Curriculum for UG & PG Programmes

(2024-25 Onwards)

असतो मा सद्गमय

Swami Keshvanand Institute of Technology, Management & Gramothan

(An Autonomous Institute, Affiliated to Rajasthan Technical University, Kota)
(Accredited by NAAC with A ++ Grade)
Approved by AICTE, Ministry of Education, Government of India
Recognized by UGC under Section 2(f) of the UGC Act, 1956

M.Tech. in Digital Communication

Name of the Programme: M.Tech. in Digital Communication	Year**: II**	Semester**: III**
Course Name: **Advance 5G Technologies**	Course Code**: ECPL311**	Credit**: 3**
Max Marks: **100**	CIE: **40**	SEE: **60**
End Term Exam Time: **3 Hrs**	Teaching Scheme: **3L+0T+0P**	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**UNIT-1: 5G Channel Modeling and use Cases:** Modeling requirements and scenarios, Channel model requirements, Propagation scenarios, Relaying multi-hop and cooperative communications: Principles of relaying, fundamentals of relaying, Cognitive radio: Architecture, spectrum sensing, Software Defined Radio (SDR).	10
3	**UNIT-2 :Multiple-input multiple-output (MIMO) systems:** Introduction to Multi-antenna Systems, Motivation, Types of multi-antenna systems, MIMO vs. multi-antenna systems. Diversity, Exploiting multipath diversity, Transmit diversity, Space-time codes, The Alamouti scheme, Delay diversity, Cyclic delay diversity, Space-frequency codes, Receive diversity, The rake receiver, Combining techniques, Spatial Multiplexing.	11
4	**UNIT-3: The 5G Architecture:** Introduction, NFV and SDN, Basics about RAN architecture, High-level requirements for the 5G architecture, Functional architecture and 5G flexibility, Functional split criteria, Functional split alternatives, Functional optimization for specific applications, Integration of LTE and new air interface to fulfill 5G Requirements, Enhanced Multi-RAT coordination features, Physical architecture and 5G deployment	11
5	**UNIT-4 :The 5G Radio-Access Technologies:** Access design principles for multi-user communications, Orthogonal multiple-access systems, Spread spectrum multiple access systems, Capacity limits of multiple-access methods, Sparse code multiple access (SCMA), Interleave division multiple access (IDMA), Radio access for dense deployments, OFDM numerology for small-cell deployments, Small-cell sub-frame structure, Radio access for V2X communication, Medium access control for nodes on the move, Radio access for massive machine type communication	12
	Total	**45**

Text Books:

1. Kushwaha Ritesh Kumar,Sikh Gurmeet Singh, "5G Technologies and Its Applications" JSR Publications,2024
2. Sachan VK, "Fundamentals of 5G Wireless Communications" , JDS Memorial Publications. 2021
3. Athanasios G.Kanatos, Konstantina S.Nikita, Panagiotis Mathiopoulos" , New Directions in Wireless Communication Systems from Mobile to 5G". CRC Press.2019
4. Velrajan Saro, " 5G Wireless Networks", Notion Press.2020.

Reference Books:

1. Manvi Sunilkumar S., "Wireless and Mobile Network ". Wiley Publications,2016
2. Lee Willams, "Wireless and Telecommunications". MGH Publications , 3rd Edition,2006.
3. Behera G K, "Mobile Communication", Scientec Publications, 3rd Edition,2016.
4. Wanshi Chain,Peter Gaal, Juan Montojo, Haris Zisimopoulos,"Fundamental of 5G communications".MGH, 2024.

