ST. JOSEPH'S
COLLEGE OF ENGINEERING
AND TECHNOLOGY,
-PALAI-

Administered by Diocese of Palai | Approved by AICTE | Affiliated to APJAKTU | An ISO 9001-2015 certified college

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ESL 130 : ELECTRICAL & ELECTRONICS WORKSHOP

Programme : **B.Tech**

Semester : **01/02**

Course Title : **ELECTRICAL & ELECTRONICS WORKSHOP**

Course Code : **ESL 130**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
ESL130.1	Demonstrate safety measures against electric shocks	K_2
ESL130.2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols	K_2
ESL130.3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings	K_2
ESL130.4	Identify and test various electronic components	K_2
ESL130.5	Draw circuit schematics with EDA tools	K_2
ESL130.6	Assemble and test electronic circuits on boards	K_2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
ESL130.1						3						1		
ESL130.2	2									1				
ESL130.3	2			1		1		1	2	2		2		
ESL130.4	3				1				2			2	1	1
ESL130.5	3				2			2	2			2	1	1
ESL130.6	3				2				2			1	1	
ESL130														

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO4 - PO1	3	Students are expected to utilize engineering knowledge for the identification and testing of various electronic components
CO4 - PO5	1	Students are expected to identify certain problems by understanding the testing of various electronic components
CO4 - PO9	2	Students are expected to function effectively as an individual and in a team during the identification and testing of various electronic components
CO4 – PO12	2	Identification and testing of various electronic components will help the students to develop the ability to engage in independent and life-long learning, in the broadest context of technological change.
CO4 - PSO1	1	Students are expected to apply the fundamental knowledge in identifying and testing of various electronic components, for the development of basic electronic systems
CO4 - PSO2	1	The usage of various instruments for testing the components will familiarize the students to use certain hardware tools
CO5 - PO1	3	Students are expected to apply the electronic circuit knowledge to draw the circuit schematic
CO5 - PO5	2	Students are expected to utilize the appropriate EDA softwares effectively to draw the circuit schematic.
CO5 - PO8	2	Students are expected to apply the ethical rules and commit to professional ethics in the laboratory.
CO5 - PO9	2	Students are expected to function effectively as an individual to obtain the expected outcome
CO5 - PO12	2	Use of the software tools enable the students to engage in independent and lifelong learning
CO5 – PSO1	1	Students are expected to apply fundamental knowledge of Electronics and Communication in electronic circuit design
CO5 - PSO2	1	Students are expected to use EDA software tools for the design of electronic circuits
CO6 - PO1	3	Students are expected to apply knowledge of Electronic circuits to rectify problems while assembling and testing electronic circuits on board.
CO6 - PO5	2	Students are expected to create, select, and apply appropriate techniques and resources, to assemble and test electronic circuits on board.
CO6 – PO9	2	Students are expected to design documentation of the various electronic circuit experiments, effectively as an individual and in a team.

CO6 - PO12	1	Students are expected to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the area of electronic circuits.
CO6 - PSO1	1	Students are expected to apply fundamental knowledge of Electronics circuits in the design, analysis and development of various electronic systems

Prepared by (Faculty Name & Signature) : DR. GIBY JOSE 10/10/20

Verified by : Stream Coordination Committee

10/10/20 Nithe. M. Biju

20/10/2020
Dr. Giby Jose
DAC convenor

DEPARTMENT OF MECHANICAL ENGINEERING

ESL 120

Semester : I/II

Course Title : **Mechanical Engineering Workshop**

Course Code : ESL 120

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 1	Identify Basic Mechanical Workshop operations in accordance with the materials and objects	K_1
CO 2	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades	K_3
CO 3	Apply appropriate safety measures with respect to the mechanical workshop trades	K_3

CO – PO Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO011	PO12	PSO1	PSO2	PSO3
CO 1	2	-	-	-	-	-	-	-	-	-	-	-	2	2	-
CO 2	2	-	-	-	-	-	-	-	-	-	-	-	2	2	-
CO 3	2	-	-	-	-	-	-	-	-	-	-	-	2	2	-
Average	2	-	-	-	-	-	-	-	-	-	-	-	2	2	-

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 – PO1	2	Graduates are able to identify and select machines and methods for mechanical engineering operations and problems by applying fundamentals in material science and engineering.
CO1 – PSO1	2	Graduates will be able to understand and develop skills in engineering application of which will make them capable of manufacturing and managing engineering fields.
CO1-PSO2	2	Graduates will be able to identify and adopt latest trends in mechanical engineering for industrial and social application
CO2-PO1	2	Graduates are able to identify and select mechanical tools and instruments to deal with engineering problems by applying fundamentals in mathematics , material science and engineering.
CO2 – PSO1	2	Graduate will be able to apply engineering knowledge and skill to develop optimum solution to the problems in manufacturing.
CO2-PSO2	2	Graduates will be able to evolve creative methods and adopt advancement in mechanical engineering for industrial and social application
CO3 – PO1	2	Graduate will be able to apply necessary considerations in operations to ensure safety ,use of PPE and can assess the risk involved when indulging in various manufacturing methodes
CO3-PSO1	2	Graduate will be able to understand the importance of avoiding accidents to improve productivity
CO3-PSO2	2	Graduates will be able to identify and adopt safety measures at all levels of mechanical engineering for industrial and social applications

Prepared by (Faculty Name & Signature) :Harikumar P.S

Verified by : Stream Coordination Committee

DEPARTMENT OF MECHANICAL ENGINEERING

EST 110 ENGINEERING GRAPHICS

Semester : S1, S2

Course Title : **ENGINEERING GRAPHICS**

Course Code : EST 110

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
EST 110.1	CO1: Draw the projection of points and lines located in different quadrants	**K3**
EST 110.2	CO2: Prepare Multiview orthographic projections of objects by visualizing them in different positions	**K3**
EST 110.3	CO3: Draw sectional views and develop surfaces of a given object	**K3**
EST 110.4	CO4: Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.	**K3**
EST 110.5	CO5: Convert 3D views to orthographic views	**K3**
EST 110.6	CO6**:** Obtain Multiview projections and solid models of objects using CAD tools	**K3**

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EST 110.1	3	-	-	-	-	-	-	-	-	-	-	-	2	-
EST 110.2	3	-	-	-	-	-	-	-	-	-	-	-	3	-
EST 110.3	3	1	-	-	-	-	-	-	-	-	-	-	3	-
EST 110.4	3	-	-	-	-	-	-	-	-	1	-	-	2	-
EST 110.5	3	-	-	-	-	-	-	-	-	2	-	-	3	-
EST 110.6	3	-	-	-	3	-	-	-	-	3	-	-	3	3
EST 110	3	1	-	-	3	-	-	-	-	2	-	-	2.5	3

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	3	Graduates are able to apply Engineering fundamentals related to 2D orthographic projection of lines to develop Engineering drawings related to complex design problems.
CO2-PO1	3	Graduates are able to apply Engineering fundamentals related to 2D orthographic projection of solids to develop Engineering drawings related to complex design problems.
CO3- PO1	3	Graduates will be able to apply the concept of section to describe the concealed features of parts designed as a part of solution to Engineering problems.
CO3 –PO2	1	To an extend graduates will be able to analysis and infer 3 Dimensional Models related to complex problems.
CO4 – PO1	3	Graduates will be able to apply knowledge related to isometric projection to develop 3 Dimensional models as a part of solution related to design problems.
CO4 – PO10	1	To an extend graduates will be able to convey solutions for complex engineering problems in a better way using 3 dimensional models developed using the concept of perspective projection and isometric projection.
CO5 – PO1	3	Graduates will be able to convert 3 Dimensional models to 2 dimensional orthographic views for simplified solutions for design problems
CO5 – PO10	2	Graduates will be able to use simplified orthogonal views to describe delicate and complex features of a 3-Dimensional models.
CO6 - PO1	3	Usage of CAD software package will help graduates apply the Engineering knowledge related to orthographic projection to 2 Dimensional drawing sand 3 Dimensional models as a part of solutions to complex problems.
CO6-PO5	3	Use of Cad Software helps graduate to become familiar with the usage of modern IT tools for modeling solutions of complex Engineering Problems.
CO6-PO10	3	The exploded views of 3D models developed using a Cad software helps graduate to effectively convey order of assembly of different parts.
CO1-PSO1	2	concept of projection of points and lines are the foundation for developing 3D models as a part of solutions for problems in the different areas of Mechanical engineering.
CO2-PSO1	3	The concept of 2D orthographic projection of solids help in developing engineering drawings related to complex design problems
CO3-PSO1	3	concept of section helps to describe the concealed features of designed components.
CO4-PSO1	2	The concept of isometric projection will help graduates to develop 3 Dimensional models as a part of solution related to design problems.

CO5-PSO1	3	Graduates will be able to convert 3 Dimensional models to 2 dimensional orthographic views for simplified solutions for design problems.
CO6-PSO1	3	Usage of CAD software package will help graduates develop optimum solutions for design problems.
CO6-PSO2	3	Use of Cad Software helps graduate to become familiar with the usage of modern IT tools for modeling solutions of complex Engineering Problems

Prepared by (Faculty Name & Signature) :
Mr. Dinu George

Verified by : Stream Coordination Committee

DEPARTMENT OF MECHANICAL ENGINEERING

Semester II

Course Title : Basics of Civil & Mechanical Engineering
Course Code : EST120

Course Outcomes (CO)

After the successful completion of this course, students will be able to

No.	Course outcomes	Knowledge Level
EST120-CO6	Analyse thermodynamic cycles and calculate its efficiency	**K_3**
EST120-CO7	Illustrate the working and features of IC Engines.	**K_2**
EST120-CO8	Explain the basic principles of Refrigeration and Air Conditioning.	**K_2**
EST120-CO9	Describe the working of hydraulic machines	**K_2**
EST120-CO10	Explain the working of power transmission elements.	**K_2**
EST120-CO11	Describe the basic manufacturing, metal joining and machining processes	**K_2**

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EST120-CO6	3	2	-	-	-	-	-	-	-	-	-			
EST120-CO7	3	1	-	-	-	-	-	-	-	-	-			
EST120-CO8	3	1	-	-	-	-	-	-	-	-	-			
EST120-CO9	3	2	-	-	-	-	-	-	-	-	-			
EST120-CO10	3	1	-	-	-	-	-	-	-	-	-			
EST120-CO11	3		-	-	-	-	-	-	-	-	-			

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO6- PO1	3	Graduates can apply engineering fundamentals related to thermodynamics to understand the thermodynamics problems
CO6 – PO2	2	Graduates can identify the different thermodynamic devices based on thermodynamic laws
CO7-PO1	3	Graduates able to apply engineering fundamentals to understand the classification of engines and distinguish them based on their respective working principles
CO7 – PO2	1	Graduate will be able to identify the constraints associated with effectiveness of different engines
CO8-PO1	3	Graduate will be able to apply the engineering fundamentals to explain the type of refrigeration process and evaluate them based on their applications
CO8-PO2	1	Graduate will be able to identify the thermodynamic applications specific to provide comfort conditions to industries and humans
CO9 – PO1	3	Graduate will be able to apply the engineering fundamentals to explain working of hydraulic machines
CO9-PO2	2	Graduate will be able to identify the hydraulic applications specific to industries and small scale .
CO10 – PO1	3	Graduate will be able to apply the engineering fundamentals to explain different power transmission devices.
CO10-PO2	1	Graduates can identify the different power transmission devices based on application.
CO11 – PO1	3	Graduates will be able to interpret the application of different manufacturing processes used in the engineering field

Prepared by (Faculty Name & Signature) : Shiblemon K V

Anooplal B

Verified by : Stream Coordination Committee

COURSE OUTCOMES

Semester	II
Regulation	2019
Course Code	EST 102
Course Name	C Programming

After the successful completion of this course, students will able to

No.	Course Outcomes	Knowledge Level
1	Analyze a computational problem and develop an algorithm/flowchart to find its solution	**K_3**
2	Develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.	**K_3**
3	Write readable C programs with arrays, structure or union for storing the data to be processed	**K_3**
4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem	**K_3**
5	Write readable C programs which use pointers for array processing and parameter passing	**K_3**
6	Develop readable C programs with files for reading input and storing output	**K_3**

CO-PO & CO-PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1	3	3	3	2	-	2	-	-	-	3	3	3	1	1
2	3	3	3	2	2	-	-	-	-	2	-	3	-	-
3	3	3	3	1	2	-	-	-	-	2	-	3	-	-
4	3	3	3	1	2	-	-	-	-	2	3	3	-	-
5	3	3	-	-	2	-	-	-	-	1	-	3	-	-
6	3	3	-	-	2	-	-	-	-	1	-	3	-	-
Avg.	3	3	3	1.5	2	2	-	-	-	1.83	3	3	1	1

Mapping	Mapping Level (3/2/1)	Justification
CO1-PO1	3	Students will be able to use Engineering knowledge by Analyzing a computational problem and develop an algorithm/flowchart.
CO1-PO2	3	With analyzing a computational problem and develop an algorithm/flowchart, the students are able to analyze complex engineering problems.
CO1-PO3	3	By analyzing a computational problem and develop an algorithm/flowchart, the students are able to design solutions for complex engineering problems.
CO1-PO4	2	Through analyzing a computational problem and develop an algorithm/flowchart, the students are able to conduct investigations of complex problems.
CO1-PO6	2	Students will be able to apply knowledge to assess social issues and responsibilities relevant to the professional engineering practice through analyzing a computational problem and developing solutions for that.
CO1-PO10	3	With analyzing a computational problem and develop an algorithm/flowchart, the students are able to communicate effectively on complex engineering activities with the engineering community.
CO1-PO11	3	The students will be able to demonstrate knowledge and understanding of the engineering principles and apply them in multi-disciplinary environments with the knowledge of analyzing a computational problem and developing an algorithm/flowchart.
CO1-PO12	3	By analyzing a computational problem and develop an algorithm/flowchart, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change.
CO1-PSO1	1	Through analyzing a computational problem and develop an algorithm/flowchart, the students are able to analyze, design and develop computing solutions for optimal solving of problems in the field of Mechanical engineering
CO1-PSO2	1	Through analyzing a computational problem and develop an algorithm/flowchart, the students are able to analyze, design and develop computing solutions for solving problems in industrial applications in Mechanical engineering
CO2-PO1	3	With the knowledge of different Arithmetic, Logical, Relational or Bitwise operators, the students will be able to use Engineering knowledge.
CO2-PO2	3	With developing programs using branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators, the students are able to analyze complex engineering problems.
CO2-PO3	3	With the knowledge of branching and looping statements and operators and by developing programs using them, the students are able to design solutions for complex engineering problems.

CO2-PO4	2	The students are able to conduct investigations of complex problems with the knowledge of programming using branching and looping statements and operators.
CO2-PO5	2	With the knowledge of programming using branching and looping statements and operators, students will be able to select and apply appropriate techniques and IT tools like prediction and modelling to complex problems.
CO2-PO10	2	The students are able to communicate effectively on complex engineering activities with the engineering community with the knowledge of programming using branching and looping statements.
CO2-PO12	3	With the knowledge of different programming using branching and looping statements, the students are able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change.
CO3-PO1	3	By examining how arrays, structure or union are used for storing data to be processed, the students will be able to apply knowledge in fundamentals of engineering and mathematics.
CO3-PO2	3	Students will be able to perform analysis of complex engineering problems by examining how arrays, structure or union are used for storing data to be processed
CO3-PO3	3	With the knowledge of how arrays, structure or union are used for storing data to be processed, the students will be able to design solutions for complex engineering problems.
CO3-PO4	1	With the knowledge of how arrays, structure or union are used for storing data to be processed, the students will be able to conduct investigations of complex problems.
CO3-PO5	2	With the knowledge of how arrays, structure or union are used for storing data to be processed, students will be able to select and apply appropriate techniques and IT tools like prediction and modelling to complex problems.
CO3-PO10	2	Students will be able to communicate effectively on complex engineering activities with the engineering community with the knowledge of how arrays, structure or union are used for storing data to be processed.
CO3-PO12	3	With the knowledge of how arrays, structure or union are used for storing data to be processed, the students will be able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CO4-PO1	3	Students will be able to use Engineering knowledge with developing readable multi-function C programs to find the solution to the computational problem.
CO4-PO2	3	Students will be able to perform analysis of complex engineering problems with developing readable multi-function C programs to find the solution to the computational problem.
CO4-PO3	3	Students will be able to design solutions for complex engineering problems by dividing a problem into modules and developing readable multi-function C programs to find the solution to the computational problem

CO4-PO4	1	With the knowledge of sub modules and by developing readable multi-function C programs to find the solution to the computational problem, the students will be able to conduct investigations of complex problems.
CO4-PO5	2	With the knowledge of Identifying Subtasks and developing readable multi-function C programs to find the solution to the computational problem, students will be able to select and apply appropriate techniques and IT tools like prediction and modelling to complex problems.
CO4-PO10	2	Students will be able to communicate effectively on complex engineering activities with the engineering community with the knowledge of Identifying Subtasks and developing readable multi-function C programs to find the solution to the computational problem.
CO4-PO11	3	The students will be able to demonstrate knowledge and understanding of the engineering principles and apply them in multi-disciplinary environments with the knowledge of Identifying Subtasks and developing readable multi-function C programs to find the solution to the computational problem
CO4-PO12	3	With the knowledge of Identifying Subtasks and developing readable multi-function C programs to find the solution to the computational problem, the students will be able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CO5-PO1	3	Students will be able to use fundamental Engineering knowledge by writing readable C programs which use pointers for array processing and parameter passing.
CO5-PO2	3	Students will be able to perform analysis of complex engineering problems with the knowledge of C programs which use pointers for array processing and parameter passing.
CO5-PO5	2	By writing readable C programs which use pointers for array processing and parameter passing, students will be able to select and apply appropriate techniques and IT tools like prediction and modelling to complex problems.
CO5-PO10	1	With writing C programs which use pointers for array processing and parameter passing, the students will be able to communicate effectively on complex engineering activities with the engineering community
CO5-PO12	3	With the knowledge of programs which use pointers for array processing and parameter passing., the students will be able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change
CO6-PO1	3	Students will be able to use Engineering knowledge with developing readable C programs with files for reading input and storing output.
CO6-PO2	3	Students will be able to perform analysis of complex engineering problems with the knowledge of developing C programs with files for reading input and storing output.
CO6-PO5	2	With developing readable C programs with files for reading input and storing output, the students will be able to conduct investigations of complex problems.

CO6-PO10	1	Through developing readable C programs with files for reading input and storing output, the students will be able to communicate effectively on complex engineering activities with the engineering community.
CO6-PO12	3	With the knowledge of the concept of File system for handling data storage and developing readable C programs with files, the students will be able to recognize the need for and to engage in independent and life-long learning in the broadest context of technological change.

Prepared by **(Faculty Name & Signature)**	
Verified by	Stream Coordination Committee

CO-PO Mapping and Justification (2019 Scheme)			
Course	**Life skills**	**Semester**	1
Course Code	HUN 101	**Academic Year**	

Name of faculty	**Babu sanker S**	**Department**	Mechanical Engineering

Course Outcomes (CO)

After the successful completion of this course, students will able to

CO	Course outcomes	Knowledge Level
CO1	Define and identify different life skills required in personal and professional life	K_3
CO2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress	K_3
CO3	Explain the basic mechanics of effective communication and demonstrate these through presentations	K_3
CO4	Take part in group discussions	K_3
CO5	Use appropriate thinking and problem-solving techniques to solve new problems	K_3
CO6	Understand the basics of teamwork and leadership	K_3

CO – PO Matrix

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	-	-	-	-	-	2	-	1	2	2	1	3	-	-
CO2	-	-	-	-	-	-	-	-	3	-	-	2	-	-
CO3	-	-	-	-	-	1	-	-	1	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	1	-	-
CO5	-	3	2	1	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	1	-	-	3	-	-	-	-	-
MNC 202 [Avg]	-	3	2	1	-	1.33	-	1	2.25	2.66	-	2	-	-

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1- PO6	2	**Students able to recognize the various life skills that are essential in both personal and professional life. Assess societal, health, safety, legal, and cultural issues, as well as the duties associated with professional engineering**
CO1- PO8	1	The skills of analysis, logical reasoning and problem-solving will enable the student to make the right decision when faced with moral dilemmas in personal and professional life
CO1- PO9	2	Developing an awareness of the self, learning to work in groups and teams, and learning about leadership enables the student to effectively carry out his responsibilities at both the individual and team level
CO1-P010	2	Developing an understanding of oneself, and learning the tools of effective communication enables the student to become a successful communicator
CO1- PO11	1	**Students able to Demonstrate knowledge and comprehension of engineering and management principles and how to apply them to one's own work, as a team member and leader, to manage projects, and in interdisciplinary settings.**
CO1-PO12	3	**Student able to Recognize the necessity for autonomous and life-long learning in the broader context of technological change, and have the preparation and ability to do so.**
CO2-PO9	3	**Student able to Develop self-awareness and use well-defined coping skills to deal with emotions and stress.** And also, the able to do **Individually and as a member or leader in different teams and transdisciplinary situations, perform well.**
CO2-PO12	2	**Student able to Recognize the necessity for autonomous and life-long learning in the broader context of technological change, and have the preparation and ability to do so. Develop self-awareness and use well-defined coping mechanisms to deal with emotions and stress.**
CO3-PO6	1	**Student to demonstrate the fundamental mechanics of effective communication through presentations.it ids relevant to professional engineering practices**
CO3- PO9	3	Effective communication strategies will help the student to be more successful at the individual level and in groups: as a leader and as a team player
CO3-PO10	3	Mastering the theoretical and practical aspects of communication will lay the foundation for effective personal and professional communication
CO4-PO10	3	Taking part in group discussions and developing the skills of listening and responding to others' opinions helps the student to learn the rudiments of effective group communication
CO4-PO12	1	By engaging in group discussions on contemporary topics the student will realize the need to keep oneself abreast of current developments thereby engaging in lifelong learning
CO5-PO2	3	The exposure to effective thinking and problem-solving techniques enables the student to learn the rudiments of problem analysis

CO5-PO3	**2**	Having gained an insight into creative and critical thinking techniques, the student will be better equipped to design and develop solutions
CO5-PO4	3	The student will learn how to apply logical and creative thinking as the situation demands while encountering complex problems
CO6-PO6	1	Learning about teamwork and leadership will help the student in both professional and personal life
C06 -PO9	3	The theoretical framework and practical exposure provided will enhance the efficiency of the student in individual and team contexts

Prepared by (Faculty Name & Signature) : BABU SANKER S.

Verified by :

PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO1 Apply Mechanical Engineering knowledge and skills to develop optimum solutions to problems in the areas of Design, Thermal, Manufacturing, Industrial Engineering and Management.

PSO2 Identify and adopt advancements in Mechanical Engineering for academic, Industrial and societal applications.

ST. JOSEPH'S COLLEGE OF ENGINEERING AND TECHNOLOGY, PALAI

DEPARTMENT OF SCIENCE & HUMANITIES

Branch: ELECTRONICS AND COMMUNICATION ENGINEERING (2019-20)

CYT 100	ENGINEERING CHEMISTRY	CATEGORY	L	T	P	CREDIT	YEAR OF INTRODUCTION
		BSC	3	1	0	4	2019

Prerequisite: Concepts of chemistry introduced at the plus two levels in schools

Course outcomes: After the completion of the course the students will be able to

CO 1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.
CO 2	Understand various spectroscopic techniques like UV-Visible, IR, and NMR and their applications.
CO 3	Apply the knowledge of the analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterization of nanomaterials.
CO 4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.
CO 5	Study various types of water treatment methods to develop skills for treating wastewater.

Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO 1	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO 2	1	1	-	1	2	-	-	-	-	-	-	-	-	-	-
CO 3	1	1	-	1	2	-	-	-	-	-	-	-	-	-	-
CO 4	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 5	1	-	-	1	-	-	3	-	-	-	-	-	-	-	-
Avg.	1.2	1.25	1	1	2	-	3	-	-	-	-	-	-	-	-

Correlation

1-Slight (Low), 2-Moderate (Medium), 3-Substantial (High), (-)-No Correlation

Justification for CO-PO Mapping.

