M.Tech in Digital Communication

Department of Electronics & Communication Engineering

Bundelkhand Institute of Engineering & Technology, Jhansi

Mission:

To provide knowledgeable, principled and inspiring Engineers for the future society by:

- Providing adequate treatment to curriculum with relevant instructions, assignments, laboratories, workshop experience and real life problems for development of graduate abilities.
- Providing high quality education in Electronics and Communication Engineering for both undergraduate and graduate students.

Vision:

Create High Quality Engineering Professionals

PEOs (Program Educational Outcome):

I. Our graduate will contribute to industry, society and government.

II. Our graduate will have successful technical or professional careers.

III. Our graduate will continue to learn and to adapt in world of constantly evolving technology.

IV. Our graduate may go for higher education.

Program Outcomes (Pos) for M.Tech Digital Communication:

1. Acquire in-depth knowledge of communication systems and engineering , including wider and global perspective, with an ability to discriminate, evaluate, analyse and synthesise existing and new knowledge, and integration of the same for enhancement of knowledge.
2. Analyse complex engineering problems of circuits & communication systems critically, apply independent judgement for synthesising information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy context.
3. Think laterally and originally, conceptualise and solve engineering problems, evaluate a wide range of potential solutions for those problems and arrive at feasible, optimal solutions after considering public health and safety, cultural, societal and environmental factors in the circuits & communication systems
4. Extract information pertinent to unfamiliar problems through literature survey and experiments, apply appropriate research methodologies, techniques and tools, design, conduct experiments, analyse and interpret data, demonstrate higher order skill and view things in a broader perspective, contribute individually/in group(s) to the development of scientific/technological knowledge in one or more domains of communication engineering.
5. Create, select, learn and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities with an understanding of the limitations of communication engineering.
6. Possess knowledge and understanding of group dynamics, recognise opportunities and contribute positively to collaborative-multidisciplinary scientific research, demonstrate a capacity for self-management and teamwork, decision-making based on open-mindedness, objectivity and

rational analysis in order to achieve common goals and further the learning of themselves as well as others.

7. Demonstrate knowledge and understanding of engineering and management principles and apply the same to one's own work, as a member and leader in a team, manage projects efficiently in communication engineering and multidisciplinary environments after consideration of economical and financial factors.

8. Communicate with the engineering community, and with society at large, regarding complex engineering activities confidently and effectively, such as, being able to comprehend and write effective reports and design documentation by adhering to appropriate standards, make effective presentations, and give and receive clear instructions.

9. Recognise the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously.

10. Acquire professional and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and an understanding of responsibility to contribute to the community for sustainable development of society.

11. Observe and examine critically the outcomes of one's actions and make corrective measures subsequently, and learn from mistakes without depending on external feedback.

Course Outcome

Course Code	Course Title	Course Outcome
DC-11	Representation and Analysis of Random Signals	To acquire in depth knowledge of random variable, discreet random variable and their applications, continuous random variable and their distribution, transforming of signal random variable, stochastic processes with an ability to discriminate evaluate, analyse and synthesise existing and new knowledge and integration of the same for enhancement of knowledge, process knowledge and understanding of group dynamics recognize opportunities and contribute positively to collaborative-multidisciplinary scientific research.
DC-12	Digital Communication	The subject covers the most important aspects of M.Tech program in digital communication. It provides basis of communication technology that has revolutionized the communication media and has seen very fast development and applications in communication technology. The subject contain, block diagram and circuits form the basis of the subject which is further fruitful for application in society. It forms the basic of mathematical modelling and deep knowledge of communication engineering for the purpose of further research and development and other applications. Modern applicants emphasize mainly on digitization and so digital communication is the key subject of programme and is the backbone of the M.tech programme. It emphasizes the technology of digital communication and provides the platform to use the concept of digital communication for further higher studies like Ph.d and R&D. It application has benefitted the society a lots communication has grown very fast and has connected the world. Distance now has become nowhere for near and dear ones as they can communicate very reliably and fast and less cost which is wonderful application of subject for the society it study and acquiring knowledge on the subject certainly leads to more option of application nad enhancement in technology.
DC-13	Information Theory and Coding	The course introduces the principles and applications of information theory. The students can learn how information be measured in term of probability and various entropies, and how these are used to calculate the capacities the communication channel, continuous/discreet with or without noise. Coding Scheme including error correcting codes along with data compression, spectral analysis, and efficient coding using wavelets will be helpful for students. Applications of information theory will also be aware the students about the applicability of the courses.
DC-14	Advanced Digital Signal	To acquire in depth knowledge of modelling to filter, linear estimation ,