Prerequisite:

1. Basic Understanding of Telecommunication Principles
2. Understanding of Networking Concepts

Course Outcomes: After learning the course the students should be able to:

Course Code	Course Outcomes	Bloom's Level
ECPL311.1	Explain 5G channel modeling and its implementation	**L2**
ECPL311.2	Explain the 5G architecture and its requirements	**L2**
ECPL311.3	Implement and Design a MIMO system	**L3**
ECPL311.4	Apply the latest radio access technologies for 5G communication	**L3**
ECPL311.5	Evaluate the mobility management parameters for 5G communication	**L4**

Prepared by: -
Dr. Suman Sharma

Verified by: -

Name & Signature

Name & Signature

Name of the Programme: M.Tech. in Digital Communication	Year**: II**	Semester**: III**
Course Name: **Nano-Technologies (Devices and Applications)**	Course Code**: ECPL312**	Credit**: 3**
Max Marks: **100**	CIE: **40**	SEE: **60**
End Term Exam Time: **3 Hrs**	Teaching Scheme: **3L+0T+0P**	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**UNIT-1: Introduction to Nanomaterials :** Nanotechnology, Frontier of future-an overview, Length Scales, Variation of physical properties from bulk to thin films to nanomaterials, Confinement of electron in 0D, 1D, 2D and 3D systems, Surface to Volume Ratio, Synthesis of Nanomaterials: Bottom-Up approach: Chemical Routes for Synthesis of nanomaterials-Sol-gel, Precipitation, Solution Combustion synthesis, Hydrothermal, SILAR, Chemical Bath Deposition. Top-Down approach- Ball milling technique, Sputtering, Laser Ablation.	10
3	**UNIT-2 :Characterization of Nanomaterials:** Basic principles and instrumentations of Electron Microscopy –Transmission Electron Microscope, Scanning Electron Microscope, Scanning Probes- Scanning Tunneling microscope, Atomic Force Microscope –different imaging modes, comparison of SEM and TEM, AFM and STM, AFM and SEM. Basic principles of working of X-ray diffraction, derivation of Debye-Scherrer equation, numericals on Debye Scherrer equation, Optical Spectroscopy-Instrumentation and application of IR, UV/VIS (Band gap measurement)	11
4	**UNIT-3: Nanotechnology in Energy storage and conversion Solar cells:** First generation, Second generation and third generation solar cells: Construction and working of Dye sensitized and Quantum dot sensitized solar cells. Batteries: Nanotechnology in Lithium ion battery- working, Requirements of anodic and cathodic materials, classification based on ion storage mechanisms, limitations of graphite anodes, Advances in Cathodic materials, Anodic materials, Separators Fuel Cells:Introduction, construction, working of fuel cells and nanotechnology in hydrogen storage and proton exchange membranes	12
5	**UNIT-4: Applications of Nanotechnology:** Nanotech Applications and Recent Breakthroughs: Introduction, Significant Impact of Nanotechnology and Nanomaterial, Medicine and Healthcare Applications, Biological and Biochemical Applications (Nano biotechnology), Electronic Applications (Nano electronics), Computing Applications (Nano computers), Chemical Applications (Nano chemistry), Optical Applications (Nano photonics), Agriculture and Food Applications, Recent Major Breakthroughs in Nanotechnology.	11
	Total	**45**

Text Books:

1. A.K. Bandyopadhyay, " Nano Materials". New Age Publisher, 2014.
2. Kulkarni Sulbha K., " Nano Technolorgy: Principles and Practice", CPC Publications, 2016
3. Rao MS Ramchandra, "Nano Science and Nano Technology". Willey Publications, 2013
4. Droege Peter, "Nano Structured Materials". Elsevier Publishers, 2011
5. M.A. Shah, K.A. Shah, "Nanotechnology: The Science of Small", Wiley India,2020.