CO	PO	LEVEL	REMARKS
CO 1	PO 1	1	Information gathered on electrochemistry and corrosion can be used to elucidate various Engineering problems
	PO 2	2	Understanding the basic principles of electrochemistry and corrosion help to assess recent research literature and also to scrutinize the issues related to the area of electrochemical engineering.

	PO 3	1	Knowledge on the Electrochemical basis of corrosion and its prevention method can be utilized in solving problems related to material corrosion and also help to design various energy storage systems.
CO 2	PO 1	1	Knowledge on spectrochemical techniques helps to find solutions to engineering problems like structure analysis of materials
	PO 2	1	Understanding the basic concepts of spectroscopic techniques can be utilized for the analysis of the structural identification of the materials of importance
	PO 4	1	Information acquired on the structural identification of compounds can be used to perform studies to solve complex problems
	PO 5	2	Spectroscopy can use as a modern tool for the prediction and design of materials having applications in the field of modern engineering materials
CO 3	PO 1	1	Understanding the basic principle of chromatography and thermal characterization techniques can be used to solve problems related to these fields in Mechanical engineering .
	PO 2	1	Analytical techniques help to design and select resources for various engineering activities.
	PO 4	1	Research based on thermoanalytical technique such as TGA, DTA and SEM etc. helps to design and reinforce the properties of engineering polymers
	PO 5	2	Knowledge on updated analytical techniques provide an effective route for the prediction and implementation of complex engineering accomplishments
CO 4	PO 1	2	Solve engineering problems by applying the knowledge on engineering materials like polymers and stereochemistry.
	PO 2	1	Stereochemical study of engineering materials used to identify materials for engineering constructions and modeling.
CO 5	PO 1	1	Knowledge on water treatment methods can be used to solve environmental related problems
	PO 4	1	By utilizing the principles of water treatment methods students will be able to design novel water treatment plants.
	PO 7	3	Knowledge on various water treatment methods can be utilized for the sustainable development based on societal, health and environmental context.

Prepared by: Dr. Manju George

Verified by: Jyothi P. Jose

ST. JOSEPH'S COLLEGE OF ENGINEERING AND TECHNOLOGY, PALAI

DEPARTMENT OF SCIENCE & HUMANITIES

Branch:Electronics and Communication Engineering (2019-20)
Course: ENGINEERING CHEMISTRY LAB
Code: CYL 120

Prerequisite: Concepts of chemistry introduced at the plus two levels in schools
Course outcomes: After the completion of the course the students will be able to

CO 1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses.
CO 2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
CO 3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds.
CO 4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis.
CO 5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.
CO 6	Function as a member of team, communicate effectively and engage in future learning. Also understand how chemistry addresses social, economical, and environmental problems and why it is an integral part of curriculum.

Mapping of course outcomes with program outcomes

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PSO2	PSO3
CO 1	3	-	-	-	2	-	-	-	-	-	-	3	-	-	-
CO 2	3	-	-	-	3	-	-	-	-	-	-	3	-	-	-
CO 3	3	-	-	-	3	-	-	-	-	-	-	3	-	-	-
CO 4	3	-	-	-	3	-	-	-	-	-	-	3	-	-	-
CO 5	3	-	-	-	1	-	-	-	-	-	-	3	-	-	-
CO 6	3	-	-	-	1	-	-	-	-	-	-	3	-	-	-
Avg.	3	-	-	-	2	-	-	-	-	-	-	3	-	-	-

Correlation

1-Slight (Low), 2-Moderate (Medium), 3-Substantial (High), (-)-No Correlation

Justification for CO-PO Mapping.

CO	PO	LEVEL	REMARKS
CO 1	PO 1	3	Basic knowledge on quantitative chemical analysis is very useful for the successful conduct of technical works related to engineering chemistry
	PO 5	2	A deep understanding of quantitative chemistry will help the engineering graduate to address the quantification of chemical errors in diverse engineering fields
	PO 12	3	Student will be able to apply the basic quantitative chemical analysis techniques in various studies.
CO 2	PO 1	3	Understanding the basic principle of chromatography techniques can be used to solve problems related to these fields in engineering stream
	PO 2	3	Basic knowledge on chromatography and organic polymers help to design and select resources for various engineering activities
	PO 12	3	Research based on chromatography and synthesis of organic polymers helps to design and reinforce the properties of engineering polymers
CO 3	PO 1	3	Knowledge on spectrochemical techniques such as IR and NMR help to find solutions to engineering problems like structure analysis of materials
	PO 2	3	Understanding the basic concepts of spectroscopic techniques can be utilized for the analysis of the structural identification of the materials of importance.
	PO 12	3	Information acquired on the structural identification of compounds can be used to perform studies to solve complex problems
CO 4	PO 1	3	To study the basic ideas of instrumental techniques for chemical analysis help to bridge the concept of theory of chemistry to practical applications in engineering fields
	PO 2	3	Students will be able to solve engineering problems related to instrumentational chemistry
	PO12	3	Gathered Information on the instrumental analysis in chemistry can be utilized to conduct studies to solve problems in modern engineering materials
CO 5	PO 1	3	With the basic information in chemical reactions, reaction conditions and safety of chemicals students can successfully design and conduct a chemical reaction of specific importance
	PO 2	1	By using the knowledge on chemical reagents and solvents efficacious design of an object or process in engineering field if possible.
	PO 12	3	Can Solve chemical engineering problems by the acquaintance of theories of basic chemical reactions
CO6	PO1	3	Doing lab experiments as a member of team help the students to communicate effectively and engage actively in future learning
	PO2	1	Team works during lab experiments facilitates students sharing attitude and helping mentality
	PO 12	3	With the help of basic knowledge in experiments on water chemistry can effectively use to solve problems related to waste water management and environmental pollution

Prepared by: Dr Manju George

Verified by: Jyothi P. Jose

3.1.1. Course Outcomes (COs)

COURSE CODE: ESL 120	COURSE NAME: CIVIL WORKSHOP	SEMESTER: 1/2

Pre-requisite:

Course Outcome: After the successful completion of this course, the student will be able to:

ESL120.1	Name different devices and tools used for civil engineering measurements
ESL120.2	Explain the use of various tools and devices for various field measurements
ESL120.3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.
ESL120.4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
ESL120.5	Compare different techniques and devices used in civil engineering measurements

3.1.2 CO-PO matrices of courses selected in 3.1.1

COURSE CODE: ESL120			COURSE NAME: CIVIL WORKSHOP									SEMESTER: 1/2		
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
ESL120.1	1	-	-	-	1	1	-	-	2	2	-	-	2	1
ESL120.2	1	-	-	-	1	1	-	-	2	2	-	-	2	1
ESL120.3	1	-	-	-	1	1	-	2	2	2	-	-	2	2
ESL120.4	1	-	-	-	1	1	-	2	2	2	-	-	2	2
ESL120.5	1	-	-	-	1	1	-	-	2	2	-	-	2	2
AVG.	**1**				**1**	**1**		**2**	**2**	**2**			**2**	**1.6**

JUSTIFICATION FOR CO-PO MAPPING:

CO	PO	LEVEL	REMARKS
ESL120.1	PO1	1	Enumerate the various tools and devices used in Civil Engineering measurements
	PO5	1	Understand the advanced surveying equipment used in Civil Engineering
	PO6	1	Define the various civil engineering tools and equipment used in real-life construction practices.
	PO9	2	Work effectively as individual or team while handling the different Civil Engineering tools and measuring devices
	PO10	2	Illustrate the measurements and readings obtained from the Civil Engineering equipment for the study of construction site and for further site plan.
	PSO1	2	Use the acquired knowledge on the various civil engineering equipment in Civil engineering practices.
	PSO2	1	Apply the knowledge in Civil Engineering Field practices to grow in profession.
ESL120.2	PO1	1	Enumerate the various tools and devices used in Civil Engineering measurements
	PO5	1	Understand the advanced surveying equipment used in Civil Engineering
	PO6	1	Apply the comprehension of civil engineering tools and equipment in real-life construction practices.
	PO9	2	Work effectively as individual or team while handling the different Civil Engineering tools and measuring devices
	PO10	2	Illustrate the measurements and readings obtained from the Civil Engineering equipment for the study of construction site and for further site plan.
	PSO1	2	Use the acquired knowledge on the various civil engineering equipment in Civil engineering practices.
	PSO2	1	Apply the knowledge in Civil Engineering Field practices to grow in profession.
ESL120.3	PO1	1	Understand the steps involved in various Civil Engineering practices
	PO5	1	Operate various civil engineering tools used in basic civil engineering activities like setting out.

	PO6	1	Apply the knowledge of basic civil engineering in real-life construction practices
	PO8	2	Apply ethical principles in the Construction field activities by following the building construction norms and regulations.
	PO9	2	Work effectively as individual or team while carrying out basic civil engineering experiments
	PO10	2	Illustrate the measurements and readings obtained from the Civil Engineering equipment for the study of construction site and for further site plan.
	PSO1	2	Use the acquired knowledge on the various civil engineering activities carried out in the field in Construction practices.
	PSO2	2	Apply the knowledge in Civil Engineering Field practices to grow in profession.
ESL120.4	PO1	1	Understand the various materials and methods used in Construction practices
	PO5	1	Apply the most appropriate construction practices and desired tools for basic civil engineering activities.
	PO6	1	Apply the comprehension of civil engineering tools and methods in real-life construction practices.
	PO8	2	Apply ethical principles in the Construction field activities by following the building construction norms and regulations.
	PO9	2	Work effectively as individual or team while handling the different Civil Engineering tools and measuring devices
	PO10	2	Illustrate the measurements and readings obtained from the Civil Engineering equipment for the study of construction site and for further site plan.
	PSO1	2	Use the acquired knowledge on the various civil engineering equipment in Civil engineering practices.
	PSO2	2	Apply the knowledge in Civil Engineering Field practices to grow in profession.
ESL 120.5	PO1	1	Understand the various materials and methods used in Construction practices
	PO5	1	Compare the various construction practices and tools used in basic civil engineering activities.
	PO6	1	Apply the best civil engineering tools and methods in real-life construction practices.

	PO9	2	Work effectively as individual or team while handling the different Civil Engineering tools and measuring devices
	PO10	2	Illustrate the measurements and readings obtained from the Civil Engineering equipment for the study of construction site and for further site plan.
	PSO1	2	Use the acquired knowledge on the various civil engineering equipment in Civil engineering practices.
	PSO2	2	Apply the knowledge in Civil Engineering Field practices to grow in profession.

Deepa V.
Department of Civil Engineering.

ST.JOSEPH'SCOLLEGEOFENGINEERINGANDTECHNOLOGY, PALAI

DEPARTMENTOFSCIENCE AND HUMANITIES

MAT 101	LINEAR ALGEBRA AND CALCULUS	L	T	P	CREDIT	Yearof Introduction
		3	1	0	4	2019

Prerequisite: A basic course in one-variable calculus and matrix theory.

Course Outcomes: After completion of the course the student will be able to:

CO 1	Solve systems of linear equations, diagonalize matrices and characterise quadratic forms
CO2	Compute the partial and total derivatives and maxima and minima of multivariable functions.
CO3	Compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas
CO4	Perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent
CO5	Determine the Taylor and Fourier series expansion of functions and learn their applications..

Mapping of course outcomes with program outcomes (Minimum requirement):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	2	1	-	-	1	2	-	2	1	-	-
CO2	3	3	3	3	2	1	-	-	1	2	-	2	1	-	-
CO3	3	3	3	3	2	1	-	-	1	2	-	2	1	-	-
CO4	3	2	3	2	1	1	-	-	1	2	-	2	1	-	-
CO5	3	3	3	3	2	1	-	-	1	2	-	2	1	-	-

3: HIGH **2: MEDIUM** **1: LOW**

Justification for CO-PO Mapping:

CO	PO	LEVEL	REMARKS
CO1	PO 1	3	By understanding the concept of matrix theory the students will be able to apply the knowledge in complex engineering problems.
	PO 2	3	By understanding the fundamental concept of matrix the students will be able to identify, formulate and analyze simple engineering problems.
	PO 3	3	By understanding the fundamental concept of diagonalization of matrices and quadratic forms the helps the student in lifelong learning in the context of technology change.
	PO4	3	By understanding the fundamental concept of matrix theory, the students will be able to do analysis and interpretation of data
	PO5	2	By understanding the fundamental concept of linear equations and matrix theory the students will be able to apply appropriate techniques in complex engineering activities.
	PO6	1	The knowledge of fundamental concept of matrix theory help to communicate effectively on complex engineering activities with the engineering community and with society at large.
	PO9	1	By understanding the concept of matrix theory the students will be able to engage in continuous learning.
	PO10	2	Understanding matrices helps students for writing effective reports.
	PO12	2	The matrix theory concepts helps students to adapt emerging Information and CommunicationTechnologies by providing innovative ideas andsolutions to novel problems that is identified.
	PSO1	1	The matrix theory concepts helps students to provide practice working towards fundamental knowledge of Electronics and communication engineering in the design analysis and development of various electronic systems.

CO2	PO 1	3	By understanding the fundamental concept of differential calculus of functions the students will be able to apply the knowledge in complex engineering problems.
	PO 2	3	By understanding the fundamental concept of differential calculus of functions the students will be able to apply the knowledge for analysis and interpretation of data.
	PO3	3	By understanding multivariable calculus the students will be able to model and study high dimensional systems.
	PO4	3	By understanding the multivariable calculus and differential equations the students will be able to explain natural phenomenon in good manner.
	PO5	2	By understanding the modern multivariable calculus the students will be able to apply appropriate techniques in complex engineering activities.
	PO6	1	By understanding the concept of differential equations the students will be able to engage in continuous learning.
	PO9	1	The knowledge of fundamental concept of differential equation help to communicate effectively on complex engineering activities
	PO10	2	The concept of multivariable calculus helps students to adapt emerging Information and Communication Technologies by providing innovative ideas and solutions to novel problems that is identified.
	PO12	2	The knowledge of multi variable calculus and differential equations help in designingsolutions to complex problems
	PSO1	1	The differential calculus helps the students to apply fundamental knowledge of Electronics and communication engineering in the design analysis and development of various electronic systems.
	PO 1	3	By understanding the fundamental concept of multiple integrals can be used to create mathematical models in order to arrive into an optimal solution.

CO3	PO 2	3	By understanding the fundamental concept of multiple integrals the students will be able to apply the knowledge for analysis and interpretation of data.
	PO 3	3	By understanding the concept of the double integrals helps in designing solutions for engineering problems
	PO 4	3	The knowledge of double integrals concepts helps the student in lifelong learning in the context of technology change.
	PO 5	2	By understanding the concept of integration can be used to create and apply appropriate techniques in solving engineering problems.
	PO 6	1	By understanding the concept of integration the students will be able to engage in continuous learning
	PO9	1	The knowledge of fundamental concept of integration helps to communicate effectively on complex engineering activities.
	PO10	2	Understanding integration helps students for writing effective reports.
	PO12	2	The concept of double integration helps students to adapt emerging Information and Communication Technologies by providing innovative ideas andsolutions to novel problems that is identified.
	PSO1	1	The concept of multiple integrals helps to apply fundamental knowledge of Electronics and communication engineering in the design analysis and development of various electronic systems.

CO4	PO 1	3	By understanding the infinite seriesthe student will be able to apply the knowledge on complex engineering problems.
	PO 2	2	By understanding infinite series, the student will be able to identify formulate and analyze simple engineering problems.
	PO 3	3	By understanding the evaluation of definite integrals and interpolation on given numerical data using standard numerical techniques, the student will be able to design solutions for simple engineering problems.
	PO4	2	The knowledge of infinite series provides technique for solving simple engineering problems.
	PO 5	1	The knowledge of fundamental concept of infinite series helps to communicate effectively on complex engineering activities
	PO 6	1	By understanding various tests can be applied to assess societal, legal and cultural issues.
	PO 9	1	By understanding infinite series the student will be able to engage in continuous learning.
	PO10	2	Understanding infinite series helps students for writing effective reports
	PO12	2	By understanding the concept of infinite series will enable students to engage in lifelong learning.
	PSO1	1	Apply infinite series to solve problems on Electronics and communication engineering in the design analysis and development of various electronic systems.
CO5	PO 1	3	By understanding the concept of Taylor series provides different techniques in solving engineering problems.
	PO 2	3	By understanding the fundamental concept of Taylor series the students will be able to apply the knowledge for analysis and interpretation of data.
	PO 3	3	By understanding the concept of Fourier series the students will be able to design system components.

PO 4	3	By understanding the concept of series helps the students to draw valid conclusions from the data
PO 5	2	Understanding the concept of series can be used to create and apply appropriate techniques in solving engineering problems.
PO 6	1	By understanding the concept of series make students to prepare effective reports and to make effective presentation
PO 9	1	By understanding the concept of Fourier series the students will be able to engage in continuous learning
PO10	2	Modern techniques are used in understanding the problems in the society
PO12	2	By understanding the concept of Fourier series the students will be able to cop- up with the technology change
PSO1	1	The concept of Fourier series helps to apply solve problems on Electronics and communication engineering in the design analysis and development of various electronic systems.

Bimi P
Bhuvana P

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ESL 130 : ELECTRICAL & ELECTRONICS WORKSHOP

Programme : **B.Tech**

Semester : **01/02**

Course Title : **ELECTRICAL & ELECTRONICS WORKSHOP**

Course Code : **ESL 130**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
ESL130.1	Demonstrate safety measures against electric shocks	K_2
ESL130.2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols	K_2
ESL130.3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings	K_2
ESL130.4	Identify and test various electronic components	K_2
ESL130.5	Draw circuit schematics with EDA tools	K_2
ESL130.6	Assemble and test electronic circuits on boards	K_2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
ESL130.1						3						1		
ESL130.2	2									1				
ESL130.3	2			1		1		1	2	2		2		
ESL130.4	3				1				2			2	1	1
ESL130.5	3				2			2	2			2	1	1
ESL130.6	3				2				2			1	1	
ESL130														

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO4 - PO1	3	Students are expected to utilize engineering knowledge for the identification and testing of various electronic components
CO4 - PO5	1	Students are expected to identify certain problems by understanding the testing of various electronic components
CO4 - PO9	2	Students are expected to function effectively as an individual and in a team during the identification and testing of various electronic components
CO4 – PO12	2	Identification and testing of various electronic components will help the students to develop the ability to engage in independent and life-long learning, in the broadest context of technological change.
CO4 - PSO1	1	Students are expected to apply the fundamental knowledge in identifying and testing of various electronic components, for the development of basic electronic systems
CO4 - PSO2	1	The usage of various instruments for testing the components will familiarize the students to use certain hardware tools
CO5 - PO1	3	Students are expected to apply the electronic circuit knowledge to draw the circuit schematic
CO5 - PO5	2	Students are expected to utilize the appropriate EDA softwares effectively to draw the circuit schematic.
CO5 - PO8	2	Students are expected to apply the ethical rules and commit to professional ethics in the laboratory.
CO5 - PO9	2	Students are expected to function effectively as an individual to obtain the expected outcome
CO5 - PO12	2	Use of the software tools enable the students to engage in independent and lifelong learning
CO5 – PSO1	1	Students are expected to apply fundamental knowledge of Electronics and Communication in electronic circuit design
CO5 - PSO2	1	Students are expected to use EDA software tools for the design of electronic circuits
CO6 - PO1	3	Students are expected to apply knowledge of Electronic circuits to rectify problems while assembling and testing electronic circuits on board.
CO6 - PO5	2	Students are expected to create, select, and apply appropriate techniques and resources, to assemble and test electronic circuits on board.
CO6 – PO9	2	Students are expected to design documentation of the various electronic circuit experiments, effectively as an individual and in a team.

CO6 - PO12	1	Students are expected to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the area of electronic circuits.
CO6 - PSO1	1	Students are expected to apply fundamental knowledge of Electronics circuits in the design, analysis and development of various electronic systems

Prepared by (Faculty Name & Signature) : DR. GIBY JOSE 10/10/20

Verified by : Stream Coordination Committee

10/10/20 Nitha. M. Biju

20/10/2020
Dr. Giby Jose
DAC convenor

ST.JOSEPH'S
COLLEGE OF ENGINEERING
AND TECHNOLOGY,
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DEPARTMENT OF CIVIL ENGINEERING

EST 110 ENGINEERING GRAPHICS

Semester : S1, S2

Course Title : **ENGINEERING GRAPHICS**

Course Code : EST 110

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
EST 110.1	CO1: Draw the projection of points and lines located in different quadrants	K3
EST 110.2	CO2: Prepare multiview orthographic projections of objects by visualizing them in different positions	K3
EST 110.3	CO3: Draw sectional views and develop surfaces of a given object	K3
EST 110.4	CO4: Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.	K3
EST 110.5	CO5: Convert 3D views to orthographic views	K3
EST 110.6	CO6: Obtain multiview projections and solid models of objects using CAD tools	K3

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EST 110.1	3	-	-	-	-	-	-	-	-	-	-	-	3	3
EST 110.2	3	-	-	-	-	-	-	-	-	-	-	-	3	3
EST 110.3	3	1	-	-	-	-	-	-	-	-	-	-	3	3
EST 110.4	3	-	-	-	-	-	-	-	-	1	-	-	3	3
EST 110.5	3	-	-	-	-	-	-	-	-	2	-	-	3	3
EST 110.6	3	-	-	-	3	-	-	-	-	3	-	-	3	3
EST 110	3	1	-	-	3	-	-	-	-	2	-	-	3	3

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	3	Graduates are able to apply Engineering fundamentals related to 2D orthographic projection of lines to develop Engineering drawings related to complex design problems.
CO2-PO1	3	Graduates are able to apply Engineering fundamentals related to 2D orthographic projection of solids to develop Engineering drawings related to complex design problems.
CO3- PO1	3	Graduate will be able to apply the concept of section to describe the concealed features of parts designed as a part of solution to Engineering problems.
CO3 –PO2	1	Graduate will be able to analysis and infer 3 Dimensional Models related to complex problems.
CO4 – PO1	3	Graduate will be able to apply knowledge related to isometric projection to develop 3 Dimensional models as a part of solution related to design problems.
CO4 – PO10	1	Graduate will be able to convey solutions for complex engineering problems in a better way using 3 dimensional models developed using the concept of perspective projection and isometric projection.
CO5 – PO1	3	Graduate will be convert 3 Dimensional models to 2 dimensional orthographic views for simplified solutions for design problems
CO5 – PO10	2	Graduate will be able to use simplified orthogonal views to describe delicate and complex features of a 3 Dimensional models.
CO6 - PO1	3	Usage of CAD software package will help graduates apply the Engineering knowledge related to orthographic projection to 2 Dimensional drawing sand 3 Dimensional models as a part of solutions to complex problems.
CO6-PO5	3	Use of Cad Software helps graduate to become familiar with the usage of modern IT tools for modeling solutions of complex Engineering Problems.
CO6-PO10	3	The exploded views of 3D models developed using a Cad software helps graduate to effectively convey order of assembly of different parts.
CO1 -PSO1 CO2 – PSO1 CO3-PSO1 CO4-PSO1 CO5-PSO1 CO6-PSO1	3	Graduates are able to understand how to apply orthographic projection of lines, simple solids, isometric projection of solids, 2D &3D drawings of CAD software packages, sections, developments and perspective projection of simple solids etc for sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.
CO1 -PSO2 CO2 – PSO2 CO3-PSO2 CO4-PSO2 CO5-PSO2 CO6-PSO2	3	Graduates are able to understand how to apply orthographic projection of lines, simple solids, isometric projection of solids, 2D &3D drawings of CAD software packages, sections, developments and perspective projection of simple solids etc for growing professionally in their careers.

