#### 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.



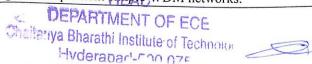
## CHAITANYA BHARATHI INSTITUTE OF TECHNOLOGY (Autonomous)

### Gandipet, Hyderabad -75

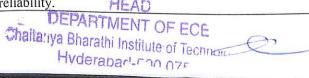
# Department Of Electronics and Communication Engineering Course Outcomes Statements for ME (CE)-R20

		Course	Course Outcomes Statements
SNo	Code	Name	
			Recall the concepts and Issues of Real Time Communications over Internet.
		Advanced	Classify protocols and algorithms for Communication Networks.
1.	20EC C101	Communication	Identify the mechanisms for Quality of Service in networking.
		Networks -	Analyze IP addressing challenges and services in Internet
			Explain the different versions of IP Protocols, IP switching and
			MPLS Protocols.
			Design digital filters for the given specifications.
			Interpret the concepts of Multirate digital signal processing.
2	20EC C102	Advanced Digital	Understand the concepts of linear prediction filters.
2.	20EC C102	Signal Processing	Analyze various Power Spectral Estimation methods for random
			signals
			Develop the various applications of Digital signal processing.
			Understand the radiation parameters of an antenna
			Apply the concept of current distribution to analyze the antennas.
	20EC C103	Antennas and Radiating	Analyze the linear arrays for uniform distribution.
3.	2020 0103	Systems	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.
			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
		Wireless and	performance.
4.	20EC C104	Mobile Communication	Distinguish various multiple-access techniques for mobile
		Communication	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.
		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
5.	20EC C105		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
		Advanced Digital Signal Processing Lab	Implement FFT algorithms for linear filtering and correlation
6.	20EC C106		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
1 .			MATLAB.  Design and Implement the edentities filters with MATLAB
			Design and Implement the adaptive filters using MATLAB.

Service I		Course	Course Outcomes Statements
SNo	Code	Name	Course Outcomes Statements
7.	8.00		Determine specifications, design, construct and test antenna.
		Antennas and Radiating	Explore and use tools for designing, analyzing and testing antennas
		Systems Lab	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.			Appraising Cellular concepts, GSM and CDMA networks.
0.			Experimenting with GSM handset and fault insertion
		Wireless and	techniques.
	20EC C108	MobileCommunication Lab	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.			Familiarize in searching the suitable literature in the chosen field.
			Develop skills to understand and summarize the contents from
	20EC C109	Mini Project with	the literature.  Ability to synthesize knowledge/ skills previously gained and
		Seminar	applied in execution of a chosen technical problem.
		Johnman	Enhance oral presentation skills through power point
			presentations.
			Learn and present the findings of their technical solution in a written report.
10.			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
		Industrial Project	design specifications of the project.
	20EC C110	/Dissertation Phase I	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.			Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and
			justify their design.
		Industrial Project	Plan experiments for a critical comparison of outputs or to verify
			the obtained analytical/simulation results with the experimental
	20EC C111	/Dissertation	results available in the literature.
	2010 0111	Phase II	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.			Identify design and performance trade-off issues in optical networks.
	<u> </u>	Data and Optical	Analyze the performance of end-to-end protocols in optical networks.
	20EC E101	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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	(	Course	Course Outcomes Statements
SNo	Code	Name	
	2000		Explain the hardware modules of programmable DSP processor.
			2. Identify and formulate architectural level characterization of DSP hardware
	20EC E102	DSP Architecture	3. Understand the architecture of TMS320C67XX DSP Processor.
13.			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.  Apply the concepts of satellite communications in
14.			understanding the principle of operation of various navigation systems and GPS fundamentals.
			Analyze GPS signal structure and receiver functioning and
		Clabal Navigation	compare coordinate systems and datum.
		Global Navigation Satellite Systems	Interpret the effect of various error sources and satellite
	20EC E103	CE103	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	Understand and design the types of networks and apply the
		Networks	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.
			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
	2050 5105	Information Theory	of typical digital communication channels and interpret the resul in terms of theoretical limits to channel coding performance.
1.0	20EC E105	and Coding	Recall the fundamental coding theorem for noisy channels
16.			(Shannon's Second Theorem) and relate its implications in
		Techniques	coding mechanism.
			Apply the principles of abstract algebra to design error control codes.
			Make use of error control coding to achieve error detection and
15			correction in digital transmission systems.  Understand the terminology, enabling technologies and
17.			applications of IoT
			Apply the concept of M2M and understand the basics of
		T	modern networking with the concepts of SDN and NFV.
	20EC E106	Internet of Things	Understand the basics of Python Scripting Language which is
	and distance of	Tilligs	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.
			Understanding fundamental knowledge of CCITT modulation
18.	20EC E107	Microwave and	plans, power and noise calculations.
	ZUEC E107	20EC E107 Satellite	Analyze LOS propagation system and calculate the path and lin
		Communication	reliability.
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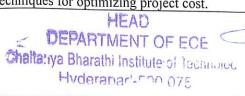
		Γ	Evaluate the Tropospheric communication system and also the
		-	concepts of Earth station Technology  Design and calculate G/T and C/N ratios of a path link.
			Explain the basic concepts of VSAT, GIS, GPS and payload engineering.
19.			Recall Concepts of MIMO, Diversity, generic MIMO problem and Channel Estimation in wireless communication system.
	20EC E108	MIMO Wireless Communications	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.
			Identify and utilize different forms of cryptography techniques.
			Analyze solutions for effective key management and distribution
20.	20EC E207	Network Security and Cryptography	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.
			Understand the concepts of pattern recognition.
			Apply the parametric and linear models for classification.
	20EC E109	Pattern Recognition	Design algorithms using neural networks for machine learning
21.		and Machine Learning	Implementation of Support Vector Machines (SVM) algorithm
21.			for real time applications.  Evaluate various unsupervised clustering techniques.
			Demonstrate the understanding of basic concepts of remote
			sensing and interpret energy interactions.
22.	20EC E110		Choose an appropriate technique for a given scenario by understanding multispectral, thermal and hyper spectral remote
		- 0	sensing.
		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.
			Apply the knowledge of Communication and Antenna concepts
	20EC E111	Signal Intelligence Systems	in understanding the operating principles of Radar and Drones.  Discuss the salient features of EW Systems and identify the
23.			type of Electronic Jamming.
	20EC ETT		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.
			Explain the difference between the super-heterodyne receiver, Software Defined Radio and Cognitive Radio.
			Analyze the different architectures of SDR and CR used for rea
24.	20EC E112	Software Defined and Cognitive Radio	time systems.  Evaluate and choose the various spectrum sensing methods bas
			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.
			Apply random variables and random process concepts in communications.
	20EC E113	Statistical Decision and Estimation Theorem	Demonstrate methamatical madeline C 1
25.			Analyze various random processes modeling's such as AR
			processes, MA processes and including