Reference Books:

1 C. P. Poole and F. J. Owens, " Introduction to Nanotechnology", Wiley, 2003
2. M. Ratner and D. Ratner, "Nanotechnology", Prentice Hall, 2013
3. M. Wildon, K. Kannagara, G. Smith, M. Simmons and B. Raguse, "Nanotechnology". CRC Press Boca Raton 2020

Prerequisite:

1. Basic Understanding of Electronics Devices & circuits
2. Understanding of materials behaviour.

Course Outcomes: After learning the course the students should be able to:

Course Code	Course Outcomes	Bloom's Level
ECPL312.1	Demonstrate the synthesis of nanoparticles by various techniques.	**L2**
ECPL312.2	Explain working of basic instruments used in characterization of nanoparticles.	**L2**
ECPL312.3	Discuss the application of nanotechnology.	**L2**
ECPL312.4	Classify the nanomaterials based on the dimensions.	**L3**
ECPL312.5	Assess the suitability of nanomaterials for various device applications.	**L4**

Prepared by: -

Dr. Swati Arora
Name & Signature

Verified by: -

Name & Signature

Name of the Programme: M.Tech. in Digital Communication	Year**: II**	Semester**: III**
Course Name: **Embedded Systems**	Course Code**: ECPL313**	Credit**: 3**
Max Marks: **100**	CIE: **40**	SEE: **60**
End Term Exam Time: **3 Hrs**	Teaching Scheme: **3L+0T+0P**	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**UNIT-1: Embedded system Basics:** Application domain of embedded systems, General characteristics of embedded systems, figure of merit for an embedded system, Model of an embedded system, Processor fundamentals and its Architecture, Memory for Embedded Systems- Semiconductor Memory, RAM, Dynamic RAM, ROM, Caches, Low Power Design, Pull down and Pull up Resistances, Examples of Embedded system.	10
3	**UNIT-2 :Sensors-** Temperature Sensors, Light Sensors, Proximity/Range Sensors, Encoders, Humidity Sensors, Other Sensors, Analog to Digital Converters, ADC Interfacing, Actuators- Motors, and Relays, Displays, Opto couplers/Opto isolators. Different types of Buses for Embedded systems, Protocols- I2C Protocol, SPI Bus, External Buses, USB, Firewire Port, Standard Serial Port, RS 422/RS 485, Ethernet, Automotive Buses, Controller Area Network (CAN), Wireless Communications Protocols, WLAN (IEEE 802.11), IEEE 802.15 for WPAN.	11
4	**UNIT-3:Introduction to RTOS: RTOS** importance in embedded systems, Task scheduling and management, Inter-task communication and synchronization, RTOS Programming basics.Software programming in C language, C program elements, Object oriented programming approach, Embedded Programming in C++ and Java.	12
5	**UNIT-4: Embedded Design:** A Systems Perspective- Typical Example, Product Design, The Concept of 'Need', Requirements, User's Perspective, User Research, Feasibility Study, Specifications, The Design Process, The Starting Point, Ergonomic Design, Mechanical and Interface Design, Software Design, Hardware Design, Schematic Design, PCB Layout, PCB Manufacturing and Assembly, Testing, Design for Testability (DFT), Levels of Testing, Reliability and 'Standards' Testing, Field Trials, Signature Testing, Bulk Manufacturing, Manufacturing Tests, Yield and Product packing/Delivery.	11
	Total	**45**

Text Books:

1. Lyla B. Das," Embedded Systems an Integrated Approach", Pearson Education, 2016
2. Raj Kamal, “Embedded Systems - Architecture, Programming and Design”, Tata-Mc Graw Hill, 12th Reprint, 2007
3. Kothari D P, “Embedded Systems”, New Age Publications, 2015

Reference Books:

1. Wayne Wolf “Computers as components: Principles of Embedded Computing System Design”, The Morgan Kaufmann Series in Computer Architecture and Design, 2013
2. Shibu K V," Introduction to Embedded Systems", McGraw Hill Education(India) Private Limited, 2014
3. Sriram V Iyer, Pankaj Gupta " Embedded Real Time Systems Programming", Tata McGraw- Hill, 2012.
4. Packol James K. , “Embedded Systems:A Contomprary Design Tool”,Willey Publication , 2010

Prerequisite:

1. Basic understanding of Computer Architectures.
2. Basic understanding of Number Systems.
3. Basic understanding of microprocessors and microcontrollers.
4. Basic understanding of C language.