010/10/2020

Prepared by (Faculty Name & Signature) :
Mr. Dinu George

Verified by : Stream Coordination Committee

10/10/2020

Course Outcomes (COs)

COURSE CODE: EST 120	COURSE NAME: BASICS OF CIVIL & MECHANICAL ENGINEERING	SEMESTER: 1

Pre-requisite: NIL

Course Outcome: After the successful completion of this course, the student will be able to:

EST120.1	Recall the role of civil engineer in society and to relate the various disciplines of civil engineering
EST 120.2	Explain different types of buildings, building components, building materials and building construction
EST 120.3	Describe the importance, objectives and principles of surveying
EST 120.4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps
EST 120.5	Discuss the materials, energy systems, water management and environment for green buildings

CO-PO matrices of courses selected

COURSE CODE: EST 120			COURSE NAME: INTRODUCTION TO CIVIL ENGINEERING									SEMESTER: 1		
CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EST120.1	3	-	-	-	-	3	2	2	-	-	-	-	1	1
EST120.2	3	2	-	1	3	-	-	3	-	-	-	-	1	1
EST120.3	3	2	-	-	3	-	-	-	2	-	-	-	1	1
EST120.4	3	2	-	-	3	-	-	-	2	-	-	-	2	1
EST120.5	3	2	-	-	3	2	3	-	2	-	-	-	2	1
AVG.	**3**	**2**	**-**	**1**	**3**	**2.5**	**2.5**	**2.5**	**2**	**-**	**-**	**-**	**1.4**	**1**

SAMPLE

JUSTIFICATION FOR CO-PO MAPPING:

CO	PO	LEVEL	REMARKS
EST120.1	PO1	3	Students will be able to know the role of a civil engineer in a society and understand the various fields of civil engineering such as structural, transportation, water resources, environmental engineering
	PO6	3	Students will be able to apply their knowledge to the society with respect to certain standards
	PO7	2	Students will be able to consider environmental impacts for a sustainable development
	PO8	2	Students can apply professional ethics and standards in the field of civil engineering
	PSO1	1	Students will be able to create a sustainable environment in all sectors of civil engineering which is fruitful to our society within industry, government and private practice
	PSO2	1	Students will be able to grow professionally with good technical skills, communication skills by keeping the professional ethics
EST120.2	PO1	3	Students will be able to know the various types of buildings, components, materials and construction methods
	PO2	2	Students will be able to analyse engineering problems related to buildings, components, materials and construction methods
	PO4	1	Students will be able to carry research/ field studies, experimental analysis on various types of buildings and its components
	PO5	3	Students will be able to apply appropriate techniques, modern technologies with the support of IT in designing, planning and implementation of a building project
	PO8	3	Students can apply professional ethics and mandatory standards in all phases of a civil engineering project to ensure the compliance on quality
	PSO1	1	Students will be able to create a sustainable environment in all sectors of civil engineering by selecting the suitable building materials, nature friendly designs etc.
	PSO2	1	Students will be able to think in a professional manner while implementing a building project
	PO1	3	Students will be able to know the various importance and objectives of

SAMPLE

EST120.3			surveying for a civil engineering project
	PO2	2	Students will be able to do preliminary survey in prior to the implementation of a civil engineering project
	PO5	3	Students will be able to apply appropriate techniques (Total station, Dumpy level), modern technologies with the support of IT, GIS, GPS platforms for surveying
	PO9	2	Students can adopt a participatory approach with good teamwork for effective surveying to minimize the errors
	PSO1	1	Students will be able to do surveying for civil engineering projects within industry, government and private practice, working towards a sustainable solution
	PSO2	1	Students will be able to think in a professional manner while doing surveying
EST120.4	PO1	3	Students will be able to apply the basic engineering knowledge to select infrastructure services, HVAC, elevators, escalators and ramps
	PO2	2	Students will be able to analyse the need, location and implementation of infrastructure services, HVAC, elevators, escalators and ramps in a building
	PO5	3	Students will be able to apply appropriate techniques, modern technologies with the support of IT for all indoor and outdoor infrastructure services
	PO9	2	Students can adopt a participatory approach for the planning and selection of basic infrastructure services
	PSO1	2	Students will be able to practice civil engineering within industry, government and private practice with various types of infrastructure services
	PSO2	1	Students will be able to grow professionally with good knowledge in implementing all types of indoor and outdoor infrastructure services
EST120.5	PO1	3	Students will be able to apply the basic engineering knowledge to design a green building by considering social, environmental aspects
	PO2	2	Students will be able to analyse the importance of green building concept to conserve energy, water etc.
	PO5	3	Students will be able to apply appropriate techniques, modern technologies with the support of IT for energy and water management aspects of green building
	PO6	2	Students will be able to contribute the concept of green building, energy

SAMPLE

			conservation, water conservation and apply their knowledge to the society with respect to certain standards
	PO7	3	Students will be able to consider environmental benefits for a sustainable development with respect to green building concept
	PO9	2	Students can adopt a participatory approach to give awareness on green buildings, energy conservation and water management practices
	PSO1	2	Students will be able to practice civil engineering within industry, government and private practice by applying green building concept
	PSO2	1	Students will be able to grow professionally with good knowledge in the field of green buildings

Department of
Mechanical
Engineering

SAMPLE

Department of Science & Humanities
CO–PSO Mapping

Department of Electronics & Communication Engineering

Semester : **First and Second**

Course Title : **Engineering Physics Lab**

Course Code : **PHL 120**

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 1	Develop analytical/experimental skills and impart prerequisite hands on experience forengineering laboratories	K3
CO 2	Understand the need for precise measurement practices for data recording	K3
CO 3	Understand the principle, concept, working and applications of relevant technologies andcomparison of results with theoretical calculations	K3
CO 4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics	K3
CO 5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results	K2

B. Tech Semester I&II/CS		
PH100	ENGINEERING PHYSICS	
The graduates of the program will be able to		Knowledge Level
PSO1	Apply fundamental knowledge of electronics and communication engineering in the design, analysis and development of various electronic systems.	K_3
PSO2	Use modern software tools in electronics engineering for the analysis of complex electronics systems.	K_3

Mapping of course outcomes with program outcomes

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	-	-	-	3	-	-	1	2	-	-	1	1	-	-
CO 2	3	-	-	-	3	-	-	1	2	-	-	1	1	-	-
CO 3	3	-	-	-	3	-	-	1	2	-	-	1	-	-	-
CO 4	3	-	-	-	3	-	-	1	2	-	-	1	1	1	-
CO 5	3	-	-	-	3	-	-	1	2	-	-	1	1	1	-
Average	3	-	-	-	3	-	-	1	2	-	-	1	1	1	-

Prepared by: Approved by:

Department of Science & Humanities
CO–PSO Mapping

PHL 120 ENGINEERING PHYSICS LAB

Department of Electronics & Communication Engineering

Semester : **First and Second**

Course Title : **Engineering Physics Lab**

Course Code : **PHL 120**

Justification

Mapping	LOW/ MEDIUM/ HIGH	Justification
CO1-PO1	HIGH	Designing of instruments, structures and analysis using tools requires fundamentals of oscillations, resonance and waves.
CO1-PO5	HIGH	Applying the theoretical knowledge of resonance and waves to design an conduct experiments for data interpretation.
CO1-PO8	LOW	Apply the principles of professional ethics by understanding the norms of engineering practice.
CO1-PO9	MEDIUM	To practice team work by combining individual responsibilities in various class room activities.
CO1-PO12	LOW	To understand the use of new technologies and relevant innovations in the respective branches.
CO1-PSO1	LOW	To develop experimental skills for analysing the fundamental concepts.
CO2-PO1	HIGH	Designing of instruments, structures and analysis tools require fundamentals of interference and diffraction engineering problems.
CO2-PO5	HIGH	Applying the theoretical knowledge of interference and diffraction to design and conduct experiments for data interpretation.
CO2-PO8	LOW	Apply the principles of professional ethics to various fields of engineering practice.
CO2-PO9	MEDIUM	To practice team work by combining individual responsibilities in various class room activities.
CO2-PO12	LOW	To understand the use of new technologies and relevant innovations in the respective branches.
CO2-PSO1	LOW	To Understand the need for precise measurement practices for data recording in various engineering problems.
CO3 -PO1	HIGH	Analyse the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices. E.g.: Wave-function and it's physical significance, Schrodinger equations and application to particle in a one-dimensional box, tunnelling, Quantum confinement, properties of nanomaterials.
CO3-PO5	HIGH	Use the principles of behaviour of matter in the atomic and sub atomic level and analyse the various microscopic processes in scientific devices and Nano structures.
CO3-PO8	LOW	Apply the principles of professional ethics to various fields of engineering practice.
CO3-PO9	MEDIUM	To practice team work by combining individual responsibilities in

Department of Science & Humanities
CO–PSO Mapping

		various class room activities.
CO3-PO12	LOW	To understand the use of new technologies and relevant innovations in the respective branches.
CO4-PO1	HIGH	Apply the fundamental knowledge of electricity and magnetism for solving various engineering problems.
CO4-PO5	HIGH	To practice effective communication by various presentations in class and laboratory sessions.
CO4-PO8	LOW	Apply the principles of professional ethics to various fields of engineering practice.
CO4-PO9	MEDIUM	To practice team work by combining individual responsibilities in various class room activities.
CO4-PO12	LOW	To understand the use of new technologies and relevant innovations in the respective branches.
CO4-PSO1	LOW	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics.
CO4-PSO2	LOW	To understand the principle, concept, working and applications in theoretical calculations.
CO5-PO1	HIGH	Application of photonics and fiber optics in various branches of engineering.
CO5-PO5	HIGH	Applying the theoretical knowledge of laser, photonics and fiber optics for data interpretation.
CO5-PO8	LOW	Apply the principles of professional ethics to various fields of engineering practice.
CO5-PO9	MEDIUM	To practice team work by combining individual responsibilities in various class room activities.
CO5-PO12	LOW	To understand the use of new technologies and relevant innovations in the respective branches.
CO5-PSO1	LOW	To develop basic communication skills through working in groups in performing the laboratory experiments in finding the results.
CO5-PSO2	LOW	To understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations by applying fundamental concepts.

Jiji Joseph

Name and Signature of the Faculty In-charge

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

HUT 101 LIFE SKILLS (2019 scheme)-

Semester : I

Course Title : **LIFE SKILLS**
Course Code : HUN 101

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
HUN101.1	Define and Identify different life skills required in personal and professional life	K_3
HUN101.2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.	K_3
HUN101.3	Explain the basic mechanics of effective communication and demonstrate these through presentations	K_2
HUN101.4	Take part in group discussions	K_5
HUN101.5	Use appropriate thinking and problem solving techniques to solve new problems	K_3
HUN101.6	Understand the basics of teamwork and leadership	K_6

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
HUN101.1	-	-	-	-	-	-	-	1	-	3	-	2	-	-
HUN101.2	-	-	-	-	-	-	-	-	-	1	-	3	-	-
HUN101.3	-	-	1	-	-	1	-	-	1	3	-	-	-	-
HUN101.4	-	-	-	-	-	-	-	-	-	3	-	1	1	-
HUN101.5	-	-	1	-	-	-	-	-	2	3	-	-	-	-
HUN101.6	1	-	-	-	-	1	-	-	1	3	-	-	1	-
	1	-	1	-	-	1	-	1	1	3	-	2	1	-

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JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO6 – PO1	1	Graduate will be able to understand the significance of teamwork in bringing solutions to complex engineering problems
CO3 – PO3	1	Graduate will be able to comprehend the need for effective communication and its significance in understanding the specified needs in designing a system with needed consideration
CO5 – PO3	1	Graduate will be able to apply the appropriate approach in developing novel solution to engineering problems taking into account the cultural, societal and environmental considerations.
CO3 – PO6	1	Graduate will be able to develop effective presentation based on the reasoning applied on information obtained from contextual knowledge
CO6- PO6	1	Graduates will be able to understand the implications of teamwork and effective leadership to help in reaching plausible conclusions taking appropriate considerations
CO1-PO8	1	Graduates will be able to the right moral and ethical values that are close to their core values to help develop themselves as better professionals
CO3 – PO9	1	Graduates will understand the need for effective communication to work effectively in a team.
CO5- PO9	2	Graduate will able to apply the techniques required as an individual or as a team member to create effective presentation
CO6-PO9	1	Graduate will understand the need for teamwork and leadership skills to effectively work in a team or as an individual
CO1-PO10	3	Graduate will be able to identify the right skill that needs to be developed in communicating effectively in complex engineering problems
CO2-PO10	1	Graduate will be able to develop the skills needed to understand the way in communicating and comprehending to the other member in his/her team
CO3-PO10	3	Graduate will be able to communicative effectively in engineering activites by developing the needed understanding to set up an effective presentation
CO4-PO10	3	Graduate will be able to display healthy participation in group discussions in developing effective solution
CO5-PO10	3	Graduate will be able to apply appropriate thinking technique to develop design documentation and reports
CO6-PO10	3	Graduate able to understand the basic function of team/group and how effective communications plays a part in it

CO1-PO12	2	Graduates will be able to recognize the need for developing life skills in their life that would culminate to importance of life-long learning for their professional life
CO2-PO12	3	Graduates will be able to understand the methods of self-awareness and managing of stress to help him/her better equip for independent and life – long learning
CO4-PO12	1	Graduate will be able to discuss his/her ideas related to technology and its advancement effectively that would channel towards the right direction for research
CO4-PSO1	1	Graduate will understand the significance of effective group discussion to help in design of complex electronic systems
CO6-PSO1	1	Graduate will understand the need for teamwork and leadership in design of complex electronic systems

Prepared by (Faculty Name & Signature) : Rincy Mariam Varkey 20/10/20

Verified by : Stream Coordination Committee

20/10/20

20/10/2020
Dr. Gibu Jose
DAC convenor

CO2-PO11	1	Graduate should able to utilize various reading skills to demonstrate knowledge and understanding of engineering principles
CO3-PO11	1	Graduate need to effectively create technical presentation to demonstrate their acquired knowledge through effective presentation
CO1-PO12	3	Graduate need to develop vocabulary and language skills relevant to engineering as a professional to engage in life long learning
CO2-PO12	3	Graduate need to analyze , interpret & effectively summarize a variety of textual content to effectively engage in life long learning
CO4-PO12	1	Graduate need to discuss technical solution related to complex engineering problems to advance in research and development
CO4-PSO1	1	Graduate need to conduct effective group discussion to develop complex electronic systems
CO3-PSO1	1	Graduate need to effectively create technical presentation to convey ideas and solutions to develop electronic systems
CO6-PSO1	1	Graduates need to create professional & technical document that will help the team to understand design of electronic system
CO2-PSO1	1	Graduate need to apply reading techniques to analyze and interpret textual content for development of electronic systems

Prepared by (Faculty Name & Signature) : Reeja Mary Varkey 10/10/20

Verified by : Stream Coordination Committee

10/10/20

20/10/2020
Dr. Gibu Jose
DAC convenor



ST. JOSEPH'S
COLLEGE OF ENGINEERING
AND TECHNOLOGY,
-PALAI-

Administered by Diocese of Palai | Approved by AICTE | Affiliated to APJAKTU | An ISO 9001-2015 certified college

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

HUT 101 LIFE SKILLS (2019 scheme)-

Semester : I

Course Title : LIFE SKILLS
Course Code : HUN 101

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
HUN101.1	Define and Identify different life skills required in personal and professional life	K_3
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HUN101.3	Explain the basic mechanics of effective communication and demonstrate these through presentations	K_2
HUN101.4	Take part in group discussions	K_5
HUN101.5	Use appropriate thinking and problem solving techniques to solve new problems	K_3
HUN101.6	Understand the basics of teamwork and leadership	K_6

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
HUN101.1	-	-	-	-	-	-	-	1	-	3	-	2	-	-
HUN101.2	-	-	-	-	-	-	-	-	-	1	-	3	-	-
HUN101.3	-	-	1	-	-	1	-	-	1	3	-	-	-	-
HUN101.4	-	-	-	-	-	-	-	-	-	3	-	1	1	-
HUN101.5	-	-	1	-	-	-	-	-	2	3	-	-	-	-
HUN101.6	1	-	-	-	-	1	-	-	1	3	-	-	1	-
	1	-	1	-	-	1	-	1	1	3	-	2	1	-

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JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO6 – PO1	1	Graduate will be able to understand the significance of teamwork in bringing solutions to complex engineering problems
CO3 – PO3	1	Graduate will be able to comprehend the need for effective communication and its significance in understanding the specified needs in designing a system with needed consideration
CO5 – PO3	1	Graduate will be able to apply the appropriate approach in developing novel solution to engineering problems taking into account the cultural, societal and environmental considerations.
CO3 – PO6	1	Graduate will be able to develop effective presentation based on the reasoning applied on information obtained from contextual knowledge
CO6- PO6	1	Graduates will be able to understand the implications of teamwork and effective leadership to help in reaching plausible conclusions taking appropriate considerations
CO1-PO8	1	Graduates will be able to the right moral and ethical values that are close to their core values to help develop themselves as better professionals
CO3 – PO9	1	Graduates will understand the need for effective communication to work effectively in a team.
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CO1-PO10	3	Graduate will be able to identify the right skill that needs to be developed in communicating effectively in complex engineering problems
CO2-PO10	1	Graduate will be able to develop the skills needed to understand the way in communicating and comprehending to the other member in his/her team
CO3-PO10	3	Graduate will be able to communicative effectively in engineering activites by developing the needed understanding to set up an effective presentation
CO4-PO10	3	Graduate will be able to display healthy participation in group discussions in developing effective solution
CO5-PO10	3	Graduate will be able to apply appropriate thinking technique to develop design documentation and reports
CO6-PO10	3	Graduate able to understand the basic function of team/group and how effective communications plays a part in it

CO1-PO12	2	Graduates will be able to recognize the need for developing life skills in their life that would culminate to importance of life-long learning for their professional life
CO2-PO12	3	Graduates will be able to understand the methods of self-awareness and managing of stress to help him/her better equip for independent and life – long learning
CO4-PO12	1	Graduate will be able to discuss his/her ideas related to technology and its advancement effectively that would channel towards the right direction for research
CO4-PSO1	1	Graduate will understand the significance of effective group discussion to help in design of complex electronic systems
CO6-PSO1	1	Graduate will understand the need for teamwork and leadership in design of complex electronic systems

Prepared by (Faculty Name & Signature) : Rincy Merrin Varkey 20/10/20

Verified by : Stream Coordination Committee

20/10/20

20/10/2020
Dr. Gibu Jose
DAC convenor

ST. JOSEPH'S COLLEGE OF ENGINEERING AND TECHNOLOGY, PALAI

DEPARTMENT OF CIVIL ENGINEERING

EST	ENGINEERING	L	T	P	CREDIT	Year of Introduction
100	MECHANICS	2	1	0	3	2019

Prerequisite: Nil

Course Outcomes: After completion of the course the student will be able to:

CO 1	Recall principles and theorems related to rigid body mechanics
CO 2	Identify and describe the components of system of forces acting on the rigid body.
CO 3	Apply the conditions of equilibrium to various practical problems involving different force system
CO 4	Choose appropriate theorems, principles or formulae to solve problems of mechanics
CO 5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses

Mapping of course outcomes with program outcomes (Minimum requirement)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	2	2	-	-	-	-	-	-	-	-	-	-	2	2
CO 2	3	3	-	-	-	-	-	-	-	-	-	-	3	2
CO 3	3	3	-	-	-	-	-	-	-	-	-	-	3	2
CO 4	3	3	-	-	-	-	-	-	-	-	-	-	3	2
CO 5	3	3	-	-	-	-	-	-	-	-	-	-	3	2

Justification for CO-PO Mapping.

CO	PO	LEVEL	REMARKS
CO 1	PO 1	2	The student will be able to solve complex engineering problems.
	PO 2	2	The student will be able to solve complex engineering problems.
	PSO 1	2	Students will be able to gain knowledge on basic problems and to work in the field of civil engineering.
	PSO 2	2	Students will be able to gain knowledge on analyzing problems which help them to grow professionally in their career.
CO 2	PO 1	3	The knowledge of representing and solving problems in three dimensions.
	PO 2	3	The knowledge of representing and solving problems in three dimensions.
	PSO 1	3	Students will be able to gain knowledge on basic design methods.
	PSO 2	2	Students will be able to gain knowledge on structural members which enable them to work in their career.
CO 3	PO 1	3	The idea of properties of different cross sections that an engineer has to encounter in professional life is an important engineering knowledge.
	PO 2	3	The idea of properties of different cross sections that an engineer has to encounter in professional life is an important engineering knowledge.
	PSO 1	3	Students will be able to gain knowledge which help them to work in civil engineering.
	PSO 2	2	Students will be able to gain knowledge which help in their career.

CO 4	PO 1	3	Students will be able to apply appropriate theorems to solve the problems.
	PO 2	3	Students will be able to apply the principles or formulae for solving the problems
	PSO 1	3	Students will be able to gain knowledge which help in their career.
	PSO 2	2	Students will be able to gain knowledge in design methods.
CO 5	PO 1	3	Students will be able to solve problems on rigid bodies.
	PO 2	3	Students will be able to solve problems by applying the properties of distributed areas and masses.
	PSO 1	3	Students will be able to gain knowledge which help in their career.
	PSO 2	2	Students will be able to gain knowledge in design methods.

Deepa
01/10/2020
Deepa.

ST. JOSEPH'S COLLEGE OF ENGINEERING AND TECHNOLOGY, PALAI

DEPARTMENT OF SCIENCE AND HUMANITIES

MAT 102	Vector calculus, Differential equation and Transforms	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

Prerequisite: Calculus of single and multi- variable functions

Course Outcomes: After completion of the course the student will be able to:

CO 1	Compute the derivatives and line integrals of vector functions and learn their applications
CO 2	Evaluate surface and volume integrals and learn their inter relations and application
CO 3	Solve homogeneous and non- homogeneous linear differential equation with constant coefficient
CO 4	Compute Laplace transform and apply them to solve ODEs arising in engineering
CO 5	Determine the Fourier transform of functions and apply them to solve problems arising in engineering

Mapping of course outcomes with program outcomes (Minimum requirement)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	3	3	3	2	1	-	-	1	2	-	2	1		
CO 2	3	3	3	3	2	1	-	-	1	2	-	2	1		
CO 3	3	3	3	3	2	1	-	-	1	2	-	2	1		
CO 4	3	3	3	3	2	1	-	-	1	2	-	2	1		
CO 5	3	3	3	3	2	1	-	-	1	2	-	2	1		

3: HIGH 2: MEDIUM 1: LOW

Justification for CO-PO Mapping.

CO	PO	LEVEL	REMARKS
CO 1	PO 1	3	By understanding the modern theory of vector calculus students will be able to apply the knowledge in complex engineering problems.
	PO 2	3	By understanding the vector calculus students will be able to identify, formulate and analyze simple engineering problems.
	PO 3	3	By understanding the differential equation students will be able to design solutions for very simple engineering problems.
	PO4	3	By understanding the vector calculus students will be able to use research knowledge for the analysis and interpretation of data.
	PO5	2	By understanding the vector calculus students will be able to use modern tools
	PO6	1	By understanding derivatives students will be able to communicate on complex engineering activities with the engineering community.
	PO9	1	By understanding derivatives students will be able to engage in continuous learning.
	PO10	2	By understanding vector calculus and derivatives the student will be able to communicate effectively on complex engineering activities with the engineering community.
	PO12	2	By understanding derivatives the student will be able to engage in continuous learning.
	PSO1	1	By understanding vector calculus and derivatives the student will be able to get a knowledge of their applications in the design, analysis and development of various electronic system
CO 2	PO 1	3	By understanding surface and volume integrals the students will be able to apply the knowledge in complex engineering problems.
	PO 2	3	By understanding the surface and volume integrals the students will be able to apply identify, formulate and analyze simple engineering problems.
	PO3	3	By understanding the surface and volume integrals students will be able to design solutions for very simple engineering problems.
	PO4	3	By understanding the volume and surface integrals students will be able to use research knowledge for the analysis and interpretation of data.

	PO5	2	By understanding the volume and surface integrals students will be able to use modern tools
	PO6	1	By understanding the volume and surface integrals students will be able to communicate on complex engineering activities with the engineering community and with the society.
	PO9	1	By understanding the volume and surface integrals students will be able to engage in continuous learning.
	PO10	2	By understanding the surface and volume integrals and learn their inter relations and application the student will be able to communicate effectively on complex engineering activities with the engineering community.
	PO12	2	By understanding the surface and volume integrals the students will be able to engage in continuous learning
	PSO1	1	By understanding the surface and volume integrals the students will be able to get a knowledge of their applications in the design, analysis and development of various electronic system
CO 3	PO 1	3	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be able to apply the knowledge to find solution of complex engineering problems.
	PO 2	3	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be able to identify, analyze and make conclusions of simple engineering problems.
	PO 3	3	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be able to design solutions for simple engineering problems.
	PO 4	3	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be able to conduct investigations of complex problems and provide valid conclusions.
	PO 5	2	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be able to use modern tools like R for the implementation of concepts.
	PO 6	1	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be able to communicate effectively on complex engineering activities with the engineering community.