	Processing	linear prediction, spectrum estimation and adaptive filter with an ability to integrate the same for enhancement of knowledge. To analyse complex engineering problem of circuits and communication system critically to make intellectual and/or creative advances for conducting research in wide theoretical, practical and policy context, to contribute to collaborative-multidisciplinary scientific research. To create, select, learn and apply appropriate techniques, resources and modern engineering tools including, prediction and modelling to complex engineering activities with an understanding of the limitation of communication engineering.
DC-21	Detection and Estimation Theory	The course provides the knowledge about the processing of information wearing signal for making inferences about the information that they contain. The course provides in depth knowledge about the fundamental theoretical principles underlying the development and analysis of technique. In this course, students can learn how to use the tools of probability and signal processing to estimates the signals and parameters and detect events from data, design and analyse optimum detection schemes, basics of linear filtering.
DC-22	Optical Communication	The most reliable and the most efficient method of communication is optical fibre communication. So study of this subject is most important as a part of M.Tech program in digital communication. Application of optical communication is in military, defence and other crucial fields where one cannot make compromise with quality. It is very fast communication media and is most preferred for internet and other field where speed and reliability matters. Optical communication as separate spectrum as compare to conventional method so is a solution of spectrum crises as well. It has EMI so is a very useful for communication technology. The maintenance of equipments are very low life of operation is very long and is not very costly. All these feature make it very important communication media. So, naturally the more R&D work need to done for further more application of the field which need to have deep knowledge of subject and hence is most necessary subject of M.Tech program which forms the basis to work on the communication technology which is most efficient and most preferred. This will lead to more application of the technology useful for mankind. Again it gives deep knowledge of the subject contents, technology, mathematical modelling which can be used for further higher studies lie PhD or R&D for further enhanced application of technologies.
RM-031	Research Methodology	The course will be able to define research and describe the research process and research method. Students will be able to select and define appropriate research problem and parameters. Students will be able to understand the processes and requirement for conducting successful research. Students will know how to apply the basic aspects of the research process in order to plan and execute a research project and

		effectively use the library and its resources in gathering information related to the learners research project. Students can understand qualitative research and methods use to execute and validate qualitative research. They will be able to present, review and publish scientific article. Students will be able to prepare research report and thesis and present a conference paper/poster at a national/international conferences.
DCE-23	Spread Spectrum Communication	For M.Tech program in digital communication, the knowledge of this subject is very important as it forms the basis t0 explore alternative techniques to optimize uses of bandwidth spectrum and in parallel provides coding thereby providing the security and encryption to the data as well. Hence spread spectrum communication find its application mainly in defence where security and privacy of the data is most important criterion. Obviously, acquiring knowledge of this subject is necessary as part of M.Tech program in digital communication. Gaining knowledge in this would enhance the basics of the technology and deep information of technique at the is higher stage of degree which can be used for the purpose of R&D in M.Tech, or higher study like Ph.D. This will lead to more application of the technology which may be fruitful for society, defence and overall mankind globally. As this advance application of communication technology so needs to be emphasized more to explore maximum benefits and application of this technology. The content of the subject will give the knowledge of mathematical modelling, complex mathematical model and engineering problems. Its study and acquiring knowledge on the subject certainly lead to more options of applications and enhancement in technology for the benefit of the society to explore maximum utilization of the technology.
DC-24	Computational Methods for Communication	The subject is very essential for M.Tech program in Digital Communication as the content of this subject fully demonstrate the mathematical concepts, emphasize on mathematical modelling, solving mathematical equations, knowledge of very strong mathematical tool rto solve complex mathematical problems of engineering applications. So, acquiring deep knowledge in this subject would open a way to apply in on complex engineering problem so as to have a suitable solution for engineering application. To be able to solve by analyzing complex engineering problem in all communication engineering field critically and originally, to conceptualize and solve problem in communication engineering application, evaluate a wide range of potential solutions for those and arrive at feasible, optimal solutions keeping in mind the environmental factors and public and societal issues and hence is foundation subject of this M.Tech program in digital communication
DCE-25	Telecommunication System Engineering	To acquire in depth knowledge of telecommunication system engineering including mathematical modelling, switching system, network