Course Outcomes: After learning the course the students should be able to:

Course Code	Course Outcomes	Bloom's Level
ECPL313.1	Describe the fundamentals of embedded systems	**L2**
ECPL313.2	Differentiate between mechanism of RTOS and OS	**L2**
ECPL313.3	Use appropriate sensors and actuators for embedded application	**L3**
ECPL313.4	Apply programming concepts for firmware development	**L3**
ECPL313.5	Select systematic approach to design embedded system	**L4**

Prepared by: -

Dr. Pallav Rawal
Name & Signature

Verified by: -

Name & Signature

Name of the Programme: M.Tech. in Digital Communication	Year**: II**	Semester**: III**
Course Name: **Research Methodology & IPR**	Course Code**: NP40.02**	Credit**: 3**
Max Marks: **100**	CIE: **40**	SEE: **60**
End Term Exam Time: **3 Hrs**	Teaching Scheme: **3L+0T+0P**	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**UNIT-1: Research Methodology**: Basic Statistics, Inferential statistics, Central tendency of data, Standard deviation, frequency distribution, level of measurement, Probability distribution, Normal distribution, Correlation, Numerical problems, Introduction to research, Need of research, Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem	9
3	**UNIT-2 :Research Approaches:** Approaches of investigation of solutions for research problems, Sample design, data collection, Regression and Z-test, t-test, ANOVA, analysis, interpretation, Necessary instrumentation's, Effective literature studies approaches, analysis. Plagiarism, Research ethics, examples	9
4	**UNIT-3:Effective Technical Writing**: Development of Research Proposal, citation of references, Report writing, Precautions for writing research reports	8
5	**UNIT-4: Nature of Intellectual Property**: Patents, Designs, Trademarks, and Copyright, Geographical Indications. Process of Patenting and Development, International Scenario, International Cooperation on Intellectual Property	9
6	**UNIT-5: Patent Rights:** Scope of Patent Rights, Licensing and transfer of technology, patent Infringement and Enforcement. New developments in IPR: IPR of Biological Systems, Computer Software, etc. Case Studies on Intellectual Properties	9
	Total	**45**

Text Books:

1. C. R. Kothari, "Research Methodology", New Age Publication, 2nd Revised Edition.2012
2. Deepak Chawla, "Research Methodology-Concept and Cases" , Vikas Publications ,2nd Edition,2020.
3. Dr. Rupinder Tewari and Ms. Mamta Bhardwaj, " Intellectual Property: A Primer for Academia" Honorary Director Publication Bureau, Panjab University Chandigarh.2016.

Reference Books:

1. Rao G Nageswara, "Research Methodology and Quantitative Methods", B S Publications.2008
2. Ganguli Prabuddha, "Intellectual Property rights - 2020". McGraw Hill Education,2020.

Prerequisite:

1. Knowledge of Basic Statistics

Course Outcomes: After learning the course the students should be able to:

Course Code	Course Outcomes	Bloom's Level
NP40.02.1	Identify the nature of intellectual property rights.	L3
NP40.02.2	Apply various data collection techniques, sampling methods, and data analysis tools	L3
NP40.02.3	Formulate a research problem and prepare a research proposal in view of the literature review and identified gaps.	L4
NP40.02.4	Select a effective research methodology to conduct research in a given domain.	L4
NP40.02.5	Prepare and apply for a patent.	L4

Prepared by: -

Mr. Deepak Kumar (ME)
Name & Signature

Verified by: -

Name & Signature

Open Elective

(For other than Electronics and Communication Branches)