PO9	1	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be able to engage in continuous learning.
PO10	2	By understanding homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be able to communicate effectively about the numerical methods to the engineering community.
PO12	2	By understanding the homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be able to engage in continuous learning.
PSO1	1	By understanding the homogeneous and non- homogeneous linear differential equation with constant coefficient the student will be able to get a knowledge of their applications in the design, analysis and development of various electronic system

10/10/2020

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CO 4	PO 1	3	By understanding the Laplace transform the student will be able to apply the knowledge on complex engineering problems.
	PO 2	3	By understanding the Laplace transform the student will be able to identify formulate and analyze simple engineering problems.
	PO 3	3	By understanding the Laplace transform the student will be able to design solutions for simple engineering problems.
	PO4	3	By understanding the Laplace transform the student will be able to use research knowledge for the analysis and interpretation of data.
	PO 5	2	By understanding the Laplace transform, the student will be able to use modern tools like Matlab, Mathematica, Maple etc. for the implementation of concepts.
	PO 6	1	By understanding the Laplace transform the student will be able to communicate effectively about the numerical methods to the engineering community.
	PO 9	1	By understanding the Laplace transform the student will be able to engage in continuous learning.
	PO10	2	By understanding the Laplace transform the students will be able to communicate effectively on complex engineering activities with the engineering community.
	PO12	2	By understanding the Laplace transform the students will be able to the student will be able to engage in continuous learning.
	PSO1	1	By understanding the Laplace transform the student will be able to get a knowledge of their applications in the design, analysis and development of various electronic system
CO 5	PO 1	3	By understanding the Fourier transform and functions the students will be able to apply the knowledge on complex engineering problems..
	PO 2	3	By understanding the Fourier transform and functions the students will be able to the student will be able to identify formulate and analyze simple engineering problems.
	PO 3	3	By understanding the Fourier transform and functions the students will be able to the student will be able to design solutions for simple engineering problems.
	PO 4	3	By understanding the Fourier transform and functions the students will be able to the student will be able to use research knowledge for the analysis and interpretation of data.
	PO 5	2	By understanding the Fourier transform and functions the students will be able to the student will be able to use modern tools for the implementation of concepts.

PO 6	1	By understanding the Fourier transform and functions the students will be able to the student will be able to communicate effectively on complex engineering activities with the engineering community.
PO 9	1	By understanding the Fourier transform and functions the students will be able to the student will be able to engage in continuous learning.
PO10	2	By understanding the Fourier transform and functions the students will be able to communicate effectively on complex engineering activities with the engineering community.
PO12	2	By understanding the Fourier transform and functions the student will be able to engage in continuous learning.
PSO1	1	By understanding the Fourier transform and functions the students will be able to get a knowledge of their applications in the design, analysis and development of various electronic system

Faculty Name & Signature :-

Verified by

Athira Vanugopal

ST.JOSEPH'S
COLLEGE OF ENGINEERING AND TECHNOLOGY,
-PALAI-

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EST 130 Basics of Electronics Engineering

Semester : **Two**

Course Title : **Basics of Electronics Engineering**

Course Code : **EST 130**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 1	Understand basic knowledge of components used in electronics	K1
CO 2	Describe working of a voltage amplifier	K2
CO 3	Outline the principle of an electronic instrumentation system	K1
CO 4	Explain the principle of radio and cellular communication	K2
CO 5	Simulate basic electronic circuits	K2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	1	1	-	-	-	-	-	-	-	-	-	-	1	-
CO 2	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CO 3	2	-	-	-	-	-	-	-	-	-	-	2	1	-
CO 4	2	-	-	-	-	-	-	-	-	-	-	2	2	-
CO 5	2	-	-	-	2	-	-	-	-	-	-	2	-	2
EST 130	**1.8**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1.5**	**2**

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 – PO1	1	Knowledge in electronic components will improve engineering skills.
CO 1 – PO2	1	Knowledge in electronic components will help to formulate engineering problems.
CO1 – PSO1	1	Fundamental knowledge in electronic components will help in the design, analysis and development of various electronic systems.
CO2 – PO1	2	Fundamental knowledge in voltage amplifier can be applied to the solution of various engineering problems.
CO2 – PSO1	2	Fundamental knowledge in voltage amplifiers will help in the design, analysis and development of various electronic systems.
CO3 – PO1	2	Basic knowledge in electronic instrumentation systems will help to find various problems in engineering fields.
CO3 – PO12	2	Motivate the students to improve their knowledge to adapt to technological changes.
CO3 – PSO1	1	Will help to design and analyze electronic systems.
CO4 – PO1	2	Knowledge in the principle of radio and cellular communication will improve engineering skills.
CO4 – PO12	2	Motivate the students to improve their knowledge to adapt technological changes.
CO4 – PSO1	2	Will help to design and develop communication systems.
CO5 – PO1	2	Will help to finding solutions for complex engineering problems.
CO5 – PO5	2	Will help to model complex electronic circuits.
CO5 – PO12	2	Motivate the students to improve their knowledge to adapt technological changes.
CO5 – PSO2	2	Will help to analyze complex electronic circuits

Prepared by (Faculty Name & Signature) : DR. GIBY JOSE 10/10/20

Verified by : Stream Coordination Committee 10/10/20 Nithe. M. Biju.

20/10/2020
Dr. Giby Jose
DAL convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

HUN 102 PROFESSIONAL COMMUNICATION (2019 scheme)-

Semester : II

Course Title : **PROFESSOINAL COMMUNICATION**
Course Code : HUN 102

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
HUN102.1	Develop vocabulary and language skills relevant to engineering as a professional	K_3
HUN102.2	Analyze , interpret & effectively summarize a variety of textual content	K_3
HUN102.3	Create effective technical presentation	K_2
HUN102.4	Discuss a given technical /non-technical topics in a group setting and arrive at generalization /consensus	K_5
HUN102.5	Identify drawbacks in listening patterns and apply listening techniques for specific needs	K_3
HUN102.6	create professional & technical document that are clear and adhering to all the necessary conventions	K_6

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
HUN101.1	-	-	-	-	-	2	-	-	2	2	1	3		
HUN101.2	1	1	-	-	-	-	-	-	3	-	-	3	1	
HUN101.3	-	-	-	-	-	1	-	-	1	3	1	-	1	
HUN101.4	1	2	-	-	-	-	-	-	-	2	1	1	1	
HUN101.5	-	3	2	1	-	-	-	-	-	1	-	1		
HUN101.6	-	-	-	-	-	1	-	-	2	3	-	1	1	
C210	1	2	2	1	-	1.33	-	-	2	2.2	1	1.8	1	

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

HUN 102 PROFESSIONAL COMMUNICATION (2019 scheme)-

Semester : II

Course Title : **PROFESSOINAL COMMUNICATION**

Course Code : HUN 102

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
HUN102.1	Develop vocabulary and language skills relevant to engineering as a professional	K_3
HUN102.2	Analyze , interpret & effectively summarize a variety of textual content	K_3
HUN102.3	Create effective technical presentation	K_2
HUN102.4	Discuss a given technical /non-technical topics in a group setting and arrive at generalization /consensus	K_5
HUN102.5	Identify drawbacks in listening patterns and apply listening techniques for specific needs	K_3
HUN102.6	create professional & technical document that are clear and adhering to all the necessary conventions	K_6

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
HUN101.1	-	-	-	-	-	2	-	-	2	2	1	3		
HUN101.2	1	1	-	-	-	-	-	-	3	-	-	3	1	
HUN101.3	-	-	-	-	-	1	-	-	1	3	1	-	1	
HUN101.4	1	2	-	-	-	-	-	-	-	2	1	1	1	
HUN101.5	-	3	2	1	-	-	-	-	-	1	-	1		
HUN101.6	-	-	-	-	-	1	-	-	2	3	-	1	1	
C210	1	2	2	1	-	1.33	-	-	2	2.2	1	1.8	1	

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JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO2-PO1	1	Graduate will be able to apply different reading styles to analyze , interpret & effectively summarize a variety of textual content
CO4-PO1	1	Graduate need to effectively conduct healthy group discussion to analyses ,understand and learn various methodologies towards efficient electronic system design
CO2-PO2	1	Graduate need to develop reading skills in order to develop sustained conclusions to complex engineering problems
CO4-PO2	2	Graduate need to actively involve in group discussions to able to arrive at optimal conclusion towards development of electronics system
CO5 – PO2	3	Graduate need to apply proper listening skills and analyze them to constructively contribute to sustained conclusions to complex engineering problems
CO5 – PO3	2	Graduate need to implement appropriate listening skills to understand the specified needs to find solution for complex engineering problems
CO5 – PO4	1	Graduate need to apply listening skills for synthesis of information to provide valid conclusion
CO1 – PO6	2	Graduate should be able to understand the textual content given to assess societal, health and legal issues
CO3- PO6	1	Graduate should be able to create technical presentation based on contextual knowledge to convey societal, health and legal issues
CO6- PO6	1	Graduate need to create technical document that convey the textual knowledge associated to an engineering system
CO1 – PO9	2	Graduate need to effectively communicate as a member or leader of a team to constructively work towards providing solution for engineering problems
CO2- PO9	3	Graduate need to effectively summarize ,analyses and interpret the textual content in order to function effectively in a team
CO3-PO9	1	Graduate need to effectively create technical presentation to convey ideas and solutions in a team
CO6-PO9	3	Graduates need to create professional & technical document that will help the team or indiviual work effectively
CO1-PO10	2	Graduate need to effectively communicate using language effectively to comprehend and write effective report
CO3-PO10	3	Graduate need to effectively create technical presentation to convey ideas
CO4-PO10	1	Graduate need to discuss technical solution related to complex engineering topics in a group setting and arrive at generalization /consensus
CO1-PO11	1	Graduate needs to communicate effectively knowledge and understanding of engineering principles in order to manage projects

CO2-PO11	1	Graduate should able to utilize various reading skills to demonstrate knowledge and understanding of engineering principles
CO3-PO11	1	Graduate need to effectively create technical presentation to demonstrate their acquired knowledge through effective presentation
CO1-PO12	3	Graduate need to develop vocabulary and language skills relevant to engineering as a professional to engage in life long learning
CO2-PO12	3	Graduate need to analyze , interpret & effectively summarize a variety of textual content to effectively engage in life long learning
CO4-PO12	1	Graduate need to.discuss technical solution related to complex engineering problems to advance in research and development
CO4-PSO1	1	Graduate need to conduct effective group discussion to develop complex electronic systems
CO3-PSO1	1	Graduate need to effectively create technical presentation to convey ideas and solutions to develop electronic systems
CO6-PSO1	1	Graduates need to create professional & technical document that will help the team to understand design of electronic system
CO2-PSO1	1	Graduate need to apply reading techniques to analyze and interpret textual content for development of electronic systems

Prepared by (Faculty Name & Signature) : Rag Mary Varky 10/10/20

Verified by : Stream Coordination Committee

10/10/20

20/10/2020
Dr. Gibu Jose
DAC convenor

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Department of Electronics and Communication Engineering

Programme : Bachelor of Technology
Course Code: HUT 200
Course Name Professional Ethics
Semester: 3

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
HUT200.1	Understand the core values that shape the ethical behaviour of a professional.	K2
HUT200.2	Adopt a good character and follow an ethical life.	K2
HUT200.3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.	K2
HUT200.4	Solve moral and ethical problems through exploration and assessment by established experiments.	K2
HUT200.5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.	K2

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-
CO3	-	-	-	-	-	-	-	3	-	-	2	-	-	-	-
CO4	-	-	-	-	-	-	-	3	-	-	2	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	2	-	-	-	-
AVG	-	-	-	-	-	-	-	2.6	-	-	2	-	-	-	-

Correlation : 1-Low, 2-Moderate, 3-High, No Correlation '-'

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Department of Electronics and Communication Engineering

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
CO1-PO8	2	By understanding the core values that shape the ethical behavior of a professional, the student will be able to apply ethical norms into engineering practices.
CO2-PO8	2	By applying ethical principles, students will be able to shoulder responsibilities with professional commitment.
CO3-PO8	3	By keeping personal ethics and legal ethics, students will be able to put ethical principles in engineering practices.
CO4-PO8	3	By following ethical and moral assessment, students will be able to develop responsible norms in engineering practices.
CO5-PO8	3	The student can adopt human and social values in solving contemporary global issues confronting and engineer.
CO1-PO11	2	By understanding the core values that shape ethical behavior of an individual, the student will be able to demonstrate engineering and management principles in teamwork in multidisciplinary environments
CO2-PO11	2	By adopting good character based on ethical values , students will be able to perform well as team leaders in engineering and management responsibilities.
CO3- PO11	2	By following personal ethics and legal ethics, students will be able to become successful engineer and management professionals..

Department of Electronics and Communication Engineering

CO4-PO11	2	Through exploration and assessment by established experiments, students will be able to excel in project management and finance.
CO5- PO11	2	By applying knowledge of human values and social values, students will be able to apply them in his / her own work either as a team leader or as a team member.

5/7/21 Vijayalakshmi.G

Prepared by (Faculty Name & Signature) : VIJAYALEKSHMI.G

Verified by : Stream Coordination Committee 5/7/21 SUNITHA S PILLAI

15/07/2021
Dr. Ruby Jose
DAC convenor

ST. JOSEPH'S COLLEGE OF ENGINEERING AND TECHNOLOGY, PALAI

DEPARTMENT OF SCIENCE AND HUMANITIES

MAT 201	PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

Prerequisite: Nil

Course Outcomes: After completion of the course the student will be able to:

CO 1	Understand the concept and the solution of partial differential equation
CO 2	Analyse and solve one dimensional wave equation and heat equation.
CO 3	Understand complex functions, its continuity differentiability with the use of Cauchy Riemann equations.
CO 4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function.
CO 5	Understand the series expansion of complex function about a singularity and Apply residue theorem to compute several kinds of real integrals.

Mapping of course outcomes with program outcomes (Minimum requirement)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO 1	3	3	3	3	2	1	-	-	-	2	-	2	1		
CO 2	3	3	3	3	2	1	-	-	-	2	-	2	1		
CO 3	3	3	3	3	2	1	-	-	-	2	-	2	1		
CO 4	3	3	3	3	2	1	-	-	-	2	-	2	1		
CO 5	3	3	3	3	2	1	-	-	-	2	-	2	1		

3: HIGH 2: MEDIUM 1: LOW

Justification for CO-PO Mapping.

CO	PO	LEVEL	REMARKS
CO 1	PO 1	3	By understanding the concept and solution of partial differential equations students will be able to apply the knowledge in complex engineering problems.
	PO 2	3	By understanding the concept and solution of partial differential equations students will be able to identify, formulate and analyse simple engineering problems.
	PO 3	3	By understanding the concept and solution of partial differential equations students will be able to develop solutions for very simple engineering problems.
	PO4	3	By understanding the concept and solution of partial differential equations students will be able to use research knowledge for the analysis and interpretation of data.
	PO5	2	By understanding the concept and solution of partial differential equations students will be able to use modern tools like Matlab for the implementation of concepts.
	PO6	1	By understanding the concept and solution of partial differential equations students will be able to solve real-life engineering problems, design and development of innovative and cost-effective products exhibiting a solid foundation in electronics and engineering fundamentals to cater needs of society.
	PO10	2	By understanding the concept and solution of partial differential equations students will be able to communicate on complex engineering activities with the engineering community.
	PO12	2	By understanding the concept and solution of partial differential equations students will be able to engage in continuous learning.
	PSO1	1	By understanding the concept and solution of partial differential equations students will be able to get a knowledge of their applications in the design, analysis and development of various electronic system
CO 2	PO 1	3	By understanding the concept and solution of wave and heat equations students will be able to apply the knowledge in complex engineering problems.
	PO 2	3	By understanding how to solve solve one dimensional wave equation and heat equation, the students will be able to apply identify, formulate and analyze simple engineering problems.

	PO3	3	By understanding the modern theory of continuous probability distribution students will be able to design solutions for very simple engineering problems.
	PO4	3	By understanding how to solve one dimensional wave equation and heat equation students will be able to use research knowledge for the analysis and interpretation of data.
	PO5	2	By understanding how to solve one dimensional wave equation and heat equation students will be able to use modern tools for the implementation of concepts
	PO6	1	By understanding how to solve one dimensional wave equation and heat equation students will be able to communicate on complex engineering activities with the engineering community and with the society.
	PO10	2	By understanding the concept and solution of partial differential equations students will be able to communicate on complex engineering activities with the engineering community.
	PO12	2	By understanding how to solve one dimensional wave equation and heat equation students will be able to engage in continuous learning.
	PSO1	1	By understanding how to solve one dimensional wave equation and heat equation students will be able to get a knowledge of their applications in the design, analysis and development of various electronic system
			.
CO 3	PO 1	3	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, students will be able to apply the knowledge to find solution of complex engineering problems.
	PO 2	3	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to identify, analyze and make conclusions of simple engineering problems.
	PO 3	3	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to design solutions for simple engineering problems.
	PO 4	3	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to conduct investigations of complex problems and provide valid conclusions.

	PO 5	2	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to use modern tools like R for the implementation of concepts.
	PO 6	1	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to communicate effectively on complex engineering activities with the engineering community.
	PO10	2	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to engage in continuous learning.
	PO12	2	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations students will be able to engage in continuous learning.
	PSO1	1	By understanding complex functions, its continuity, differentiability with the use of Cauchy- Reimann equations, the student will be able to get a knowledge of their applications in the design, analysis and development of various electronic system .

CO 4	PO 1	3	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, the student will be able to apply the knowledge on complex engineering problems.
	PO 2	3	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, the student will be able to identify formulate and analyze simple engineering problems.
	PO 3	3	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, the student will be able to design solutions for simple engineering problems.
	PO 4	3	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, the student will be able to use research knowledge for the

			analysis and interpretation of data.
	PO 5	2	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, the student will be able to use modern tools like Matlab, Mathematica, Maple etc. for the implementation of concepts.
	PO 6	1	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, the student will be able to communicate effectively on complex engineering activities with the engineering community.
	PO10	2	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, the student will be able to engage in continuous learning.
	PO12	2	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, the students will be able to engage in continuous learning.
	PSO1	1	By understanding how to evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula and understand series expansion of analytic functions, get a knowledge of their applications in the design, analysis and development of various electronic system
CO 5	PO 1	3	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to apply the knowledge on complex engineering problems.
	PO 2	3	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to the student will be able to identify formulate and analyze simple engineering problems.
	PO 3	3	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to the student will be able to design solutions for simple engineering problems.
	PO 4	3	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to the

		student will be able to use research knowledge for the analysis and interpretation of data.
PO 5	2	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to the student will be able to use modern tools for the implementation of concepts.
PO 6	1	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to the student will be able to communicate effectively on complex engineering activities with the engineering community.
PO10	2	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to the student will be able to engage in continuous learning.
PO12	2	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the students will be able to engage in continuous learning.
PSO1	1	By understanding the series expansion of complex function about a singularity and apply residue theorem to compute several kinds of real integrals, the student will be able to get a knowledge of their applications in the design, analysis and development of various electronic system .

Prepared by (Faculty Name & Signature) : Georgeena Mary George

Verified by : Stream Coordination Committee Binumon P

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Programme : **B.Tech**

Semester : **THIRD**

Course Title : **SCIENTIFIC COMPUTING LAB**

Course Code : **ECL 201**

University Prescribed CO

CO	Statement
CO1	Describe the needs and requirements of scientific computing and to familiarize one programming language for scientific computing and data visualization
CO2	Approximate an array/matrix with matrix decomposition
CO3	Implement numerical integration and differentiation
CO4	Solve ordinary differential equations for engineering applications
CO5	Compute with exported data from instruments
CO6	Realize how periodic functions are constituted by sinusoids
CO7	Simulate random processes and understand their statistics.

Proposed CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	3	0	0	0	3	1	0	3	0	3
CO2	3	3	1	2	3	0	0	0	0	0	0	1	1	2
CO3	3	3	1	1	3	0	0	0	0	0	0	1	1	2
CO4	3	3	1	1	3	0	0	0	0	0	0	1	1	2
CO5	3	3	1	3	0	0	0	0	3	0	0	0	1	2
CO6	3	3	2	2	3	0	0	0	0	0	0	0	1	2
CO7	3	3	2	2	3	0	0	0	0	0	0	1	1	2

CO-PO-PSO mapping justification

CO-PO	Mapping	Justification
CO1-PO1	3	CO1 Contributes fundamental engineering knowledge
CO1-PO2	3	CO1 Contributes fundamental problem solving skills
CO1-PO3	3	CO1 Contributes in design and developing solutions

CO1-PO4	2	CO1 Contributes in investigating complex problems
CO1-PO5	3	CO1 Contributes fundamental knowledge in modern tools
CO1-PO9	3	CO1 Contributes in developing oneself both as an individual and as a team
CO1-PO10	1	CO1 Contributes in developing effective technical communication
CO1-PO12	3	CO1 Contributes in laying foundation to lifelong learning
CO1-PSO2	3	CO1 Contributes in developing knowledge in modern software tools
CO2-PO1	3	Arrays and Matrices are fundamental knowledge in the Engineering Domain
CO2-PO2	3	Arrays and Matrices are fundamental knowledge in the Engineering Domain for problem analysis
CO2-PO3	1	CO2 helps in design and development of engineering solutions
CO2-PO4	2	Arrays and Matrices are fundamental knowledge in the Engineering Domain for problem analysis
CO2-PO5	3	Most modern software tools a matrix based
CO2-PO12	1	Arrays and Matrices are fundamental knowledge in the Engineering Domain for lifelong learning
CO2-PSO1	1	Arrays and Matrices are fundamental knowledge in the Engineering Domain
CO2-PSO2	2	Arrays and Matrices are fundamental knowledge to use most modern software tools
CO3-PO1	3	Integration and differentiation are fundamental knowledge in the Engineering Domain
CO3-PO2	3	Integration and differentiation are fundamental knowledge in the Engineering Domain for problem analysis
CO3-PO3	1	Integration and differentiation helps in design and development of engineering solutions
CO3-PO4	1	Integration and differentiation are fundamental knowledge in the Engineering Domain for problem analysis
CO3-PO5	3	Knowledge in Integration and differentiation is fundamental in computational tools
CO3-PO12	1	Integration and differentiation are fundamental knowledge in the Engineering Domain for lifelong learning
CO3-PSO1	1	Integration and differentiation are fundamental knowledge in the Engineering Domain
CO3-PSO2	2	Integration and differentiation are fundamental knowledge to use most modern software tools
CO4-PO1	3	Solving ODEs are fundamental knowledge in the Engineering Domain
CO4-PO2	3	Solving ODEs are fundamental knowledge in the Engineering Domain for problem analysis
CO4-PO3	1	Solving ODEs helps in design and development of engineering solutions
CO4-PO4	1	Solving ODEs are fundamental knowledge in the Engineering Domain for problem analysis
CO4-PO5	3	Solving ODEs is fundamental in computational tools
CO4-PO12	1	Solving ODEs are fundamental knowledge in the Engineering Domain for lifelong learning
CO4-PSO1	1	Solving ODEs are fundamental knowledge in the Engineering Domain
CO4-PSO2	2	Solving ODEs are fundamental knowledge to use most modern software tools
CO5-PO1	3	Knowledge in computing with data exported from measuring instruments is fundamental in the engineering domain
CO5-PO2	3	Knowledge in computing with data exported from measuring instruments is fundamental in problem solving

CO5-PO3	1	Knowledge in computing with data exported from measuring instruments is fundamental in developing solutions
CO5-PO4	3	Knowledge in computing with data exported from measuring instruments is fundamental in conducting investigations
CO5-PO9	3	Knowledge in computing with data exported from measuring instruments is fundamental in developing skills both individually and as in a team
CO5-PSO1	1	Knowledge in computing with data exported from measuring instruments is fundamental in the engineering domain
CO5-PSO2	2	Knowledge in computing with data exported from measuring instruments is fundamental in using modern tools
CO6-PO1	3	Understanding fundamentally all signals are sinusoids is fundamental knowledge in Engineering
CO6-PO2	3	Understanding fundamentally all signals are sinusoids is fundamental knowledge to analyze problems
CO6-PO3	2	Understanding fundamentally all signals are sinusoids is fundamental knowledge to design and develop solutions
CO6-PO4	2	Understanding fundamentally all signals are sinusoids is fundamental knowledge to investigate complex problems
CO6-PO5	3	Understanding fundamentally all signals are sinusoids is fundamental knowledge to use modern computational tools
CO6-PSO1	1	Understanding fundamentally all signals are sinusoids is fundamental knowledge in the Engineering Domain
CO6-PSO2	2	Understanding fundamentally all signals are sinusoids is fundamental knowledge to use most modern software tools
CO7-PO1	3	Random processes is fundamental knowledge in Engineering
CO7-PO2	3	Random processes is fundamental knowledge to analyze problems
CO7-PO3	2	Random processes is fundamental knowledge to design and develop solutions
CO7-PO4	2	Random processes is fundamental knowledge to investigate complex problems
CO7-PO5	3	Random processes is fundamental knowledge to use modern computational tools
CO7-PO12	1	Random processes is fundamental knowledge for lifelong learning
CO7-PSO1	1	Random processes is fundamental knowledge in the Engineering Domain
CO7-PSO2	2	Random processes is fundamental knowledge to use most modern software tools

Prepared by (Faculty Name & Signature) : SABARINATH.G.