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			Markov chains.
			Understand binary hypothesis techniques.
			Compare parameter estimation techniques.
			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
26.	20EC E114	WIRELESS SENSOR NETWORKS	experimental platforms  Analyze Sensor Network Protocols and Security Challenges,
		NETWORKS	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.
			Define research problem, review and asses the quality of literature from various sources
27.	100 0000	Research Methodology and IPR	Improve the style and format of writing a report for technical paper/ Journal report, understand and develop various research designs
27.	20ME M103		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
		Disaster Management	Ability to analyze and critically examine existing programs in disaster management regarding vulnerability, risk and capacity at different levels
28.	20CE A101		Ability to understand and choose the appropriate activities and tools and set up priorities to build a coherent and adapted disaster management plan
20.			Ability to understand various mechanisms and consequences of human induced disasters for the participatory role of engineer
			in disaster management  Understand the impact on various elements affected by the
			disaster and to suggest and apply appropriate measures for the
			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
			Illustrate the nuances of research paper writing and draw conclusions about the benefits and limitations of research.
29.	20EG A101	English for Research Paper Writing	Classify different types of research papers and organize the
			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.
			Understand the making of the Indian Constitution and its features.
30.	20EG A102	Indian Constitution and Fundamental Rights	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, Panchaya
			and Co-operativeSocieties.
			Understand Electoral Process, specialprovisions.
	20IT A101	Pedagogy	Illustrate the pedagogical practices followed by teachers in developing countries both in formal and informal classrooms.
31.	Zori Aror	Studies	Examine the effectiveness of pedagogical practices.
			Understand the concept characteristics and types of education

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, i	1	Г	research and perspectives of research.
			Describe the role of classroom practices, curriculum and
			barriers to learning.
			Understand Research gaps and learn the future directions.
			Develop their personality and achieve their highest goal of life.
		Personality	Lead the nation and mankind to peace and prosperity.
	20EG A104	Development through	To practice emotional self-regulation.
32.		Life Enlightenment	Develop a positive approach to work and duties.
*.3		Skills	Develop a versatile personality.
			Develop passion towards Sanskrit language
			Decipher the latent engineering principles from Sanskrit literature
33.	20EE A101	Sanskrit for Technical	Correlates the technological concepts with the ancient Sanskrit history.
		Knowledge	Develop knowledge for the technological progress
			Explore the avenue for research in engineering with aid of Sanskrit
			Understand yoga and its benefits.
		Stress Management by	Enhance Physical strength and flexibility.
34.	20EG A103	Yoga	Learn to relax and focus.
54.		1054	Relieve physical and mental tension through asanas
			Improve work performance and efficiency.
			Summarize classification of values and values for self-
			development.
35.	20EC A101	Value Education	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.
			Identify and describe complex business problems in terms of analytical models.
36.		D Auglatica	Apply appropriate analytical methods to find solutions to business problems that achieve stated objectives.
	20CS O101	Business Analytics	Interpret various metrics, measures used in business analytics
	2005 0101		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
			Classify and characterize the composite materials.
	1	Composite	Describe types of reinforcements and their properties.
	20ME O103		Understand different fabrication methods of metal matrix
37.		Materials	composites
			Understand different fabrication methods of polymer matrix
			composites.  Decide the failure of composite materials.
			Acquire in-depth knowledge about the concepts of project
38.	20CE O101	Cost Management of Engineering Projects	management and understand the principles of project
			management.
			Determine the critical path of a typical project using CPM and
			PERT techniques.
			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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SNo	Code	Name	Course Outcomes Statements
			Identify the causes for industrial accidents and suggest preventive measures for safety.
39.	20ME O101	Industrial Safety	Understand the basic need and requirements of different maintenance procedures.
39.			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.
	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.
40.			Compare various inventory control techniques.
			Apply sequencing and queuing theory concepts for industry applications.
	20EE O101	Waste to Energy	Understand the concept of conservation and Identify the devices for conservation
41.			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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