Name of the Programme: M.Tech. in Digital Communication	Year**: II**	Semester**: III**
Course Name: **Introduction To Sensors**	Course Code**: -ECPL340.01**	Credit**: 3**
Max Marks: **100**	CIE: **40**	SEE: **60**
End Term Exam Time: **3 Hrs**	Teaching Scheme: **3L+0T+0P**	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Unit-1 - Fundamentals and Sensor Characteristics:** Introduction on Sensor - General concepts and terminology of measuring systems, transducer classification, general input-output configuration, static and dynamic characteristics of a measuring system, and statistical analysis of measurement data, classification of sensors	8
3	**Unit-2 - Motion, Proximity and Ranging Sensors:** Motion Sensors – Potentiometers – Resolver - Encoders – Optical, magnetic, inductive, capacitive, LVDT – RVDT – Synchro – Microsyn, accelerometer – GPS - Bluetooth, range sensors – RF beacons - Ultrasonic ranging - Reflective beacons - Laser Range Sensor (LIDAR).	9
4	**Unit-3 - Force, Magnetic and Heading Sensors:** Strain Gage - Load Cell - Magnetic Sensors - Types, principle, requirement and advantages - Magneto resistive – Hall effect – Current sensor heading sensors – Compass, gyroscope, inclinometers	9
5	**Unit-4 - Optical, Pressure and Temperature Sensors:** Photo conductive cell, photo voltaic, photo resistive - LDR – Fiber optic sensors – Pressure – Diaphragm – Bellows - Piezoelectric – Tactile sensors, Temperature – IC, Thermistor - RTD – Thermocouple - Acoustic sensors – Flow and level measurement - Radiation sensors - Smart sensors - Film sensor - MEMS & Nano Sensors - LASER sensors.	9
6	**Unit-5 – Miscellaneous :** Moisture, humidity, wind chill indicator, radioactive count rate, smoke sensor, infrared, microwave, air purity, fire detector - Imaging sensors - Non-destructive monitoring - Pressure sensitive paint (PSP) measurements for aerodynamic applications	9
	Total	**45**

Text Books:

1. Patranabis D, "Sensors and Transducers" 2nd ed., PHI Publications,2021.
2. Krishnamachari Bhaskar, "Networking Wireless Sensors ", Cambridge, 3rd ed., 2018
3. S. J. Prosser, E. Lewis,"Sensors and Their Applications XII", CRC Press, 1st ed., 2014.

Reference Books:

1. Murthy DVS, "Transducers & Instrumentation", 2nd ed., Prentice Hall of India, 2008 .
2. Ernest O. Doebelin , Dhanesh N. Manik,Doebelin's Measurement Systems: 7th ed., Tata McGraw Hill , 2019
3. NPTEL Lecture notes on "Sensors and Actuators" by Prof Hardick J Pandiya, IISc Bangalore.2022.

Prerequisite:

1. Basic understanding of Electronics Circuits and Devices.

Course Outcomes: After learning the course the students should be able to:

Course Code	Course Outcomes	Bloom's Level
ECPL340.01.1	Familiarize the transduction principles and label their characteristics of the measurement system	**L1**
ECPL340.01.2	Describe the principle of motion, proximity and ranging sensors	**L2**
ECPL340.01.3	Recall the performance of force, magnetic and heading sensors	**L2**
ECPL340.01.4	Outline the working principles optical, pressure and temperature sensors	**L2**
ECPL340.01.5	Apply the type of sensors used in various real time applications	**L3**

Prepared by: -

Dr. Kiran Rathi
Name & Signature

Verified by: -

Name & Signature

Open Elective

(For other than Electronics and Communication Branches)