Verified by : Stream Coordination Committee

5/7/21

15/07/2021
Dr. Gibu Jose
DAC convenor

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Semester : **3**
Course Title : LOGIC DESIGN LAB (ECL 203)
Course Code : ECL 203

Course Outcomes (COs)

After the successful completion of the course students will be able to

CO.1	Design and demonstrate the functioning of various combinational and sequential circuits using ICs. (K3)
CO.2	Apply an industry compatible hardware description language to implement digital circuits. (K3)
CO.3	Implement digital circuits on FPGA boards and connect external hardware to the boards. (K3)
CO.4	Function effectively as an individual and in a team to accomplish the given task. (K3)

CO-PO matrix

	PO1 (K3)	PO2 (K4)	PO3 (K5)	PO4 (K5)	PO5 (K6)	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1 (K3)	PSO2 (K3)
CO.1	3	3	3	-	-	-	-	-	3	-	-	3	3	-
CO.2	3	1	1	3	3	-	-	-	3	-	-	3	3	3
CO.3	3	1	1	3	3	-	-	-	3	1	-	3	3	3
CO.4	3	3	3	-	3	-	-	-	3	-	-	3	3	3

Mapping	**Low(1), med.(2), high(3)**	**JUSTIFICATION**
CO1-PO1	3	knowledge in the functioning of various combinational and sequential circuits using ICs helps to find solutions for complex problems in digital circuits.
CO1-PO2	3	knowledge in the functioning of various combinational and sequential circuits using ICs helps to analyze problems in digital circuits.
CO1-PO3	3	knowledge in the functioning of various combinational and sequential circuits using ICs helps in developing solution for engineering problems in digital circuits.

CO1-PO9	3	knowledge in the functioning of various combinational and sequential circuits using ICs helps to function effectively as an individual and in a team during the implementation of digital circuits..
CO1-PO12	3	By acquiring the knowledge functioning of various combinational and sequential circuits using ICs more advanced digital circuits can be easily studied and used.
CO1-PSO1	3	knowledge in the functioning of various combinational and sequential circuits using ICs helps to design and analyze complex problems in digital circuits.
CO2-PO1	3	Knowledge in industry compatible hardware description language helps to find solutions for complex problems in digital circuits.
CO2-PO2	1	Knowledge in industry compatible hardware description language helps to analyze problems in digital circuits.
CO2-PO3	1	Knowledge in industry compatible hardware description language helps in developing solution for engineering problems as well as design digital circuits.
CO2-PO4	3	Knowledge in industry compatible hardware description language helps in the design of experiments, analysis and interpretation of digital circuits.
CO2-PO5	3	Knowledge in industry compatible hardware description language helps to apply appropriate techniques to develop digital circuits using modern simulation tools
CO2-PO9	3	Knowledge in industry compatible hardware description language helps to function effectively as an individual and in a team during the development of digital circuits.
CO2-PO12	3	By acquiring the Knowledge in industry compatible hardware description language, more advanced digital circuits can be easily studied and used.
CO2-PSO1	3	Knowledge in industry compatible hardware description language, helps to design and analyze complex problems in digital circuits.
CO2-PSO2	3	Knowledge in industry compatible hardware description language helps to apply appropriate techniques to develop digital circuits using modern simulation tools
CO3-PO1	3	Implementation of digital circuits on FPGA boards and connect external hardware to the boards helps to find solutions for complex problems in digital circuits based electronic systems
CO3-PO2	1	Implementation of digital circuits on FPGA boards and connect external hardware to the boards helps to analyze problems in digital circuits based electronic systems
CO3-PO3	1	Implementation of digital circuits on FPGA boards and connect external hardware to the boards helps in developing solution for engineering problems as well as design digital circuits in electronic systems.
CO3-PO4	3	Implementation of digital circuits on FPGA boards and connect external hardware to the boards helps in the design of experiments, analysis and interpretation of digital circuits.
CO3-PO5	3	Implementation of digital circuits on FPGA boards and connect external hardware to the boards helps to apply appropriate techniques to develop digital circuit based electronic system.
CO3-PO9	3	Implementation of digital circuits on FPGA boards and connect external hardware to the boards helps to function effectively as an individual and in a team during the implementation of digital circuit based electronic systems.
CO3-PO10	1	Practical experience in the implementation of digital circuits on FPGA boards and connect external hardware to the boards helps to

		communicate effectively on complex engineering problems with the engineering community during the development of digital circuit based electronic systems.
CO3-PO12	3	By acquiring the knowledge in the implementation of digital circuits on FPGA boards and connect external hardware to the boards, more advanced digital circuits and boards can be easily studied and used.
CO3-PSO1	3	Implementation of digital circuits on FPGA boards and connect external hardware to the boards helps to find solutions for complex problems in digital circuit based electronic systems.
CO3-PSO2	3	Implementation of digital circuits on FPGA boards and connect external hardware to the boards helps to apply appropriate techniques to develop digital circuit based electronic system.
CO4-PO1	3	Function effectively as an individual and in a team to accomplish the given task helps to find solutions for complex problems in digital circuits.
CO4-PO2	3	Function effectively as an individual and in a team to accomplish the given task helps to analyze problems in digital circuits.
CO4-PO3	3	Function effectively as an individual and in a team to accomplish the given task helps in developing solution for engineering problems as well as design digital circuits.
CO4-PO5	3	Function effectively as an individual and in a team to accomplish the given task helps to apply modern tools in the develop digital circuit based electronic system.
CO4-PO9	3	Function effectively as an individual and in a team help to accomplish the development of digital circuits.
CO4-PO12	3	Function effectively as an individual and in a team to accomplish the given task, more advanced digital circuits can be easily studied and used.
CO4-PSO1	3	Function effectively as an individual and in a team to accomplish the given task, helps to design and analyze complex problems in digital circuits.
CO4-PSO2	3	Function effectively as an individual and in a team to accomplish the given task helps to apply modern tools in the develop digital circuit based electronic system.

Prepared by (Faculty Name and signature): Jumy m George 5/7/21

Stream Co-Ordinator

15/07/2021
Dr. Gibu Jose
DAC Convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ECT 201 Solid State Devices

Semester: III
Course Title: Solid State Devices
Course Code : ECT 201

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
ECT201.1	Apply Fermi-Dirac Distribution function and compute carrier concentration at equilibrium and the parameters associated with generation, recombination and transport mechanism	K3
ECT201.2	Explain drift and diffusion currents in extrinsic semiconductors and Compute current density due to these effects.	K2
ECT201.3	Define the current components and derive the current equation in a pn junction diode and bipolar junction transistor.	K2
ECT201.4	Explain the basic MOS physics and derive the expressions for drain current in linear and saturation regions.	K2
ECT201.5	Discuss scaling of MOSFETs and short channel effects.	K2

CO – PO Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECT201.1	3	3											2	
ECT201.2	3	3											2	
ECT201.3	3	3											2	
ECT201.4	3	3											1	
ECT201.5	3												1	
ECT201	3	3											1.6	

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	3	Graduate has to apply fundamentals of mathematics and engineering fundamentals to solve problems associated with estimation of carrier concentration
CO1 – PO2	3	Graduate to understand and analyze the constraints associated with estimations of carrier concentration and carrier transportation
CO1- PSO1	2	Graduates will be able to understand the relation of doping concentration with carrier concentration and factors that influences carrier generation
CO2 - PO1	3	Graduate has to apply the fundamentals of mathematics and engineering to estimate the current density under various constraints
CO2 - PO2	3	Graduates need to analyze the factors influencing carrier concentration under different mechanisms
CO2 – PSO1	2	Graduates will have to apply the constraints to estimate current density that would influence the system design
CO3-PO1	3	Graduates would have to apply the knowledge to understand factors associated with working of devices and to estimate parameters
CO3-PO2	3	Graduates will have to estimate the current flow in pn junction and BJT devices under various constraints
CO3-PSO1	2	Graduates will have to apply the basic design fundamentals in developing new electronic system
CO4-PO1	3	Graduates will have to apply fundamental knowledge in engineering to design MOS circuits
CO4-PO2	3	Graduates will be able to analyze and identify various constraints associated with design of MOS circuits
CO4-PSO1	1	Graduates will have to apply fundamental engineering in design of electronic system
CO5-PO1	3	Graduates will have to apply the various factors of short channel effects to determine the design of system
CO5-PSO1	1	Graduates will be able to understand the various device consideration for electronic system design

Prepared by (Faculty Name & Signature): Rincy Merrin Varkey 10/10/20

Verified by : Stream Coordination Committee 10/10/20
Nike. M. Biju

20/10/2020
Dr. Giby Jose
DAC Convener

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CO'S AND CO-PO MATRIX

Programme : **B.Tech**

Semester : **THIRD**

Course Title : **LOGIC CIRCUIT DESIGN**

Course Code : **ECT 203**

No.	Course outcomes	Knowledge Level
CO1	Explain the elements of digital system abstractions such as digital representations of information, digital logic and Boolean algebra	K2
CO2	Create an implementation of a combinational logic function described by a truth table using and/or/inv gates	K3
CO3	Compare different types of logic families with respect to performance and efficiency	K2
CO4	Design a sequential logic circuit using basic building blocks like flip-flops	K3
CO5	Design and analyze combinational and sequential logic circuits through gate-level Verilog models	K3

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	2
CO2	3	3	3	-	-	-	-	-	-	-	-	-	3	2
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	2
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	2
CO5	3	3	3	-	3	-	-	-	-	-	-	-	3	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	3	Students are expected to apply the knowledge of mathematics and engineering fundamentals to understand the elements of digital system abstractions such as digital representations of information, digital logic and Boolean algebra
CO1 - PO2	3	Students are equipped to identify and formulate problems based on the concepts of various digital systems
CO1 - PSO1	3	Students are expected to apply the fundamental knowledge of digital circuits for the development of various electronic systems
CO1 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various digital systems and its abstractions
CO2 - PO1	3	Students are expected to apply the engineering fundamentals and mathematics to create an implementation of a combinational logic function
CO2 - PO2	3	Students are equipped to identify, formulate and analyse the problems that can occur during the implementation of combinational logic circuits using gates.
CO2– PO3	3	Students are expected to design solutions for engineering problems using combinational logic circuits that meet the specified needs
CO2 - PSO1	3	Students are expected to apply the fundamental knowledge of combinational logic circuits for the development of various electronic systems
CO2– PSO2	2	Students are expected to use modern software and hardware tools for the analysis and modelling of various combinational logic circuits using gates.
CO3 - PO1	3	Students are expected to apply the engineering fundamentals and mathematics to compare different types of logic families with respect to performance and efficiency
CO3 - PO2	3	Students are equipped to identify, formulate and analyze the problems that can occur during the study of various logic families.
CO3 - PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the development of logic families.
CO3 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various logic families with respect to performance and efficiency.
CO4- PO1	3	Students are expected to apply the engineering fundamentals and mathematics to design a sequential logic circuit using basic building blocks like flip-flops
CO4- PO2	3	Students are equipped to identify, formulate and analyse the problems that can occur during the design of sequential logic circuit using basic building blocks like flip-flops
CO4– PO3	3	Students are expected to design solutions for engineering problems using sequential logic circuits that meet the specified needs

CO4 - PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the design of sequential logic circuit using basic building blocks like flip-flops
CO4 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis and design of sequential logic circuit using basic building blocks like flip-flops
CO5- PO1	3	Students are expected to apply the engineering fundamentals and mathematics to design and analyze combinational and sequential logic circuits through gate-level Verilog models
CO5 - PO2	3	Students are equipped to identify, formulate and analyse the problems that can occur during the design and analysis of combinational and sequential logic circuits through gate-level Verilog models
CO5 – PO3	3	Students are expected to design solutions for engineering problems by modelling the digital circuits using gate-level Verilog models that meet the specified needs for the public considerations.
CO5- PO5	3	Students are expected to select and apply various modern tools for modelling of various combinational and sequential logic circuits
CO5 - PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the design and analysis of combinational and sequential logic circuits through gate-level Verilog models
CO5– PSO2	2	Students are expected to use modern software and hardware tools for the analysis and modelling of various combinational and sequential logic circuits

Prepared by (Faculty Name & Signature) : 10/10/20 Nitha. M. Biju.

Verified by : Stream Coordination Committee

20/10/2020
Dr. Bibu Jose
DAC convenor



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ECT 205 :: Network Theory :: 2019 Scheme

Semester : 3

Course title : Network Theory

Course Code : ECT 205

University Prescribed CO

CO1	Apply Mesh/Node Analysis or Network theorems to obtain steady state response of linear time invariant networks	K3
CO2	Apply Laplace transform to determine the transient behavior of RLC networks	K3
CO3	Apply network functions/ parameters to analyze single port and two port networks	K3

University Prescribed CO – PO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	3										2
CO 2	3	3										2
CO 3	3	3										2

Proposed CO (with respect to Modules in syllabus)

ECT205.1	Apply Mesh/Node Analysis to obtain steady state response of linear time invariant networks	K3
ECT205.2	Apply Network theorems to analyze to obtain steady state response of linear time invariant networks	K3
ECT205.3	Apply Laplace transform to determine the transient behavior of RLC networks	K3
ECT205.4	Apply network functions to analyze single port and two port networks	K3
ECT205.5	Apply network parameters to analyze single port and two port networks	K3

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
ECT205.1	2	1	-	-	-	-	-	-	-	-	-	-	1	-
ECT205.2	2	3	2	-	1	-	-	-	-	-	-	-	1	1
ECT205.3	3	2	1	-	1	-	-	-	-	-	-	-	2	1
ECT205.4	2	1	-	-	-	-	-	-	-	-	-	-	1	-
ECT205.5	3	2	1	-	-	-	-	-	-	-	-	-	1	-

Justifications for CO – PO Mapping

Mapping	Mapping level (3/2/1)	Justifications
CO1-PO1	2	helps in solving engineering problems related to electric circuits
CO1-PO2	1	helps in analyzing engineering problems related to electric circuits
CO1-PSO1	1	helps in developing engineering systems with electric circuits
CO2-PO1	2	helps in solving engineering problems related to electric circuits
CO2-PO2	3	helps in analyzing engineering problems related to electric circuits
CO2-PO3	2	helps in developing engineering solutions to problems related to electric circuits
CO2-PO5	1	helps in analyzing engineering problems related to electric circuits using modern simulation tools
CO2-PSO1	1	helps in developing engineering systems with electric circuits
CO2-PSO2	1	helps in analyzing engineering problems related to electric circuits using modern simulation tools
CO3-PO1	3	helps in solving engineering problems related to electric circuits
CO3-PO2	2	helps in analyzing engineering problems related to electric circuits
CO3-PO3	1	helps in developing engineering solutions to problems related to electric circuits
CO3-PO5	1	helps in analyzing engineering problems related to electric circuits using modern simulation tools
CO3-PSO1	2	helps in developing engineering systems with electric circuits
CO3-PSO2	1	helps in analyzing engineering problems related to electric circuits using modern simulation tools
CO4-PO1	2	helps in solving engineering problems related to electric circuits
CO4-PO2	1	helps in analyzing engineering problems related to electric circuits
CO4-PSO1	1	helps in developing engineering systems with electric circuits

CO5-PO1	3	helps in solving engineering problems related to electric circuits
CO5-PO2	2	helps in analyzing engineering problems related to electric circuits
CO5-PO3	1	helps in developing engineering solutions to problems related to electric circuits
CO5-PSO1	1	helps in developing engineering systems with electric circuits

Prepared by (Faculty Name & Signature) : SABARINATH. G.

Verified by : Stream Coordination Committee

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Department of Electronics and Communication Engineering

Programme : Bachelor of Technology
Course Code: HUT 200
Course Name Professional Ethics
Semester: 3

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
HUT200.1	Understand the core values that shape the ethical behaviour of a professional.	K2
HUT200.2	Adopt a good character and follow an ethical life.	K2
HUT200.3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.	K2
HUT200.4	Solve moral and ethical problems through exploration and assessment by established experiments.	K2
HUT200.5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.	K2

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-
CO2	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-
CO3	-	-	-	-	-	-	-	3	-	-	2	-	-	-	-
CO4	-	-	-	-	-	-	-	3	-	-	2	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	2	-	-	-	-
AVG	-	-	-	-	-	-	-	2.6	-	-	2	-	-	-	-

Correlation : 1-Low, 2-Moderate, 3-High, No Correlation '-'

Department of Electronics and Communication Engineering

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
CO1-PO8	2	By understanding the core values that shape the ethical behavior of a professional, the student will be able to apply ethical norms into engineering practices.
CO2-PO8	2	By applying ethical principles, students will be able to shoulder responsibilities with professional commitment.
CO3-PO8	3	By keeping personal ethics and legal ethics, students will be able to put ethical principles in engineering practices.
CO4-PO8	3	By following ethical and moral assessment, students will be able to develop responsible norms in engineering practices.
CO5-PO8	3	The student can adopt human and social values in solving contemporary global issues confronting and engineer.
CO1-PO11	2	By understanding the core values that shape ethical behavior of an individual, the student will be able to demonstrate engineering and management principles in teamwork in multidisciplinary environments
CO2-PO11	2	By adopting good character based on ethical values , students will be able to perform well as team leaders in engineering and management responsibilities.
CO3- PO11	2	By following personal ethics and legal ethics, students will be able to become successful engineer and management professionals..

Department of Electronics and Communication Engineering

CO4-PO11	2	Through exploration and assessment by established experiments, students will be able to excel in project management and finance.
CO5- PO11	2	By applying knowledge of human values and social values, students will be able to apply them in his / her own work either as a team leader or as a team member.

5/7/21 Vijayalakshmi G

Prepared by (Faculty Name & Signature) : VIJAYALEKSHMI. G

Verified by : Stream Coordination Committee 5/7/21 SUNITHA S PILLAI

15/07/2021
Dr. Binby Jose
DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

UNIVERSITY PRESCRIBED CO'S AND CO-PO MATRIX

Programme : **B.Tech**

Semester : **Third**

Course Title : **Sustainable Engineering**

Course Code : **MCN 201**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO1	Understand the relevance and the concept of sustainability and the global initiatives in this direction	K2
CO2	Explain the different types of environmental pollution problems and their sustainable solutions	K2
CO3	Discuss the environmental regulations and standards	K2
CO4	Outline the concepts related to conventional and non-conventional energy	K2
CO5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles	K3

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	-	-	-	-	-	2	3	-	-	-	-	2
CO2	-	-	-	-	-	2	3	-	-	-	-	2
CO3	-	-	-	-	-	2	3	-	-	-	-	2
CO4	-	-	-	-	-	2	3	-	-	-	-	2
CO5	-	-	-	-	-	2	3	-	-	-	-	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level 3/2/1	JUSTIFICATION
CO1-PO6	2	The knowledge about the concept and importance of sustainability will help the student to focus better on societal, health, safety and cultural aspects of his/her profession

CO1-PO7	3	The course entirely deals with environment and sustainability, and thus all the course outcomes fully contributes to this program outcome
CO1-PO12	2	Sustainable engineering is one of the elements of ethical engineering practices.
CO2-PO6	2	Student's understanding of causes, effects and control of pollution contributes to making him/her a responsible engineer
CO2-PO7	3	The course entirely deals with environment and sustainability, and thus all the course outcomes fully contributes to this program outcome
CO2-PO12	2	Provides scope for implementation of strategies to curb environmental pollution
CO3-PO6	2	Student's basic knowledge of environmental standards and environmental impact assessment will guide him/her in the assessment of his/her engineering practice.
CO3-PO7	3	The course entirely deals with environment and sustainability, and thus all the course outcomes fully contributes to this program outcome
CO3-PO12	2	Leads to more efficient energy management systems based on EIA
CO4-PO6	2	The understanding of basic concepts on conventional and non-conventional energy sources will enable the student to understand importance of energy efficient systems
CO4-PO7	3	The course entirely deals with environment and sustainability, and thus all the course outcomes fully contributes to this program outcome
CO4-PO12	2	Leads to more efficient utilization of resource and energy consumption
CO5-PO6	2	The student's understanding of sustainable development will help him be a responsible engineer working for the benefit of the society.
CO5-PO7	3	The course entirely deals with environment and sustainability, and thus all the course outcomes fully contributes to this program outcome
CO5-PO12	2	Helps the student to opt for sustainable energy resources where applicable in the project.

Jaus Thomas

Prepared by (Faculty Name & Signature) : 5/7/21

Verified by : Stream Coordination Committee

5/7/21

15/07/2021
Dr. Gibu Jose
DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

UNIVERSITY PRESCRIBED CO'S AND CO-PO MATRIX

Programme : **B.Tech**

Semester : **Third**

Course Title : **Sustainable Engineering**

Course Code : **MCN 201**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO1	Understand the relevance and the concept of sustainability and the global initiatives in this direction	K2
CO2	Explain the different types of environmental pollution problems and their sustainable solutions	K2
CO3	Discuss the environmental regulations and standards	K2
CO4	Outline the concepts related to conventional and non-conventional energy	K2
CO5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles	K3

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	-	-	-	-	-	2	3	-	-	-	-	2
CO2	-	-	-	-	-	2	3	-	-	-	-	2
CO3	-	-	-	-	-	2	3	-	-	-	-	2
CO4	-	-	-	-	-	2	3	-	-	-	-	2
CO5	-	-	-	-	-	2	3	-	-	-	-	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level 3/2/1	JUSTIFICATION
CO1-PO6	2	The knowledge about the concept and importance of sustainability will help the student to focus better on societal, health, safety and cultural aspects of his/her profession

CO1-PO7	3	The course entirely deals with environment and sustainability, and thus all the course outcomes fully contributes to this program outcome
CO1-PO12	2	Sustainable engineering is one of the elements of ethical engineering practices.
CO2-PO6	2	Student's understanding of causes, effects and control of pollution contributes to making him/her a responsible engineer
CO2-PO7	3	The course entirely deals with environment and sustainability, and thus all the course outcomes fully contributes to this program outcome
CO2-PO12	2	Provides scope for implementation of strategies to curb environmental pollution
CO3-PO6	2	Student's basic knowledge of environmental standards and environmental impact assessment will guide him/her in the assessment of his/her engineering practice.
CO3-PO7	3	The course entirely deals with environment and sustainability, and thus all the course outcomes fully contributes to this program outcome
CO3-PO12	2	Leads to more efficient energy management systems based on EIA
CO4-PO6	2	The understanding of basic concepts on conventional and non-conventional energy sources will enable the student to understand importance of energy efficient systems
CO4-PO7	3	The course entirely deals with environment and sustainability, and thus all the course outcomes fully contributes to this program outcome
CO4-PO12	2	Leads to more efficient utilization of resource and energy consumption
CO5-PO6	2	The student's understanding of sustainable development will help him be a responsible engineer working for the benefit of the society.
CO5-PO7	3	The course entirely deals with environment and sustainability, and thus all the course outcomes fully contributes to this program outcome
CO5-PO12	2	Helps the student to opt for sustainable energy resources where applicable in the project.