		architecture, packet switching. To think ..... and originally conceptualise and solve engineering problem, evaluate a wide range of practical solution for these problems and ..... at feasible, optimal solution after considering public health and safety, cultural, societal and environmental factors in communication system.
DC-26	Advanced Antenna and Propagation	To acquire in depth knowledge of radiation from cylindrical antennas, /antenna arrays, Antenna synthesis and measurements, propagation. To analyse complex engineering problem of communication system critically to extract information pertinent to unfamiliar problem through experiment, apply appropriate research methodologies, techniques and tools, design, conduct experiment, analyze and interpret data.
DCE-27	Digital Image Processing	To acquire in depth knowledge of image model and transform, image enhancement image restoration, image encoding and image segmentation. To analyse complex engineering problems, critically apply independent judgement for synthesising information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy content. To extract information pertinent to unfamiliar problems through literature survey and experiments apply appropriate research methodologies techniques and tools, design, conduct experiments , analyse and interpret data, demonstrate higher order skill and view thing in a broader perspective, contribute individually/in group(s) to the development of scientific/technological knowledge in one or more domain of engineering after considering public health and safety, cultural, societal and environmental factors.
DCE-28	Microwave Communication	To acquire in depth knowledge of microwave communication including interference frequency planning, digital microwave radio equipments, line of sight radio link engineering. To analyse complex engineering problem of communication system critically to extract information pertinent to unfamiliar problem through experiment, apply appropriate research methodologies, techniques and tools, design, conduct experiment, analyze and interpret data.
DCE-29	Computer Communication	To acquire the in depth knowledge of computer networks, networking, medium access, data link layers, transport layer, their design issue. To acquire professional and intellectual integrity, professional code of conduct, ethics of resources and scholarship, recognise the need for and have the preparation and ability to engage in life long learning independently.
DCE-30	Neural Network	To create, select and apply appropriate techniques, resources and modern engineering and IT tools, including prediction and modelling to complete engineering activities with an understanding of the limitation of engineering .To simulate the problem and solution with the help of Artificial neural network, which would be more difficult to solve in real

		environment. The course gives in depth knowledge of various type of neural network, learning algorithms, transfer functions, adaptive resonance theory, Radial basis function networks and also the application of fuzzy logic. It also helps to analyze complex engineering problems of circuits and system critically, apply independent judgement of synthesising information to make intellectual and for creative advances for conducting research in a wider theoretical, practical and policy context, to observe and examine critically the outcomes of one's actions and make corrective measures subsequently, and learn from mistake without depending on external feedback.
DCE-31	Array Processing	To acquire in depth knowledge of array performance, optimum array processing various algorithm used to recognise the need for and have the preparation and ability to engage in life long learning independently, with a high level of commitment to improve knowledge and competence continuously.
DCE-32	Internet and Intranet	To think laterally and originally conceptualize and solve engineering problem. To acquire in depth knowledge of development of internet, routing protocol, intranet including wider and global perspective with an ability to discriminate and evaluate, analyse and synthesize existing and new knowledge and integration of the same for enhancement of knowledge to engage in life long learning.
DC-33	Radar Engineering	To create in depth knowledge of radar engineering including radar antenna, detection of radar signal, echo cancellation to analyse complex engineering problem of communication system critically to extract information pertinent to unfamiliar problem through experiment, apply appropriate research methodologies, techniques and tools, design, conduct experiment, analyze and interpret data.
DCE-34	Quencing Systems	To review the probability and stochastic process to acquire knowledge of Quencing systems with lilltle's theorm modelling, Murke's Theorm to engage in life long learning
DCE-35	Cryptography and Data Security	To acquire knowledge of internet and communication protocol, trends in internet crime, virtual private network, firewall, encryption and decryption algorithm, concepts of private and public keys. Including wider and global perspective with an ability to discriminate and evaluate, analyse and synthesize existing and new knowledge and integration of the same for enhancement of knowledge to engage in life long learning.
DCE-36	Opto Electronic Devices	To acquire in depth knowledge of optical wave guides, electro-optic modulators, a .....optic modulator, magneto-optic devices, non linear fibre optics and application in the communication system to recognize the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously to acquire professional