Name of the Programme: M.Tech. in Digital Communication	Year**: II**	Semester**: III**
Course Name: **Cognitive Radio**	Course Code**: -ECPL340.02**	Credit**: 3**
Max Marks: **100**	CIE: **40**	SEE: **60**
End Term Exam Time: **3 Hrs**	Teaching Scheme: **3L+0T+0P**	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Unit-1 - Introduction to Cognitive Radios:** Digital dividend, cognitive radio (CR) architecture, functions of cognitive radio, dynamic spectrum access (DSA), components of cognitive radio, spectrum sensing, spectrum analysis and decision, potential applications of cognitive radio.	8
3	**Unit-2 - Spectrum Sensing:** Spectrum sensing, detection of spectrum holes (TVWS), collaborative sensing, geo-location database and spectrum sharing business models (spectrum of commons, real time secondary spectrum market).	9
4	**Unit-3 - Optimization Techniques of Dynamic Spectrum Allocation:** Linear programming, convex programming, non-linear programming, integer programming, dynamic programming, stochastic programming.	9
5	**Unit-4 - Dynamic Spectrum Access and Management:** Spectrum broker, cognitive radio architectures, centralized dynamic spectrum access, distributed dynamic spectrum access, learning algorithms and protocols.	9
6	**Unit-5 – Spectrum Trading:** Introduction to spectrum trading, classification to spectrum trading, radio resource pricing, brief discussion on economics theories in DSA (utility, auction theory), and classification of auctions (single auctions, double auctions, concurrent, sequential). Research Challenges in Cognitive Radio: Network layer and transport layer issues, cross layer design for cognitive radio networks.	9
	Total	**45**

Text Books:

1. Mitalo Joseph, "Cognitive Radio Architecture", Willey Publications , 2017.
2. Kwang-Cheng Chen, Ramjee Prasad, "Cognitive radio networks", John Wiley & Sons Ltd., 2009.
3. Bruce Fette, "Cognitive Radio Technology", Elsevier, 2nd edition, 2009.

Reference Books:

1. Huseyin Arslan, "Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems", Springer, 2007
2. Linda Doyle, "Essentials of Cognitive Radio", Cambridge University Press, 2009.

Prerequisite:

1. Digital Communication
2. Computer Networks

Course Outcomes: After learning the course the students should be able to:

Course Code	Course Outcomes	Bloom's Level
ECPL340.02.1	Develop the cognitive radio, as well as techniques for spectrum holes detection that cognitive radio takes advantages in order to exploit it.	L2
ECPL340.02.2	Understand technologies to allow an efficient use of TVWS for radio communications based on two spectrum sharing business models/policies.	L2
ECPL340.02.3	Understand fundamental issues regarding dynamic spectrum access, the radio-resource management and trading,	L3
ECPL340.02.4	Analyze the number of optimization techniques for better spectrum exploitation.	L3
ECPL340.02.5	Apply spectrum trading concepts for higher research	L4

Prepared by: -

Mr. Harshal Nigam
Name & Signature

Verified by: -

Name & Signature

Open Elective

(For other than Electronics and Communication Branches)

Name of the Programme: M.Tech. in Digital Communication	Year**: II**	Semester**: III**
Course Name: **High Performance Communication Networks**	Course Code**: -ECPL340.03**	Credit**: 3**
Max Marks: **100**	CIE: **40**	SEE: **60**
End Term Exam Time: **3 Hrs**	Teaching Scheme: **3L+0T+0P**	

Module No.	Contents	Hours
1	**Introduction:** Objective, Scope, Outcome of the Course and Prerequisite	1
2	**Unit-1 - Network Services and Layered Architectures :**Networking principles, Applications, Traffic characterization, Network elements, Basic network mechanisms, Open data network model, OSI, TCP, UDP and IP Models, Network architectures, Network bottlenecks.	8
3	**Unit-2 - High Speed Networks:** Packet switching networks, Frame relay networks, ATM, High speed LAN, Ethernet, WLAN, DWDM, OBS, OPS.	9
4	**Unit-3 -Congestion and Traffic Management:** Congestion control in data networks, Effects of congestion, Traffic management, Congestion control in packet switching networks Link level Flow, Error and Traffic Control. Need for flow and error control, Link control mechanisms, ARQ performance, TCP flow and congestion control.	9
5	**Unit-4 -UDP-TCP/IP Protocol Stack over WLAN Network:** UDP behaviour over WLAN, Effect of access based on RTS/CTS, Behaviour of TCP over WLAN, Influence of errors in UDP and TCP.	9
6	**Unit-5 Integrated and Differentiated Services & Quality of Service Protocols :**Integrated Services Architecture (ISA), Queuing discipline, Random early detection, Differentiated services. Protocol for QoS support, Resource reservation: RSVP, MPLS, Real Time Transport Protocol, Self-Configuring techniques, Multichannel protocols.	9
	Total	**45**