Jacob Thomas

Prepared by (Faculty Name & Signature) : 5/7/21

Verified by : Stream Coordination Committee

5/7/21

15/07/2021
Dr. Gibey Dore
DAC convenor

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Programme : **B.Tech**

Semester : **Fourth**

Course Title : **Analog Circuits and Simulation lab**

Course Code : **ECL 202**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO1	Design, demonstrate and simulate the RC integrating and differentiating circuits using discrete components.	K3
CO2	Design, demonstrate and simulate the clipping and clamping circuits	K3
CO3	Design ,demonstrate and simulate the RC coupled amplifier using discrete components.	K3
CO4	Design ,demonstrate and simulate the feedback amplifier circuits	K3
CO5	Design ,demonstrate and simulate the low frequency oscillator circuits	K3
CO6	Design ,demonstrate and simulate the transistor series voltage regulator	K3
CO7	Function effectively as an individual and as in a team to accomplish the given task.	K3

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	-	3	-	-	-	2	-	-	2	3	3
CO2	3	3	3	-	3	-	-	-	2	-	-	2	3	3
CO3	3	3	3	-	3	-	-	-	2	-	-	2	3	3
CO4	3	3	3	-	3	-	-	-	2	-	-	2	3	3
CO5	3	3	3	-	3	-	-	-	2	-	-	2	3	3
CO6	3	3	3	-	3	-	-	-	2	-	-	2	3	3
CO7				-	-	-	-	-	3	-		3	2	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	3	Students are expected to apply the knowledge of mathematics and engineering fundamentals to understand the RC differentiating and integrating circuits using discrete components
CO1 - PO2	3	Students are equipped to identify and formulate problems by properly designing the basic analog circuits
CO1 – PO3	3	Students are expected to design solutions for complex engineering problems and processes by properly understanding the functioning of basic analog circuits using discrete components
CO1– PO5	3	Students are expected to select and apply various modern tools for modelling RC differentiating and integrating circuits
CO1 – PO9	2	Students are expected to work as an individual and as a member in teams to function effectively
CO1 – PO12	2	Students are expected to engage in independent and life long learning of the basic analog circuits using discrete components
CO1 – PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the development of various electronic systems
CO1 – PSO2	3	Students are expected to use modern software and hardware tools for the analysis of various analog signal processing circuits
CO2 - PO1	3	Students are expected to apply the knowledge of mathematics and engineering fundamentals to understand the clipping and clamping crcuits using discrete components
CO2 - PO2	3	Students are equipped to identify and formulate problems by properly designing the basic analog circuits
CO2– PO3	3	Students are expected to design solutions for complex engineering problems and processes by properly understanding the functioning of clipping and clamping crcuits using discrete components
CO2 – PO5	3	Students are expected to select and apply various modern tools for modelling clipping and clamping crcuits using discrete components
CO2 – PO9	2	Students are expected to work as an individual and as a member in teams to function effectively
CO2– PO12	2	Students are expected to engage in independent and life long learning of the basic analog circuits using discrete components
CO2 – PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the development of various electronic systems
CO2– PSO2	3	Students are expected to use modern software and hardware tools for the analysis of various analog signal processing circuits
CO3 - PO1	3	Students are expected to apply the knowledge of mathematics and engineering fundamentals to understand the amplifier circuits using discrete components
CO3 - PO2	3	Students are equipped to identify and formulate problems by properly designing the basic analog circuits

CO3 – PO3	3	Students are expected to design solutions for complex engineering problems and processes by properly understanding the functioning of amplifier circuits using discrete components
CO3 – PO5	3	Students are expected to select and apply various modern tools for modelling amplifier circuits
CO3 – PO9	2	Students are expected to work as an individual and as a member in teams to function effectively
CO3– PO12	2	Students are expected to engage in independent and life long learning of the basic analog circuits using discrete components
CO3– PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the development of various electronic systems
CO3– PSO2	3	Students are expected to use modern software and hardware tools for the analysis of various analog signal processing circuits
CO4 - PO1	3	Students are expected to apply the knowledge of mathematics and engineering fundamentals to understand the feedback amplifier circuits using discrete components
CO4- PO2	3	Students are equipped to identify and formulate problems by properly designing the basic analog circuits
CO4 – PO3	3	Students are expected to design solutions for complex engineering problems and processes by properly understanding the functioning of feedback amplifier circuits using discrete components
CO4 – PO5	3	Students are expected to select and apply various modern tools for modelling feedback amplifier circuits
CO4– PO9	2	Students are expected to work as an individual and as a member in teams to function effectively
CO4 – PO12	2	Students are expected to engage in independent and life long learning of the basic analog circuits using discrete components
CO4– PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the development of various electronic systems
CO4– PSO2	3	Students are expected to use modern software and hardware tools for the analysis of various analog signal processing circuits
CO5 - PO1	3	Students are expected to apply the knowledge of mathematics and engineering fundamentals to understand the low frequency oscillator circuits using discrete components
CO5 - PO2	3	Students are equipped to identify and formulate problems by properly designing the basic analog circuits
CO5 – PO3	3	Students are expected to design solutions for complex engineering problems and processes by properly understanding the functioning of low frequency oscillator using discrete components
CO5– PO5	3	Students are expected to select and apply various modern tools for modelling low frequency oscillator
CO5– PO9	2	Students are expected to work as an individual and as a member in teams to function effectively
CO5– PO12	2	Students are expected to engage in independent and life long learning of the basic analog circuits using discrete components
CO5 – PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the development of various electronic systems

CO5 – PSO2	3	Students are expected to use modern software and hardware tools for the analysis of various analog signal processing circuits
CO6- PO1	3	Students are expected to apply the knowledge of mathematics and engineering fundamentals to understand the voltage regulator circuits using discrete components
CO6- PO2	3	Students are equipped to identify and formulate problems by properly designing the basic analog circuits
CO6– PO3	3	Students are expected to design solutions for complex engineering problems and processes by properly understanding the functioning of voltage regulator circuits using discrete components
CO6 – PO5	3	Students are expected to select and apply various modern tools for modelling voltage regulator circuits
CO6 – PO9	2	Students are expected to work as an individual and as a member in teams to function effectively
CO6– PO12	2	Students are expected to engage in independent and life long learning o the basic analog circuits using discrete components
CO6 – PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the development of various electronic systems
CO6– PSO2	3	Students are expected to use modern software and hardware tools for the analysis of various analog signal processing circuits
CO7– PO9	3	Students can function effectively as an individual and as a member in teams for designing various electronic systems
CO7– PO12	3	Students are expected to work as a team in independent and lifelong learning of various electronic systems
CO7– PSO1	2	Students are expected to work as a team to apply the fundamental knowledge of electronics and communication engineering in the design, analysis and development of various electronic systems.
CO7 – PSO2	2	Students are expected to work as a team to practice various software and hardware tools in Electronics engineering for analysis of electronic systems

Prepared by (Faculty Name & Signature) : 10/10/20 Nitha. M. Biju.

Verified by : Stream Coordination Committee

20/10/2020
Dr. Gibu Jose
DAC convenor

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Semester : **4**
Course Title : MICROCONTROLLER LAB (ECL 204)
Course Code : ECL 204

Course Outcomes (COs)

After the successful completion of the course students will be able to

CO.1	Write Assembly language programs/Embedded C programs for performing data Manipulation and arithmetic operations. (K3)
CO.2	Develop ALP/Embedded C Programs to interface microcontroller with peripherals. (K3)
CO.3	Develop programming/interfacing experiments with IDE for modern microcontrollers. (K3)

CO-PO matrix

	PO1 (K3)	PO2 (K4)	PO3 (K5)	PO4 (K5)	PO5 (K6)	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1 (K3)	PSO2 (K3)
CO.1	3	2	1	-	3	-	-	-	2	-	-	2	3	3
CO.2	3	2	1	-	3	-	-	-	2	-	-	2	3	3
CO.3	3	2	1	-	3	-	-	-	2	-	-	2	3	3
AVG	3	2	1	-	3	-	-	-	2	-	-	2	3	3

Mapping	**Low(1), med.(2), high(3)**	**JUSTIFICATION**
CO1-PO1	3	knowledge in assembly language programming for microcontrollers helps to find solutions for complex problems in microcontroller based electronic systems
	2	knowledge in assembly language programming for microcontrollers helps to analyze problems in microcontroller based electronic systems
CO1-PO3	1	knowledge in assembly language programming for microcontrollers helps in developing solution for engineering problems as well as design system processes related to embedded systems
CO1-PO5	3	knowledge in assembly language programming for microcontrollers helps to apply appropriate techniques to develop embedded systems using modern simulation tools

CO1-PO9	2	knowledge in assembly language programming for microcontrollers helps to function effectively as an individual and in a team during the implementation of microcontroller-based system.
CO1-PO12	2	By acquiring the knowledge in assembly language programming for microcontrollers, more advanced processors and controllers can be easily studied and used.
CO1-PSO1	3	knowledge in assembly language programming for microcontrollers helps to find solutions for complex problems in microcontroller based electronic systems
CO1-PSO2	3	knowledge in assembly language programming for microcontrollers helps to apply appropriate techniques to develop embedded systems using modern simulation tools
CO2-PO1	3	Knowledge in interfacing various peripheral devices to microcontroller helps to find solutions for complex problems in microcontroller based electronic systems
CO2-PO2	2	Knowledge in interfacing various peripheral devices to microcontroller helps to analyze problems in microcontroller based electronic systems
CO2-PO3	1	Knowledge in interfacing various peripheral devices to microcontroller helps in developing solution for engineering problems as well as design system processes related to embedded systems
CO2-PO5	3	Knowledge in interfacing various peripheral devices to microcontroller helps to apply appropriate techniques to develop embedded systems using modern simulation tools
CO2-PO9	2	Knowledge in interfacing various peripheral devices to microcontroller helps to function effectively as an individual and in a team during the implementation of microcontroller-based system.
CO2-PO12	2	By acquiring the knowledge in interfacing various peripheral devices to microcontroller, more advanced processors and controllers can be easily studied and used.
CO2-PSO1	3	Knowledge in interfacing various peripheral devices to microcontroller helps to find solutions for complex problems in microcontroller based electronic systems
CO2-PSO2	3	Knowledge in interfacing various peripheral devices to microcontroller helps to apply appropriate techniques to develop embedded systems using modern simulation tools
CO3-PO1	3	Programming with embedded IDE for modern microcontrollers helps to find solutions for complex problems in microcontroller based electronic systems
CO3-PO2	2	Programming with embedded IDE for modern microcontrollers helps to analyze problems in microcontroller based electronic systems
CO3-PO3	1	Programming with embedded IDE for modern microcontrollers helps in developing solution for engineering problems as well as design system processes related to embedded systems
CO3-PO5	3	Programming with embedded IDE for modern microcontrollers helps to apply appropriate techniques to develop embedded systems using modern simulation tools
CO3-PO9	2	Programming with embedded IDE for modern microcontrollers helps to function effectively as an individual and in a team during the implementation of microcontroller-based system.
CO3-PO12	2	By acquiring the knowledge in Programming with embedded IDE for modern microcontrollers, more advanced processors and controllers can be easily studied and used.
CO3-PSO1	3	Programming with embedded IDE for modern microcontrollers helps to find solutions for complex problems in microcontroller based electronic systems

CO3-PSO2	3	Programming with embedded IDE for modern microcontrollers helps to apply appropriate techniques to develop embedded systems using modern simulation tools

Prepared by (Faculty Name & Signature) : Sunny M George 10/12/21

Verified by : Stream Coordination Committee

10/12/2021
Dr. Suby Dose
DAC convenor

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

UNIVERSITY PRESCRIBED CO'S AND CO-PO MATRIX

Programme : **B.Tech**

Semester : **Fourth**

Course Title : **Analog Circuits**

Course Code : **ECT 202**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO1	Design analog signal processing circuit using diodes and first order RC circuit	K3
CO2	Analyse basic amplifiers using BJT and MOSFETs	K3
CO3	Apply the principle of oscillator and regulated power supply circuits	K3

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	3	3	-	-	-	-	-	-	-	-	-	2
CO2	3	3	-	-	-	-	-	-	-	-	-	2
CO3	3	3	-	-	-	-	-	-	-	-	-	2

MODIFIED COURSE OUTCOMES AND CO-PO MATRIX

No.	Course outcomes	Knowledge Level
CO1	Design analog signal processing circuit using diodes and first order RC circuit	K3
CO2	Analyse basic amplifiers using BJT	K3
CO3	Analyse basic amplifiers using MOSFET	K3
CO4	Analyse the basic feedback amplifiers using BJT and MOSFET and also analyse the principle of oscillators	K3
CO5	Analyse the power amplifier circuits and design the voltage regulator for given specifications	K3

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	-	-	2	-	-	-	-	-	-	2	3	2
CO2	3	3	-	-	2	-	-	-	-	-	-	2	3	2
CO3	3	3	-	-	2	-	-	-	-	-	-	2	3	2
CO4	3	3	-	-	2	-	-	-	-	-	-	2	3	2
CO5	3	3	-	-	2	-	-	-	-	-	-	2	3	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	3	Students are expected to apply the knowledge of mathematics and engineering fundamentals to understand the basic concepts of analog signal processing using diodes and RC circuits
CO1 - PO2	3	Students are equipped to identify and formulate problems based on the concepts of various wave shaping circuits
CO1 – PO5	2	Students are expected to select and apply various modern tools for modelling various analog signal processing circuits
CO1 – PO12	2	Students are expected to recognize the need and ability to engage in independent and life long learning of various electronic systems
CO1 - PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the development of various electronic systems
CO1 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various analog signal processing circuits
CO2 - PO1	3	Students are expected to apply the engineering fundamentals and mathematics to analyse the various amplifier circuits using BJT
CO2 - PO2	3	Students are equipped to identify, formulate and analyse the problems that can occur during the design of amplifier circuits using BJT.
CO2– PO5	2	Students are expected to select and apply various modern tools for modelling of basic amplifier circuits using BJT.
CO2 – PO12	2	Students are expected to recognize the need and ability to engage in independent and life long learning of various electronic systems
CO2 - PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the development of various electronic systems
CO2– PSO2	2	Students are expected to use modern software and hardware tools for the analysis and modelling of various amplifier circuits using BJT.
CO3 - PO1	3	Students are expected to apply the engineering fundamentals and mathematics to analyse the various amplifier circuits using MOSFET

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ECT 204 Signals and Systems

Semester : **Four**

Course Title : Signals and Systems

Course Code : **ECT 204**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 1	Apply properties of signals and systems to classify them	**K3**
CO 2	Represents signals with the help of series and transforms	**K3**
CO 3	Describe orthogonality of signals and convolution integral	**K2**
CO 4	Apply transfer function to compute the LTI response to input signals	**K3**
CO 5	Apply sampling theorem to discretize continuous time signals	**K3**

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO 2	3	3	3	-	-	-	-	-	-	-	-	-	3	-
CO 3	3	3	3	-	-	-	-	-	-	-	-	-	3	-
CO 4	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO 5	3	3	3	-	-	-	-	-	-	-	-	-	3	-
ECT 204	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 – PO1	3	Knowledge in properties of signals and systems will help to the solution for many engineering problems.
CO 1 – PO2	3	Knowledge in properties of signals and systems will help to identify and formulate engineering problems.
CO1 – PSO1	3	Fundamental knowledge in properties of signals and systems will help in the design, analysis and development of various electronic systems.
CO2 – PO1	3	Fundamental knowledge in Fourier series, Fourier transforms and Laplace transform can be applied to the solution of various engineering problems.
CO2 – PO2	3	Knowledge in Fourier series, Fourier transforms and Laplace transform will help to formulate and analyze complex engineering problems.
CO2 – PO3	3	Knowledge in various series and transforms can be applied to the development of solution for complex engineering problems.
CO2 – PSO1	3	Knowledge in Fourier series, Fourier transforms and Laplace transform will help in the design, analysis and development of various electronic systems.
CO3 – PO1	3	Knowledge in orthogonality of signals and convolution can be applied to the solution of various engineering problems.
CO3 – PO2	3	Knowledge in orthogonality of signals and convolution will help to formulate and analyze complex engineering problems.
CO3 – PO3	3	Knowledge in orthogonality of signals and convolution can be applied to the development of solution for complex engineering problems.
CO3 – PSO1	3	Knowledge in orthogonality of signals and convolution will help in the design, analysis and development of various electronic systems.
CO4 – PO1	3	Knowledge in transfer function will help to design LTI system.
CO4 – PO2	3	Knowledge in transfer function will help to formulate and analyze specifications of LTI system.
CO4 – PSO1	3	Knowledge in transfer function will help in the design, analysis and development of various electronic systems.
CO5 – PO1	3	Knowledge in sampling theorem can be applied to design a reliable digital signal processing system.
CO5 – PO2	3	Knowledge in sampling theorem can be used to formulate a reliable digital signal processing system.
CO5 – PO3	3	Knowledge in sampling theorem can be applied to the development of solution for complex engineering problems.
CO5 – PSO1	3	Knowledge in sampling theorem will help in the design and development of a reliable digital signal processing system.

Prepared by (Faculty Name & Signature) : DR. Gibby Dore 10/12/21

Verified by : Stream Coordination Committee DR. Gibby Dore 10/12/21

10/12/2021
Dr. Gibby Dore
DAC convenor

CO3 - PO2	3	Students are equipped to identify, formulate and analyse the problems that can occur during the design of amplifier circuits using MOSFET.
CO3 – PO5	2	Students are expected to select and apply various modern tools for modelling of basic amplifier circuits using MOSFET.
CO3 – PO12	2	Students are expected to recognize the need and ability to engage in independent and life long learning of various electronic systems
CO3 - PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the development of various electronic systems
CO3 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis and modelling of various amplifier circuits using MOSFET.
CO4- PO1	3	Students are expected to apply the engineering fundamentals and mathematics to analyse the various feedback topologies and oscillator circuits
CO4- PO2	3	Students are equipped to identify, formulate and analyse the problems that can occur during the design of various feedback amplifiers using BJT and MOSFET and oscillator circuits
CO4– PO5	2	Students are expected to select and apply various modern tools for modelling of various feedback topologies and oscillator circuits
CO4 – PO12	2	Students are expected to recognize the need and ability to engage in independent and life long learning of various electronic systems
CO4 - PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the development of various electronic systems
CO4 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis and modelling of various feedback topologies and oscillator circuits
CO5- PO1	3	Students are expected to apply the engineering fundamentals and mathematics to analyse the various power amplifier circuits and regulated power supplies
CO5 - PO2	3	Students are equipped to identify, formulate and analyse the problems that can occur during the design of various power amplifier circuits and regulated power supplies
CO5- PO5	2	Students are expected to select and apply various modern tools for modelling of various power amplifier circuits and regulated power supplies
CO5 – PO12	2	Students are expected to recognize the need and ability to engage in independent and life long learning of various electronic systems
CO5 - PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the development of various electronic systems
CO5– PSO2	2	Students are expected to use modern software and hardware tools for the analysis and modelling of various power amplifier circuits and regulated power supplies

Prepared by (Faculty Name & Signature) : 10/10/20 Nithe. M. Biju

Verified by : Stream Coordination Committee

22/10/2020
Dr. Ruby Dose
DAC convenor

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ECT 206 COMPUTER ARCHITECTURE AND MICROCONTROLLERS

Semester : **4**

Course Title : **COMPUTER ARCHITECTURE AND MICROCONTROLLERS**

Course Code : **ECT 206**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO.1	Explain the functional units,I/O and memory management w.r.t a typical computer architecture	K_2
CO.2	Distinguish between microprocessor and controller	K_2
CO.3	Develop simple programs using assembly language programming	K_3
CO.4	Interface 8051 microcontroller with peripheral devices using ALP/Embedded C	K_3
CO.5	Familiarize system memory and I/O operations.	K_2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO.1	2	-	-	-	-	-	-	-	-	-	-	1	0	0
CO.2	2	-	-	-	-	-	-	-	-	-	-	1	0	0
CO.3	3	-	3	-	3	-	-	-	-	-	-	3	1	1
CO.4	3	2	3	-	3	-	-	-	-	-	-	3	1	1
CO.5	1	-	-	-	-	-	-	-	-	-	-	1	0	0
CO	2.4	2	3	-	3							1.8	1	1

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 -PO1	2	Graduate is able to develop solutions to complex problems using embedded C programming.Hence it is highly correlated.

CO1 – PO12	1	By acquiring the knowledge in embedded programming more processors can be studied and used according to technological change.
CO2-PO1	2	Knowledge in microcontroller 8051can be applied to solve engg problems.
CO2-PO12	1	By acquiring the knowledge in embedded programming more processors can be studied and used according to technological change .
CO3-PO1	3	Knowledge in microcontroller programming can be used to solve engg problems.
CO3-PO3	3	Knowledge in programming helps in developing solution for engineering problems as well as design system process related to microcontrollers.
CO3-PO5	3	Use of modern resources and tools helps the graduate to model complex engg activities with an understanding of limitations.
CO3-PO12	3	By acquiring the knowledge in embedded programming more processors can be studied and used according to technological change
CO3-PSO1	1	Knowledge in microcontroller programming can be used for design, analysis and development of electronic sytem.
CO3 – PSO2	1	Programming in embedded controllers and use of better resources can help to design complex electronic systems.
CO4-PO1	3	Graduate is able to develop solutions to complex problems using embedded C programming.Hence it is highly correlated.
CO4-PO2	2	Knowledge of Interfacing with various peripheral devices can be used to analyze complex engg problems.
CO4-PO3	3	Knowledge in interfacing various peripheral devices to microcontroller helps in developing solution for engineering problems as well as design system process related to microcontrollers.
CO4-PO5	3	Use of modern resources and tools helps the graduate to model complex engg activities with an understanding of limitations.
CO4-PO12	3	By acquiring the knowledge in embedded programming more processors can be studied and used according to technological change
CO4-PSO1	1	Knowledge in microcontroller programming can be used for design, analysis and development of electronic sytem.
CO4-PSO2	1	Programming in embedded controllers and use of better resources can help to design complex electronic systems.
CO5-PO1	1	Graduate is able to develop solutions to complex problems using memory management
CO5-PO12	1	By acquiring the knowledge in system software,memory and I/O module, more processors can be studied and used according to technological change

5/12/21

Prepared by (Faculty Name & Signature) :Sunitha S Pillai

Verified by : Stream Coordination Committee

10/12/2021
Dr. Gibu John
DAC convenor

COURSE CODE: EST 200	COURSE NAME: DESIGN AND ENGINEERING	SEMESTER: 4

Pre-requisite:

Course Outcome: After the successful completion of this course, the student will be able to:

CO.1	Explain the different concepts and principles involved in design engineering.
CO.2	Apply design thinking while learning and practicing engineering.
CO.3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.

CO-PO matrices

COURSE CODE: EST 200			COURSE NAME: DESIGN AND ENGINEERING									SEMESTER: 4		
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
EST200.1	2	1	-	-	-	-	1	-	-	1	-	-		
EST200.2	-	2	-	-	-	1	-	1	-	-	-	2		
EST200.3	-	-	2	-	-	1	1	-	2	2	-	1		

JUSTIFICATION FOR CO-PO MAPPING:

CO	PO	LEVEL	REMARKS
CO.1	PO1	2	Illustrate the different concept and principles in Design Engineering.
	PO2	1	Analyze the different concepts in Design Engineering, in order to choose best design solution.
	PO7	1	Apply the different concepts and principles in Design Engineering to develop a sustainable design solution.
	PO10	1	Communicating the numerous design solutions developed by the designer effectively to the client through proper documentation.
CO.2	PO2	2	Analyze the different design thinking approaches, inorder to reach a sustainable design solution.
	PO6	1	Apply the design thinking approach to develop design solution in context with societal needs and aspects.
	PO8	1	Apply ethical principles while proposing design solution to the client, by following norms of engineering practices.
	PO12	2	Use the knowledge in design engineering through out the phase of career development and provide effectual problem solution to the habitué.
CO.3	PO3	2	Evaluate the various adaptive and development level design to formulate a new design solution.
	PO6	1	Apply the design thinking approach to develop design solution in context with societal needs and aspects.
	PO7	1	Apply the proficiency in Design Engineering to develop a sustainable design solution.
	PO9	2	Construct design solution efficaciously in team environment or as an individual.
	PO10	2	Communicating the numerous design solutions developed by the designer effectively to the client through proper documentation.
	PO12	1	Use the knowledge in design engineering through out the phase of career development and provide effectual problem solution to the habitué.