		and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and an understanding of responsibility to contribute to the community for sustainable development of society.
DCE-37	VLSI Design	TO acquire in depth knowledge of VLSI design techniques including wider and global perspective, with an ability to discriminate, evaluate, analyze and synthesize existing and new knowledge and integration of the same for enhancement of knowledge to analyze complex engineering problem of circuits for conducting research in a wider theoretical, practical and policy context. Design expands such as USART design, microcontroller design, design of microcontroller CPU, filter design etc. are used to conduct experiments, analyze and interpret data, contribute individually/in group(s) to the development of scientific/technological knowledge in one or more domain of communication engineering. To create, select, learn and apply appropriate techniques, resource and modern engineering tools including prediction and modelling to complex engineering activities with an understanding of limitation of communication engineering to engage in life long learning
DCE-38	Optical Computer	To acquire in depth knowledge of optical image and signal processing, non linear optics, digital optical computer, feasibility and technology of waveguide. To recognize the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously to acquire professional and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and an understanding of responsibility to contribute to the community for sustainable development of society.
DCE-39	Architecture and Applications of Digital Signal Processors	To acquire in depth knowledge of DSP processor design, development tools, detector characteristics to Create, select, learn and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities with an understanding of the limitations of communication engineering to Analyse complex engineering problems of circuits & communication systems critically, apply independent judgement for synthesising information to make intellectual and/or creative advances for conducting research in a wider theoretical, practical and policy context.
DCE-40	Speech Signal Processing	To acquire in depth knowledge of spectrum analysis techniques, base coding techniques to Create, select, learn and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering activities with an understanding of the limitations of communication engineering.

DCE-41	Photonic Networks and Switching	To acquire in depth knowledge of optical communication, optical network, optical switching including wider and global perspective with the ability to discriminate, evaluate, analyse and synthesise existing and new knowledge, and integration of the same for enhancement of knowledge.
DC-42	Satellite Communication	To acquire in-depth knowledge of satellite communication and system including wider and global perspectives by learning the orbital aspects of satellite communication and mechanism of launching the satellite, the spacecraft system with an ability to discriminate, evaluate, analyse and synthesise existing and new knowledge, and integration of the same for enhancement of knowledge. To be able to design the satellite links for specified performance by analysing complex engineering problem in satellite communication critically and by thinking latterly and originally to conceptualise and solve problems in satellite link design, evaluate the wide range of potential solutions for those problems and arrive at feasible, optimal solutions after considering public health, societal and environmental factors.
DCE-43	Mobile Communication	Mobile communication is mainly used for transmitting voice, video and data in local or wide areas. It Provides information about voice and data communication services to mobile users who use cell phones, PDAs, internet terminal, and related computing devices. The number of wireless mobile devices is increasing globally. Users equipped with portable computers, PDAs(personal digital assistance), and variety of small wireless communication devices increasingly need to connect to corporate network, perform data base queries, exchange message, transfer file, and even participate in collaborative computing. Mobile communication systems are achieving higher data rates to support internet and other data related applications.