, curriculum and barriers to learning.
			Understand Research gaps and learn the future directions.
32.	20EG A104	Personality Development through Life Enlightenment Skills	Develop their personality and achieve their highest goal of life. Lead the nation and mankind to peace and prosperity. To practice emotional self-regulation. Develop a positive approach to work and duties. Develop a versatile personality.
33.	20EE A101	Sanskrit for Technical Knowledge	Develop passion towards Sanskrit language Decipher the latent engineering principles from Sanskrit literature Correlates the technological concepts with the ancient Sanskrit history. Develop knowledge for the technological progress Explore the avenue for research in engineering with aid of Sanskrit
34.	20EG A103	Stress Management by Yoga	Understand yoga and its benefits. Enhance Physical strength and flexibility. Learn to relax and focus. Relieve physical and mental tension through asanas Improve work performance and efficiency.
35.	20EC A101	Value Education	Summarize classification of values and values for self-development. Identify the importance of values in personal and professional life .Apply the importance of social values for better career and relationships. Compile the values from holy books for personal and social responsibility. Discuss concept of soul and reincarnation, values Dharma, Karma and Guna.
36.	20CS O101	Business Analytics	Identify and describe complex business problems in terms of analytical models. Apply appropriate analytical methods to find solutions to business problems that achieve stated objectives. Interpret various metrics, measures used in business analytics Illustrate various descriptive, predictive and prescriptive methods and techniques Model the business data using various business analytical methods and techniques 6. Create viable solutions to decision making problems
37.	20ME O103	Composite Materials	Classify and characterize the composite materials. Describe types of reinforcements and their properties. Understand different fabrication methods of metal matrix composites Understand different fabrication methods of polymer matrix composites. Decide the failure of composite materials.
38.	20CE O101	Cost Management of Engineering Projects	Acquire in-depth knowledge about the concepts of project management and understand the principles of project management. Determine the critical path of a typical project using CPM and PERT techniques. Prepare a work break down plan and perform linear scheduling using various methods. Solve problems of resource scheduling and levelling using network diagrams. Learn the concepts of budgetary control and apply quantitative techniques for optimizing project cost.

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39.	20ME O101	Industrial Safety	Identify the causes for industrial accidents and suggest preventive measures for safety.
			Understand the basic need and requirements of different maintenance procedures.
			Apply different techniques to reduce and prevent wear and corrosion in industry.
			Analyze different types of faults present in various equipments like machine tools, IC engines, boilers etc.
			Formulate a plan for periodic and preventive maintenance techniques as required for industrial equipments like motors, pumps and air compressors.
40.	20ME O102	Introduction to Optimization Techniques	Build and Solve the linear programming problems.
			Solve the given transportation problem.
			Analyze project management techniques like CPM and PERT to plan and execute projects successfully.
			Compare various inventory control techniques.
			Apply sequencing and queuing theory concepts for industry applications.
41.	20EE O101	Waste to Energy	Understand the concept of conservation and Identify the devices for conservation
			Classify the different forms of wastage
			Explain the process of Gasification and Demonstrate the design and operation of Gasifiers
			Explain the process of Combustion, Demonstrate the construction and operation of various combustors
			Describe the process of biomass conversion and to Differentiate biomass, biogas, biochemical and biodiesel plants

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