Prepared by
Sreesh. P.R
2/12/21

Verified by
SUNITHA S PILLAI

12/12/2021
Dr. Giby Jose
DAC convener

MAT 204	PROBABILITY DISTRIBUTIONS, RANDOM PROCESSES AND NUMERICAL METHODS	L	T	P	CREDIT	Year of Introduction
		3	1	0	4	2019

Prerequisite: A basic course in one-variable and multi-variable calculus.

Course Outcomes: After the completion of the course the student will be able to

CO1	Understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena.
CO2	Understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena
CO3	Analyse random processes using autocorrelation, power spectrum and Poisson process model as appropriate.
CO4	Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques
CO5	Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations

Mapping of course outcomes with program outcomes (Minimum requirement)

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	2	2	2	2	-	-	-	-	2	-	1	1	
CO 2	3	2	2	2	2	-	-	-	-	2	-	1	1	
CO 3	3	2	2	2	2	-	-	-	-	2	-	1	1	
CO 4	3	2	2	2	2	-	-	-	-	2	-	1	1	
CO 5	3	2	2	2	2	-	-	-	-	2	-	1	1	
AVERAGE	3	2	2	2	2					2		1	1	

Justification for CO-PO Mapping.

Mapping	LOW/ MEDIUM/ HIGH	Justification
CO1-PO1	HIGH	By understanding the theory of discrete random variable helps in analysis of performance of solutions to complex engineering problems.
CO1-PO2	MEDIUM	By understanding the theory of discrete random variable helps to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions.
CO1-PO3	MEDIUM	By understanding the theory of discrete random variable helps in design solutions for complex engineering problems
CO1-PO4	MEDIUM	By understanding the theory of discrete random variable helps in using research-based knowledge and research methods for analysis and interpretation of data and synthesis of the information to provide valid conclusions
CO1-PO5	MEDIUM	By understanding the theory of discrete random variable helps in modelling complex engineering activities
CO1-PO10	MEDIUM	By understanding the theory of discrete random variable helps to make effective presentations and give and receive clear instructions.
CO1-PO12	LOW	By understanding the theory of discrete random variable helps in lifelong learning
CO1-PSO1	LOW	By understanding the theory of discrete random variable helps to apply fundamental knowledge of electronics and communication engineering in design, analysis and development of various system
CO2-PO1	HIGH	By understanding the theory of continuous random variable helps in analysis of performance of solutions to complex engineering problems.
CO2-PO2	MEDIUM	By understanding the theory of continuous random variable to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions.
CO2-PO3	MEDIUM	By understanding the theory of continuous random variable helps in design solutions for complex engineering problems
CO2-PO4	MEDIUM	By understanding the theory of continuous random variable helps in using research-based knowledge and research methods for analysis and interpretation of

		data and synthesis of the information to provide valid conclusions
CO2-PO5	MEDIUM	By understanding the theory of continuous random variable helps in modelling complex engineering activities
CO2-PO10	MEDIUM	By understanding the theory of continuous random variable
CO2-PO12	LOW	By understanding the theory of continuous random variable helps in lifelong learning
CO2-PSO1	LOW	By understanding the theory of continuous random variable helps to apply fundamental knowledge of electronics and communication engineering in design, analysis and development of various system
CO3 -PO1	HIGH	By understanding the theory of random processes helps in analysis of performance of solutions to complex engineering problems.
CO3-PO2	MEDIUM	By understanding the theory of random processes to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions.
CO3-PO3	MEDIUM	By understanding the theory of random processes helps in design solutions for complex engineering problems
CO3-PO4	MEDIUM	By understanding the theory of random processes helps in using research-based knowledge and research methods for analysis and interpretation of data and synthesis of the information to provide valid conclusions
CO3-PO5	MEDIUM	By understanding the theory of random processes helps in modelling complex engineering activities
CO3-PO10	MEDIUM	By understanding the theory of random processes
CO3-PO12	LOW	This knowledge of random processes helps in lifelong learning
CO3-PSO1	LOW	By understanding the theory of random processes helps to apply fundamental knowledge of electronics and communication engineering in design,analysis and development of various system
CO4-PO1	HIGH	By understanding the theory of computing roots of equations evaluation of definite integrals and interpolation on given numerical data helps in analysis of performance of solutions to complex engineering problems.
CO4-PO2	MEDIUM	By understanding the theory of computing roots of equations evaluation of definite integrals and interpolation on given numerical data to identify,

		formulate, research literature and analyse complex engineering problems reaching substantiated conclusions.
CO4-PO3	MEDIUM	By understanding the theory of computing roots of equations evaluation of definite integrals and interpolation on given numerical data helps in design solutions for complex engineering problems
CO4-PO4	MEDIUM	By understanding the theory of computing roots of equations evaluation of definite integrals and interpolation on given numerical data helps in using research based knowledge and research methods for analysis and interpretation of data and synthesis of the information to provide valid conclusions
CO4-PO5	MEDIUM	By understanding the theory of computing roots of equations evaluation of definite integrals and interpolation on given numerical data helps in modelling complex engineering activities
CO4-PO10	MEDIUM	By understanding the theory of computing roots of equations evaluation of definite integrals and interpolation on given numerical data
CO4-PO12	LOW	By understanding the theory of computing roots of equations evaluation of definite integrals and interpolation on given numerical data helps in lifelong learning
CO4-PSO1	LOW	By understanding the theory of computing roots of equations evaluation of definite integrals and interpolation on given numerical data helps to apply fundamental knowledge of electronics and communication engineering in design,analysis and development of various system
CO5-PO1	HIGH	By understanding the theory of standard numerical techniques fitting curves, solving system of equations and solving ODE helps in analysis of performance of solutions to complex engineering problems.
CO5-PO2	MEDIUM	By understanding the theory of standard numerical techniques fitting curves, solving system of equations and solving ODE to identify, formulate, research literature and analyse complex engineering problems reaching substantiated conclusions.
CO5-PO3	MEDIUM	By understanding the theory of standard numerical techniques fitting curves, solving system of equations and solving ODE helps in design solutions for complex engineering problems
CO5-PO4	MEDIUM	By understanding the theory of standard numerical techniques fitting curves, solving system of equations

		and solving ODE helps in using research based knowledge and research methods for analysis and interpretation of data and synthesis of the information to provide valid conclusions
CO5-PO5	MEDIUM	By understanding the theory of standard numerical techniques fitting curves, solving system of equations and solving ODE helps in modelling complex engineering activities
CO5-PO10	MEDIUM	By understanding the theory of standard numerical techniques fitting curves, solving system of equations and solving ODE
CO5-PO12	LOW	By understanding the theory of standard numerical techniques fitting curves , solving system of equations and solving ODE helps in lifelong learning
CO5-PSO1	LOW	By understanding the theory of standard numerical techniques fitting curves, solving system of equations and solving ODE6 helps to apply fundamental knowledge of electronics and communication engineering in design,analysis and development of various system

Prepared by (Faculty Name & Signature) : Fr. Vinod

Verified by : Stream Coordination Committee

ST. JOSEPH'S COLLEGE OF ENGINEERING AND TECHNOLOGY, -PALAI-

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Department of Electronics & Communication Engineering

Programme : Bachelor of Technology
Course Code: MCN202
Course Name: Constitution of India
Semester: 4

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
MCN202.1	Explain the background of the present constitution of India and features.	K2
MCN202.2	Utilize the fundamental rights and duties.	K3
MCN202.3	Understand the working of the union executive, parliament and judiciary.	K2
MCN202.4	Understand the working of the state executive, legislature and judiciary	K2
MCN202.5	Utilize the special provisions and statutory institutions	K3
MCN202.6	Show national and patriotic spirit as responsible citizens of the country.	K3

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO 3
CO1	-	-	-	-	-	2	2	2	-	2	-	-	-	-	-
CO2	-	-	-	-	-	3	3	3	-	3	-	-	-	-	-
CO3	-	-	-	-	-	3	2	3	-	3	-	-	-	-	-
CO4	-	-	-	-	-	3	2	3	-	3	-	-	-	-	-
CO5	-	-	-	-	-	3	2	3	-	3	-	-	-	-	-
CO6	-	-	-	-	-	3	3	3	-	2	-	-	-	-	-
AVG	-	-	-	-	-	2.83	2.33	2.83	-	2.66	-	-	-	-	-

Correlation : 1-Low, 2-Moderate, 3-High, No Correlation '-'

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Department of Electronics & Communication Engineering

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
MCN202.1-PO6	M	Understanding the background of the present constitution of India and its features, students are expected to apply the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
MCN202.1-PO7	M	Understanding the background of the present constitution of India and its features, students are expected to treat sustainable development is an integral part of life under article 21 of Indian Constitution.
MCN202.1-PO8	M	Understanding the background of the present constitution of India and its features, students are expected to show ethical values like integrity, transparency, accountability, impartiality, public welfare and equity which are the guiding principles of Indian constitution.
MCN202.1-PO10	M	Understanding the background of the present constitution of India and its features, students are expected to communicate judgements of various landmark cases and the amendments of articles in the constitution.
MCN202.2-PO6	H	Knowledge gained from the study of fundamental rights and duties, students are expected to apply the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
MCN202.2-PO7	H	Knowledge gained from the study of fundamental rights and duties; students are expected to practice

		the duty imposed on every citizen to protect environment as stated in Article 48 A.
MCN202.2-PO8	H	Knowledge gained from the study of fundamental rights and duties, students are expected to issue public statements in an objective and truthful manner.
MCN202.2-PO10	H	Knowledge gained from the study of fundamental rights and duties; students are expected to raise their voice effectively if the fundamental rights are denied and also communicate the fundamental duties one should perform.
MCN202.3-PO6	H	Understand the working of the union executive, parliament and judiciary, students are expected to apply the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
MCN202.3-PO7	M	With the knowledge gained from the working of the union executive, parliament and judiciary, students are expected to understand the key role played in achieving the development goals and targets through, for instance, setting and implementing water quality policy frameworks and standards, and regulating the discharge of pollutants into the environment and wastewater management, recycling and reuse.
MCN202.3-PO8	H	With the knowledge gained from the working of the union executive, parliament and judiciary, students are expected to understand the government ethics applies to the process, behavior, and policy of governments and the public officials who serve in elected or appointed positions. It also covers issues of honesty and transparency in government, dealing with matters such as bribery, political corruption, police corruption, legislative ethics, regulatory ethics, conflict of interest, avoiding the appearance of impropriety, open government and legal ethics.

MCN202.3-PO10	H	With the knowledge gained from the working of the union executive, parliament and judiciary, students are expected to understand the government communication involves not only sending out persuasive messages to the public, but also explaining working policies, creating awareness of the rights of the citizens, and developing mechanisms that enable two-way communication between citizen and government.
MCN202.4-PO6	H	Understand the working of the state executive, legislature and judiciary, students are expected to apply the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
MCN202.4-PO7	M	With the knowledge gained from the working of the state executive, legislature and judiciary, students are expected to understand the key role played in achieving the development goals and targets through, for instance, setting and implementing water quality policy frameworks and standards, and regulating the discharge of pollutants into the environment and wastewater management, recycling and reuse.
MCN202.4-PO8	H	With the knowledge gained from the working of the state executive, legislature and judiciary, students are expected to understand the government ethics applies to the process, behavior, and policy of governments and the public officials who serve in elected or appointed positions. It also covers issues of honesty and transparency in government, dealing with matters such as bribery, political corruption, police corruption, legislative ethics, regulatory ethics, conflict of interest, avoiding the appearance of impropriety, open government and legal ethics.
MCN202.4-PO10	H	With the knowledge gained from the working of the state executive, legislature and judiciary, students are expected to understand the government

		communication involves not only sending out persuasive messages to the public, but also explaining working policies, creating awareness of the rights of the citizens, and developing mechanisms that enable two-way communication between citizen and government.
MCN202.5-PO6	H	With the knowledge gained on special provisions and statutory institutions, the students are expected to understand that the State shall promote with special care the educational and economic interests of the weaker sections of the society and in particular, of the Scheduled Castes and Scheduled Tribes and shall protect them from social injustice and all forms of exploitation.
MCN202.5-PO7	M	With the knowledge gained on special provisions and statutory institutions, the students are expected to understand that the State shall endeavor to protect and improve the environment. Various cases include Bhopal gas leakage tragedy, Taj Mahal case.
MCN202.5-PO8	H	With the knowledge gained on special provisions and statutory institutions, the students are expected to understand that the various statutory institutions and ethical practices followed; SEBI issued a code on conflicts of interests for members on board of the regulator.
MCN202.5-PO10	H	With the knowledge gained on special provisions and statutory institutions, the students are expected to understand that in most cases the justification for creation of a statutory body to give advice to Government is to introduce expertise of a particular kind or kinds into the decision-making process.
MCN202.6-PO6	H	After the completion of the course, the students are expected to show national and patriotic spirit as responsible citizens of the country – helping the country to do better; supporting and being responsible for your family, your community and all levels of government with your willingness to work, to volunteer, to pay your share of taxes and pay.

Department of Electronics & Communication Engineering

MCN202.6-PO7	H	After the completion of the course, the students are expected to show national and patriotic spirit as responsible citizens of the country – helping the country to do better; rise of social movements that closely connect problems of environment protection with nationalist concerns - Eco-nationalism.
MCN202.6-PO8	H	After the completion of the course, the students are expected to show national and patriotic spirit as responsible citizens of the country – helping the country to do better; supporting and being responsible for your family, your community and all levels of government with your willingness to work, to volunteer, to pay your share of taxes and pay, fight against corruptions.
MCN202.6-PO10	M	After the completion of the course, the students are expected to show national and patriotic spirit as responsible citizens of the country – helping the country to do better; fight against corruptions, raise the voice if your fundamental rights are denied, organize campaigns to create awareness among illiterate ones about their fundamental rights and duties.

Prepared by (Faculty Name & Signature) : Tom Jyothy 2/12/21

Verified by : Stream Coordination Committee SUNITHA S PILLAI 2/12/21

10/12/2021
Dr. Gibu Jose
DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

UNIVERSITY PRESCRIBED CO'S AND CO-PO MATRIX

Programme : **B.Tech**

Semester : **Fifth**

Course Title : **ANALOG INTEGRATED CIRCUITS AND SIMULATION LAB**
Course Code : **ECL 331**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO1	Use data sheets of basic Analog Integrated Circuits and design and implement Application circuits using Analog ICs.	K3
CO2	Design and simulate the application circuits with Analog Integrated Circuits using simulation tools.	K3
CO3	Function effectively as an individual and in a team to accomplish the given task.	K3

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	-	-				2	-	-	2	3	-
CO2	3	3	3	2	3				2	-	-	2	3	3
CO3	2	2	2	-	2				3	2	-	3	2	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level 3/2/1	JUSTIFICATION
CO1-PO1	3	STUDENTS ARE EXPECTED TO APPLY THE ENGINEERING FUNDAMENTALS TO DESIGN AND IMPLEMENT APPLICATION CIRCUITS USING ANALOG INTEGRATED CIRCUITS
CO1-PO2	3	STUDENTS ARE EXPECTED TO IDENTIFY AND RESOLVE PROBLEMS IF ANY IN DIFFERENT APPLICATION CIRCUITS USING ANALOG INTEGRATED CIRCUITS DESIGNED AND SETUP BY THEM

CO1-PO3	3	GRADUATES ARE MADE CAPABLE OF DESIGNING SOLUTIONS FOR VARIOUS PROBLEMS USING THE CONCEPTS OF ANALOG INTEGRATED CIRCUITS
CO1-PO9	2	STUDENTS ARE EXPECTED TO FUNCTION EFFECTIVELY AS AN INDIVIDUAL AND A SMALL TEAMS FOR DESIGN AND IMPLEMENTATION OF ANALOG INTEGRATED CIRCUITS
CO1-PO12	2	GOING BEYOND THE FUNCTION OF ANALOG INTEGRATED CIRCUITS THE STUDENTS ARE PROVIDED THE KNOWLEDGE TO PURSUE FURTHER RESEARCH AND STUDIES IN THE FIELD OF AICs.
CO2-PO1	3	GRADUATES WILL BE ABLE TO APPLY THE ENGINEERING FUNDAMENTS TO DESIGN AND SIMULATE THE APPLICATION CIRCUITS WITH AICs AND SIMULATION TOOLS.
CO2-PO2	3	GRADUATED ARE EQUIPPED TO IDENTIFY AND FORMULATE PROBLEMS THAT CAN OCCUR IN VARIOUS AICs.
CO2-PO3	3	GRADUATES ARE MADE CAPABLE OF DESIGNING SOLUTIONS FOR VARIOUS PROBLEMS USING ANALOG INTEGRATED CIRCUITS
CO2-PO4	2	GRADUATES ARE ABLE TO DESIGN ANALOG INTEGRATED CIRCUITS.
CO2-PO5	3	GRADUATES WILL BE ABLE TO USE RESOURSES AND MODERN TOOLS AS AN INDIVIDUAL AND TEAMS TO DO VARIOUS EXPERIMENTS IN AICs.
CO2-PO9	2	GRADUATES WILL BE ABLE TO FUNCTION EFFECTIVELY AS AN INDIVIDUAL AND IN ATEAM DURING THE IMPLEMENTATION OF ANALOG CIRCUITS USING SIMULATION TOOLS
CO2-PO12	2	GOING BEYOND THE FUNCTION OF ANALOG INTEGRATED CIRCUITS USING SIMULATION TOOLS THE STUDENTS ARE PROVIDED THE KNOWLEDGE TO PURSUE FURTHER RESEARCH AND STUDIES IN THE FIELD OF AICs BASED ON SIMULATION TOOLS.

CO3-PO1	2	GRADUATES ARE ABLE TO UTILIZE ENGG.KNOWLEDGE TO UNDERSTAND THE CONCEPTS OF AICs.
CO3-PO2	2	GRADUATED WILL BE ABLE TO ANALYZE VARIOUS PROBLEMS USING THE CONCEPTS OF AICs.
CO3-PO3	2	GRADUATED ARE MADE CAPABLE OF DESIGNING SOLUTIONS FOR VARIOUS PROBLEMS BY FUCTION EFFECTIVELY AS AN INDIVIDULA AND A TEAM TO DO VARIOUS ANALOG INTEGRATED CIRCUITS
CO3-PO5	2	GRADUATES WILL BE ABLE TO USE MODERN TOOLS AS AN INDIVIDUAL AND TEAMS TO DO VARIOUS EXPERIMENTS IN AICs.
CO3-PO9	3	GRADUATES WILL BE ABLE TO FUNCTION EFFECTIVELY AS AN INDIVIDUAL AND IN ATEAM DURING THE IMPLEMENTATION OF ANALOG CIRCUITS
CO3-PO10	2	GRADUATES ARE ABLE TO DESIGN VARIOUS DOCUMENTATION OF THE VARIOUS EXPERIMENTS AS AN INDIVIDUAL AND A TEAM.
CO3-PO12	3	GOING BEYOND THE FUNCTION OF ANALOG INTEGRATED CIRCUITS THE STUDENTS ARE PROVIDED THE KNOWLEDGE TO PURSUE FURTHER RESEARCH AND STUDIES AS AN INDIVIDUAL AND A TEAM IN THE FIELD OF AICs.
CO1-PSO1	3	STUDENTS ARE EXPECTED TO APPLY THE ENGINEERING FUNDAMENTALS TO DESIGN AND IMPLEMENT APPLICATION CIRCUITS USING ANALOG INTEGRATED CIRCUITS
CO2-PSO1	3	GRADUATES WILL BE ABLE TO APPLY THE ENGINEERING FUNDAMENTS TO DESIGN AND SIMULATE THE APPLICATION CIRCUITS WITH AICs AND SIMULATION TOOLS.
CO3-PSO1	2	GRADUATES ARE ABLE TO UTILIZE ENGG.KNOWLEDGE TO UNDERSTAND THE CONCEPTS OF AICs.
CO2-PSO2	3	GRADUATES WILL BE ABLE TO USE RESOURSES AND MODERN TOOLS AS AN INDIVIDUAL AND TEAMS TO DO VARIOUS EXPERIMENTS IN AICs.

CO3-PSO2	2	GRADUATES WILL BE ABLE TO USE MODERN TOOLS AS AN INDIVIDUAL AND TEAMS TO DO VARIOUS EXPERIMENTS IN AICs.

Prepared by (Faculty Name & Signature): Jacob Thomas 5/12/21

Verified by: Stream Coordination Committee

10/12/2021
Dr. Ruby Jose
DAC convener

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ECL 333: Digital Signal Processing Laboratory

Semester : 5

Course Title : Digital Signal Processing Laboratory

Course Code : ECL 333

Course Outcomes (CO)

After the successful completion of this course, students will able

No.	Course outcomes	Knowledge Level
ECL 333.1	Simulate digital signals	K_3
ECL 333.2	Verify the properties of DFT Computationally	K_3
ECL 333.3	Familiarize the DSP hardware and interface with computer	K_2
ECL 333.4	Implement LTI systems with linear convolution	K_3
ECL 333.5	Implement FFT and IFFT and use it on real time signals.	K_3
ECL 333.6	Implement FIR low pass filters	K_3
ECL 333.7	Implement real time LTI systems with block convolution and FFT	K_3

PROGRAM SPECIFIC OUTCOME (PSO)

The graduates of the department will accomplish:

PSO1: Apply Fundamental Knowledge of Electronics and Communication Engineering in the design, analysis and development of various electronic systems

PSO2: Use modern software and hardware tools in electronics engineering for the analysis of complex electronic systems

CO – PO - PSO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
ECL333.1	3	3	1	2	3	-	-	-	3	-	-	1	1	1
ECL333.2	3	3	1	2	3	-	-	-	3	-	-	1	1	1
ECL333.3	3	3	3	2	3	-	-	-	3	1	-	1	1	1
ECL333.4	3	3	1	2	3	-	-	-	3	-	-	1	1	1
ECL333.5	3	3	1	1	3	-	-	-	-	-	-	1	1	1
ECL333.6	3	3	1	1	3	-	-	-	-	-	-	1	1	1
ECL333.7	3	3	1	3	3	-	-	-	3	3	-	-	1	1

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping level (3/2/1)	Justifications
CO1-PO1	3	Students will be able to simulate digital signals which helps in solving complex signal processing problems
CO2-PO1	3	Students will be able to apply DFT based mathematical models in solving complex signal processing problems
CO3-PO1	3	Students will be able to use DSP hardware which helps in solving complex signal processing problems
CO4-PO1	3	Students will be able implement LTI systems which helps in solving complex signal processing problems
CO5-PO1	3	Students will be able implement real time systems which helps in solving complex signal processing problems
CO6-PO1	3	Students will be able implement Low pass filter which helps in solving complex signal processing problems
CO7-PO1	3	Students will be able implement efficient real time systems which helps in solving complex signal processing problems
CO1-PO2	3	Students will be able to simulate digital signals which helps to analyse complex signal processing problems
CO2-PO2	3	Students will be able to apply DFT based mathematical models to analyse complex signal processing problems
CO3-PO2	3	Students will be able to use DSP hardware which helps to analyse complex signal processing problems