Text Books:

1. William Stallings, "High-speed Networks and Internets, Pearson Education", 2nd Edition, ,United Kingdom.2012.
2. Jean Warland, Pravin Varaiya, "High Performance Communication Networks", 2011, Elsevier Publications, 2nd Edition, London.2006.

Reference Books:

1. Leon Gracia, Widjaja, "Communication Networks", McGraw Hill,1st Edition, New York, USA. 2011.
2. Ramjee Prasad, Luis Munoz, "WLANs and WPANs Towards 4G Wireless", Artech House, 1st Edition, London. 2013.

Prerequisite:

1. Computer Networks

Course Outcomes: After learning the course the students should be able to:

Course Code	Course Outcomes	Bloom's Level
ECPL340.03.1	Explain the functions of the OSI, TCP/IP reference models.	L2
ECPL340.03.2	Describe the importance of various congestion and traffic management techniques related to packet	L2
ECPL340.03.3	Illustrate the performance of link level protocols.	L3
ECPL340.03.4	Apply the behavior of TCP and UDP protocols over WLAN	L3
ECPL340.03.5	.Analyze the performance of various high speed networks.	L4

Prepared by: -

Prof. Monika Mathur
Name & Signature

Verified by: -

Name & Signature

Name of the Programme: M.Tech. in Digital Communication	Year**: II**	Semester**: III**
Course Name: **Pre-Dissertation**	Course Code**: ECPD360**	Credit**: 12**
Max Marks: **400**	CIE: **240**	SEE: **160**
End Term Exam Time:- **2 Hrs**	Teaching Scheme: **0L+0T+2P**	

Course Outcomes: After learning the course the students should be able to:

Course Code	Course Outcomes	Bloom's Level
ECPD360.1	Gather, form and critique knowledge from research studies	**L3**
ECPD360.2	Identify and investigate a research problem	**L3**
ECPD360.3	Conduct the research project in an ethical fashion	**L3**
ECPD360.4	Interpret the research outcomes through various statistical tools and validate them.	**L3**
ECPD360.5	Apply the research methodology tools for data collection and analysis.	**L3**

Prepared by: -

Prof. Monika Mathur
Name & Signature

Verified by: -

Name & Signature

Teaching and Examination Scheme

II Year IV Semester: M.Tech. (DC)

S. No.	Course Code	Course Name	Category	Teaching Scheme			Exam Hrs	Marks			Credit
				L	T	P		CIE	SEE	Total	
1	ECPD470	Dissertation	**REW**	0	0	32	4	360	240	600	**20**
										Total Credit	**20**

Name of the Programme: M.Tech. in Digital Communication	Year**: II**	Semester**: IV**
Course Name: **Dissertation**	Course Code**: ECPD470**	Credit**: 20**
Max Marks: **600**	CIE: **360**	SEE: **240**
End Term Exam Time: **- 4 Hrs**	Teaching Scheme: **0L+0T+32P**	

Course Outcomes: After learning the course the students should be able to:

Course Code	Course Outcomes	Bloom's Level
ECPD470.1	Identify a research problem	**L3**
ECPD470.2	Perform the related investigation with the help of available software and hardware tools	**L4**
ECPD470.3	Apply an appropriate research design and associated methods	**L4**
ECPD470.4	Draw appropriate conclusions and indicate the significance of the findings for research	**L4**
ECPD470.5	Report the research in a scholarly fashion appropriate to the disciplinary area	**L4**

Prepared by: -

Prof. Monika Mathur
Name & Signature

Verified by: -

Name & Signature