CO4-PO2	3	Students will be able to apply the knowledge of LTI systems which helps to analyse complex signal processing problems
CO5-PO2	3	Students will be able to apply the knowledge of real time systems which helps to analyse complex signal processing problems
CO6-PO2	3	Students will be able to apply the knowledge of Low pass filter which helps to analyse complex signal processing problems
CO7-PO2	3	Students will be able implement efficient real time systems which helps to analyse solving complex signal processing problems
CO1-PO3	1	Students will be able to simulate digital signals which helps in designing solution to complex signal processing problems
CO2-PO3	1	Students will be able to apply DFT based mathematical models in designing solution to complex signal processing problems
CO3-PO3	1	Students will be able to use DSP hardware which helps in designing solution to complex signal processing problems
CO4-PO3	1	Students will be able implement LTI systems which helps in designing solution to complex signal processing problems
CO5-PO3	1	Students will be able implement real time systems which helps in designing solution to complex signal processing problems
CO6-PO3	1	Students will be able implement Low pass filter which helps in designing solution to complex signal processing problems
CO7-PO3	1	Students will be able implement efficient real time systems which helps in designing solution to complex signal processing problems
CO1-PO4	2	Helps in conducting investigation of complex problems in signal processing
CO2-PO4	2	Helps in conducting investigation of complex problems in signal processing
CO3-PO4	2	Helps in conducting investigation of complex problems in signal processing
CO4-PO4	2	Helps in conducting investigation of complex problems in signal processing
CO5-PO4	1	Helps in conducting investigation of complex problems in signal processing
CO6-PO4	1	Helps in conducting investigation of complex problems in signal processing
CO7-PO4	3	Students will be able to use modern tools to model Digital signal processing systems
CO1-PO5	3	Students will be able to use modern tools to model Digital signal processing systems
CO2-PO5	3	Students will be able to use modern tools to model Digital signal processing systems
CO3-PO5	3	Students will be able to use modern tools to model Digital signal processing systems
CO4-PO5	3	Students will be able to use modern tools to model Digital signal processing systems
CO5-PO5	3	Students will be able to use modern tools to model Digital signal processing systems

CO6-PO5	3	Students will be able to use modern tools to model Digital signal processing systems
CO7-PO5	3	Students will be able to use modern tools to model Digital signal processing systems
CO1-PO9	3	Helps in understanding the fundamental concepts of communication engineering for further analysis and development
CO2-PO9	3	Helps in understanding the fundamental concepts of communication engineering for further analysis and development
CO3-PO9	3	Helps in understanding the fundamental concepts of communication engineering for further analysis and development
CO4-PO9	3	Helps in understanding the fundamental concepts of communication engineering for further analysis and development
CO7-PO9	3	Helps in understanding the fundamental concepts of communication engineering for further analysis and development
CO3-PO10	1	Students will be able to communicate effectively on Digital signal processing system hardware.
CO7-PO10	3	Students will be able to communicate effectively Digital signal processing system design
CO1-PO12	1	Helps in lifelong learning in the context of technological change
CO2-PO12	1	Helps in lifelong learning in the context of technological change
CO3-PO12	1	Helps in lifelong learning in the context of technological change
CO4-PO12	1	Helps in lifelong learning in the context of technological change
CO5-PO12	1	Helps in lifelong learning in the context of technological change
CO6-PO12	1	Helps in lifelong learning in the context of technological change
CO1-PSO1	1	Students will be able to simulate digital signals which helps in developing digital signal processing systems
CO2-PSO1	1	Students will be able to apply DFT based mathematical models in developing digital signal processing systems
CO3-PSO1	1	Students will be able to use DSP hardware which helps in developing digital signal processing systems
CO4-PSO1	1	Students will be able implement LTI systems which helps in developing digital signal processing systems
CO5-PSO1	1	Students will be able implement real time systems which helps in developing digital signal processing systems
CO6-PSO1	1	Students will be able implement Low pass filter which helps in developing digital signal processing systems
CO7-PSO1	1	Students will be able implement efficient real time systems which helps in developing digital signal processing systems.
CO1-PSO2	1	Students will be able to use modern software tools to analyse digital signal processing systems

CO2-PSO2	1	Students will be able to use modern software tools to analyse digital signal processing systems
CO3-PSO2	1	Students will be able to use modern software tools to analyse digital signal processing systems
CO4-PSO2	1	Students will be able to use modern software tools to analyse digital signal processing systems
CO5-PSO2	1	Students will be able to use modern software tools to analyse digital signal processing systems
CO6-PSO2	1	Students will be able to use modern software tools to analyse digital signal processing systems
CO7-PSO2	1	Students will be able to use modern software tools to analyse digital signal processing systems

Prepared by (Faculty Name & Signature) : Sanju Sebastian 12/10/21

Verified by : Stream Coordination Committee DR. Bibi Jose 12/10/21

12/10/2021
Dr. Bibi Jose
DAC convenor

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

UNIVERSITY PRESCRIBED CO'S AND CO-PO MATRIX

Programme : **B.Tech**

Semester :**FIFTH**

Course Title : **LINEAR INTEGRATED CIRCUITS**

Course Code : **ECT 301**

No.	Course outcomes	Knowledge Level
CO1	Understand Op-amp fundamentals and differential amplifier configurations	K2
CO2	Design operational amplifier circuits for various applications	K3
CO3	Design oscillators and active filters using op-amps	K3
CO4	Explain the working and applications of timer, VCO and PLL ICs	K2
CO5	Outline the working of voltage regulator ICs and Data converters	K2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	1	2	-	-	-	-	-	-	-	1	3	2
CO2	3	3	2	2	2	-	-	-	-	-	-	1	3	2
CO3	3	3	2	2	2	-	-	-	-	-	-	1	3	2
CO4	3	3	1	2	2	-	-	-	-	-	-	1	3	2
CO5	3	3	2	2	2	-	-	-	-	-	-	1	3	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	3	Students are expected to apply the knowledge of mathematics and engineering fundamentals to understand Op-amp fundamentals and differential amplifier configurations
CO1 - PO2	3	Students are equipped to identify and formulate problems based on the concepts of various analog circuits using op-amp
CO1-PO3	1	Students are expected to design solutions for engineering problems using op-amp fundamentals and differential amplifier configurations
CO1-PO4	2	Students are expected to use research-based knowledge and methods including analysis to understand op-amp fundamentals and differential amplifier configurations
CO1-PO12	1	Students should develop the ability to engage in life long learning of various analog systems
CO1 - PSO1	3	Students are expected to apply the fundamental knowledge of op-amp fundamentals and differential amplifier configurations for the development of various electronic systems
CO1 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of op-amp fundamentals and differential amplifier configurations
CO2 - PO1	3	Students are expected to apply the engineering fundamentals and mathematics to design operational amplifier circuits for various applications
CO2 - PO2	3	Students are equipped to identify, formulate and analyze the problems that can occur during the design of operational amplifier circuits for various applications
CO2– PO3	2	Students are expected to design solutions for engineering problems using operational amplifier circuits that meet the specified needs
CO2-PO4	2	Students are expected to use research-based knowledge and methods including analysis to design operational amplifier circuits for various applications
CO2-PO5	2	Students are expected to use modern software and hardware tools for the analysis and design of operational amplifier circuits for various applications
CO2-PO12	1	Students should develop the ability to engage in life long learning of design of operational amplifier circuits for various applications
CO2 - PSO1	3	Students are expected to apply the fundamental knowledge of operational amplifier circuits for the development of various electronic systems
CO2– PSO2	2	Students are expected to use modern software and hardware tools for the analysis and design of operational amplifier circuits for various applications
CO3 - PO1	3	Students are expected to apply the engineering fundamentals and mathematics to design oscillators and active filters using op-amps

CO3 - PO2	3	Students are equipped to identify, formulate and analyze the problems that can occur during the design of oscillators and active filters using op-amps.
CO3– PO3	2	Students are expected to design solutions for engineering problems using oscillators and active filters that meet the specified needs
CO3-PO4	2	Students are expected to use research-based knowledge and methods including analysis to design oscillators and active filters using op-amps
CO3-PO5	2	Students are expected to use modern software and hardware tools for the analysis and design of oscillators and active filters using op-amps
CO2-PO12	1	Students should develop the ability to engage in life long learning of design of operational amplifier circuits for various applications
CO3 - PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the design of oscillators and active filters using op-amps
CO3 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of oscillators and active filters using op-amps
CO4- PO1	3	Students are expected to apply the engineering fundamentals and mathematics to design timer, VCO and PLL ICs
CO4- PO2	3	Students are equipped to identify, formulate and analyze the problems that can occur during the design of timer, VCO and PLL ICs
CO4– PO3	1	Students are expected to design solutions for engineering problems using timer, VCO and PLL ICs that meet the specified needs
CO3-PO4	2	Students are expected to use research-based knowledge and methods including analysis to design timer, VCO and PLL ICs
CO3-PO5	2	Students are expected to use modern software and hardware tools for the analysis and design of timer, VCO and PLL ICs
CO2-PO12	1	Students should develop the ability to engage in life long learning of design of operational amplifier circuits for various applications
CO4 - PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the design of timer, VCO and PLL ICs
CO4 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of timer, VCO and PLL ICs
CO5- PO1	3	Students are expected to apply the engineering fundamentals and mathematics to design voltage regulator ICs and Data converters
CO5 - PO2	3	Students are equipped to identify, formulate and analyze the problems that can occur during the design of voltage regulator ICs and Data converters
CO5 – PO3	2	Students are expected to design solutions for engineering problems using voltage regulator ICs and Data convertersthat meet the specified needs
CO5-PO4	2	Students are expected to use research-based knowledge and methods including analysis to design voltage regulator ICs and Data converters
CO5- PO5	2	Students are expected to use modern software and hardware tools for the analysis and design of voltage regulator ICs and Data converters
CO5-PO12	1	Students should develop the ability to engage in life long learning of design of operational amplifier circuits for various applications
CO5 - PSO1	3	Students are expected to apply the fundamental knowledge of analog circuits for the design of voltage regulator ICs and Data converters

CO5– PSO2	2	Students are expected to use modern software and hardware tools for the analysis of voltage regulator ICs and Data converters

Prepared by (Faculty Name & Signature) : 10/12/21 Nitha. M. Biju.

Verified by : Stream Coordination Committee

10/12/2021
Dr. Binby Jose
DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ECT 303: Digital Signal Processing

Semester : 5

Course Title : Digital Signal Processing

Course Code : ECT 303

Course Outcomes (CO)

After the successful completion of this course, students will able

No.	Course outcomes	Knowledge Level
ECT 303.1	State and prove the fundamental properties and relations relevant to DFT and solve basic problems involving DFT based filtering methods	K_2
ECT 303.2	Compute DFT and IDFT using DIT and DIF radix-2 FFT algorithms	K_2
ECT 303.3	Design Linear phase FIR filters and IIR filters for a given specification	K_3
ECT 303.4	Illustrate the various FIR and IIR filter structures for the realization of the given system function	K_3
ECT 303.5	Explain the basic multi-rate DSP operations decimation and interpolation in both time and frequency domains using supported mathematical equations	K_2
ECT 303.6	Explain the architecture of DSP Processor(TMS320C67xx) and the finite word length effects	K_2

PROGRAM SPECIFIC OUTCOME (PSO)

The graduates of the department will accomplish:

PSO1: Apply Fundamental Knowledge of Electronics and Communication Engineering in the design, analysis and development of various electronic systems

PSO2: Use modern software and hardware tools in electronics engineering for the analysis of complex electronic systems

CO – PO - PSO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
ECT303.1	3	3	2	-	2	-	-	-	-	-	-	2	1	-
ECT303.2	3	3	3	-	3	-	-	-	-	-	-	2	1	-
ECT303.3	3	3	3	-	3	-	-	-	-	-	-	2	1	-
ECT303.4	3	3	2	-	3	-	-	-	-	-	-	2	1	-
ECT303.5	2	2	2	-	2	-	-	-	-	-	-	2	1	-
ECT303.6	2	2	-	-	-	-	-	-	-	-	-	2	1	-

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping level (3/2/1)	Justifications
CO1-PO1	3	Students will be able to apply the knowledge of DFT in solving complex signal processing problems
CO2-PO1	3	Students will be able to apply the knowledge of FFT in solving complex signal processing problems
CO3-PO1	3	Students will be able to apply the knowledge of filter design in solving complex signal processing problems
CO4-PO1	3	Students will be able to illustrate filter structures for solving complex signal processing problems
CO5-PO1	2	Students will be able to apply the knowledge of multi-rate DSP operations in solving complex signal processing problems
CO6-PO1	2	Students will be able to apply the knowledge of DSP processor in solving complex signal processing problems
CO1-PO2	3	Students will be able to apply the knowledge of DFT to analyse complex signal processing problems
CO2-PO2	3	Students will be able to apply the knowledge of FFT to analyse complex signal processing problems
CO3-PO2	3	Students will be able to apply the knowledge of filter design to analyse complex signal processing problems
CO4-PO2	3	Students will be able to illustrate filter structures to analyse complex signal processing problems
CO5-PO2	2	Students will be able to apply the knowledge of multi-rate DSP operations to analyse complex signal processing problems
CO6-PO2	2	Students will be able to apply the knowledge of DSP processor to analyse complex signal processing problems

CO1-PO3	2	Students will be able to apply the knowledge of DFT to design solution for complex signal processing problems
CO2-PO3	3	Students will be able to apply the knowledge of FFT to design solution for complex signal processing problems
CO3-PO3	3	Students will be able to apply the knowledge of filter design to design solution for complex signal processing problems
CO4-PO3	2	Students will be able to illustrate filter structures to design solution for complex signal processing problems
CO5-PO3	2	Students will be able to apply the knowledge of multi-rate DSP operations to design solution for complex signal processing problems
CO1-PO5	2	Students will be able to simulate DFT using Modern tools
CO2-PO5	3	Students will be able to simulate FFT using Modern tools
CO3-PO5	3	Students will be able to simulate Filter Design using Modern tools
CO4-PO5	3	Students will be able to simulate filter structures using Modern tools
CO5-PO5	2	Students will be able to simulate the multi-rate DSP operations using Modern tools
CO1-PO12	2	Helps in lifelong learning in the context of technological change
CO2-PO12	2	Helps in lifelong learning in the context of technological change
CO3-PO12	2	Helps in lifelong learning in the context of technological change
CO4-PO12	2	Helps in lifelong learning in the context of technological change
CO5-PO12	2	Helps in lifelong learning in the context of technological change
CO6-PO12	2	Helps in lifelong learning in the context of technological change
CO1-PSO1	1	Students will be able to apply the knowledge of DFT in developing electronic systems
CO2-PSO1	1	Students will be able to apply the knowledge of FFT in developing electronic systems
CO3-PSO1	1	Students will be able to apply the knowledge of filter design developing electronic systems
CO4-PSO1	1	Students will be able to illustrate filter structures for developing electronic systems
CO5-PSO1	1	Students will be able to apply the knowledge of multi-rate DSP operations for developing electronic systems
CO6-PSO1	1	Students will be able to apply the knowledge of DSP processor in developing electronic systems

Prepared by (Faculty Name & Signature) : Sanju Sebastian 10/12/21

Verified by : Stream Coordination Committee Dr. Gibby Thomas 10/12/21

10/12/2021
Dr. Gibby Thomas
DAC convenor

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

UNIVERSITY PRESCRIBED CO'S AND CO-PO MATRIX

Programme : **B.Tech**

Semester : **Fifth**

Course Title : **Analog and Digital Communication**

Course Code : **ECT 305**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 1	Explain the existent analog communication systems.	K2
CO 2	Apply the concepts of random processes to LTI systems.	K3
CO 3	Apply waveform coding techniques in digital transmission.	K3
CO 4	Apply GS procedure to develop digital receivers.	K3
CO 5	Apply equalizer design to counteract ISI.	K3
CO 6	Apply digital modulation techniques in signal transmission.	K3

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	2	2
CO2	3	3	2	3	3	-	-	-	-	-	-	-	2	2
CO3	3	3	2	3	3	2	-	-	-	-	-	2	2	3
CO4	3	3	2	3	3	2	-	-	-	-	-	2	2	2
CO5	3	3	2	3	3	2	-	-	-	-	-	2	2	2
CO6	3	3	2	3	3	2	-	-	-	-	-	2	2	3

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	3	Students are expected to apply the engineering fundamentals to understand the basic concepts of analog communication systems
CO1 - PO2	3	Students are equipped to identify and formulate problems based on the concepts of analog communication systems
CO1 - PSO1	2	Students are expected to select and apply the fundamental knowledge of communication devices for the development of analog communication systems
CO1 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various analog communication systems
CO2 - PO1	3	Students are expected to apply the engineering fundamentals to understand the basic concepts of random processes
CO2 - PO2	3	Students are equipped to identify and formulate problems based on the concepts of random processes
CO2 – PO3	2	Students are expected to design solutions for engineering problems on various random processes
CO2 – PO4	3	Students are equipped to conduct investigations on the problems based on various random processes
CO2– PO5	3	Students are expected to select and apply various modern tools for modelling various random processes
CO2 - PSO1	2	Students are expected to select and apply the fundamental knowledge of communication devices for the study of various random processes
CO2– PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various random processes
CO3 - PO1	3	Students are expected to apply the engineering fundamentals to understand the basic concepts of waveform coding techniques
CO3 - PO2	3	Students are equipped to identify and formulate problems based on the concepts of waveform coding techniques
CO3 – PO3	2	Students are expected to design solutions for engineering problems on various waveform coding techniques
CO3 – PO4	3	Students are equipped to conduct investigations on the problems based on various waveform coding techniques
CO3 – PO5	3	Students are expected to select and apply various modern tools for modelling various waveform coding techniques
CO3 – PO6	2	Students are expected to assess social, health, safety, legal and cultural issues and consequent responsibilities while solving problems in waveform coding techniques
CO3 – PO12	2	Students should develop the ability to engage in life long learning of design of waveform coding techniques
CO3 - PSO1	2	Students are expected to select and apply the fundamental knowledge of communication devices for the development of waveform coding techniques

CO3 – PSO2	3	Students are expected to use modern software and hardware tools for the analysis of various waveform coding techniques
CO4 - PO1	3	Students are expected to apply the engineering fundamentals to understand the basic concepts of GS procedure
CO4 - PO2	3	Students are equipped to identify and formulate problems based on the concepts of GS procedure
CO4 – PO3	2	Students are expected to design solutions for engineering problems on various GS procedure
CO4 – PO4	3	Students are equipped to conduct investigations on the problems based on various GS procedure
CO4 – PO5	3	Students are expected to select and apply various modern tools for modelling various GS procedure
CO4 – PO6	2	Students are expected to assess social, health, safety, legal and cultural issues and consequent responsibilities while solving problems in GS procedure
CO4 – PO12	2	Students should develop the ability to engage in life long learning of design of GS procedure
CO4 - PSO1	2	Students are expected to select and apply the fundamental knowledge of communication devices for the development of GS procedure
CO4 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various GS procedure
CO5 - PO1	3	Students are expected to apply the engineering fundamentals to understand the basic concepts of equalizers
CO5 - PO2	3	Students are equipped to identify and formulate problems based on the concepts of equalizers
CO5 – PO3	2	Students are expected to design solutions for engineering problems on various equalizers
CO5 – PO4	3	Students are equipped to conduct investigations on the problems based on various equalizers
CO5 – PO5	3	Students are expected to select and apply various modern tools for modelling various equalizers
CO5 – PO6	2	Students are expected to assess social, health, safety, legal and cultural issues and consequent responsibilities while solving problems in equalizers
CO5 – PO12	2	Students should develop the ability to engage in life long learning of design of equalizers
CO5 - PSO1	2	Students are expected to select and apply the fundamental knowledge of communication devices for the development of equalizers
CO5 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various equalizers
CO6 - PO1	3	Students are expected to apply the engineering fundamentals to understand the basic concepts of digital modulation techniques
CO6 - PO2	3	Students are equipped to identify and formulate problems based on the concepts of digital modulation techniques
CO6 – PO3	2	Students are expected to design solutions for engineering problems on various digital modulation techniques

CO6 – PO4	3	Students are equipped to conduct investigations on the problems based on various digital modulation techniques
CO6 – PO5	3	Students are expected to select and apply various modern tools for modelling various digital modulation techniques
CO6 – PO6	2	Students are expected to assess social, health, safety, legal and cultural issues and consequent responsibilities while solving problems in digital modulation techniques
CO6 – PO12	2	Students should develop the ability to engage in life long learning of design of digital modulation techniques
CO6 - PSO1	2	Students are expected to select and apply the fundamental knowledge of communication devices for the development of digital modulation techniques
CO6 – PSO2	3	Students are expected to use modern software and hardware tools for the analysis of various digital modulation techniques

Prepared by (Faculty Name & Signature): Tomson Devis 18/12/21

Verified by: Stream Coordination Committee

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ECT 307 Control Systems

Semester : **Five**

Course Title : Control Systems

Course Code : **ECT 307**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 1	Analyse electromechanical systems by mathematical modelling and derive their transfer functions (K3)	**K3**
CO 2	Determine Transient and Steady State behaviour of systems using standard test signals (K2)	**K2**
CO 3	Determine absolute stability and relative stability of a system (K3)	**K3**
CO 4	Apply frequency domain techniques to assess the system performance and to design a control system with suitable compensation techniques (K3)	**K3**
CO 5	Analyse system Controllability and Observability using state space representation (K3)	**K3**

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	3	2	-	1	-	-	-	-	-	-	2	3	1
CO 2	3	3	2	1	1	-	-	-	-	-	-	2	3	1
CO 3	3	3	3	1	1	-	-	-	-	-	-	2	3	1
CO 4	3	3	3	1	1	-	-	-	-	-	-	2	3	1
CO 5	3	3	3	1	1	-	-	-	-	-	-	2	3	1
ECT 307	**3**	**3**	**2.5**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**1**

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 – PO1	3	Knowledge in transfer function of a system will help to the solution for many engineering problems.
CO1 – PO2	3	Knowledge in transfer function of a system will help to identify and formulate engineering problems.
CO1 – PO3	2	Knowledge in transfer function of a system will help to design or development of solutions with appropriate consideration for the public safety and environmental conditions.
CO1 – PO5	1	Knowledge in transfer function of a system will help to apply appropriate techniques and modern engineering tools and modelling to complex engineering activities.
CO1 – PO12	2	Knowledge in transfer function of a system will help in the lifelong learning in the broadest contest of technological changes.
CO1 – PSO1	3	Fundamental knowledge in transfer function of a system will help in the design, analysis and development of various control systems.
CO1 – PSO2	1	Knowledge in transfer function of a system will help for the analysis of complex control systems.
CO2 – PO1	3	Knowledge in the standard input signals will help to identify and formulate engineering problems.
CO2 – PO2	3	Knowledge in the standard input signals will help to formulate and analyze complex engineering problems.
CO2 – PO3	2	Knowledge in the standard input signals can be applied to the development of solution for complex engineering problems.
CO2 – PO5	1	Knowledge in the standard input signals will help to apply appropriate techniques and modern engineering tools and modelling to complex engineering activities.
CO2 – PO12	2	Knowledge in the standard input signals will help in the lifelong learning in the broadest contest of technological changes.
CO2 – PSO1	3	Knowledge in the standard input signals will help in the design, analysis and development of various electronic systems.
CO2 – PSO2	1	Knowledge in the standard input signals will help for the analysis of complex control systems.
CO3 – PO1	3	Knowledge in stability can be applied to the solution of various engineering problems.
CO3 – PO2	3	Knowledge in stability will help to formulate and analyze complex engineering problems.
CO3 – PO3	3	Knowledge in stability can be applied to the development of solution for complex engineering problems.
CO3 – PO5	1	Knowledge in stability will help to apply appropriate techniques and modern engineering tools and modelling to complex engineering activities.
CO3 – PO12	2	Knowledge in stability will help in the lifelong learning in the broadest contest of technological changes.

CO3 – PSO1	3	Knowledge in stability will help in the design, analysis and development of various electronic systems.
CO3 – PSO2	1	Knowledge in stability will help for the analysis of complex control systems.
CO4 – PO1	3	Knowledge in compensation techniques will help to design LTI system.
CO4 – PO2	3	Knowledge in compensation techniques will help to formulate and analyze specifications of LTI system.
CO4 – PO3	3	Knowledge in compensation techniques can be applied to the development of solution for complex engineering problems.
CO4 – PO5	1	Knowledge in compensation techniques will help to apply appropriate techniques and modern engineering tools and modelling to complex engineering activities.
CO4 – PO12	2	Knowledge in compensation techniques will help in the lifelong learning in the broadest contest of technological changes.
CO4 – PSO1	3	Knowledge in compensation techniques will help in the design, analysis and development of various electronic systems.
CO4 – PSO2	1	Knowledge in compensation techniques will help for the analysis of complex control systems.
CO5 – PO1	3	Knowledge in digital control system can be applied to design a reliable digital signal processing system.
CO5 – PO2	3	Knowledge in digital control system can be used to formulate a reliable digital signal processing system.
CO5 – PO3	3	Knowledge in digital control system can be applied to the development of solution for complex engineering problems.
CO5 – PO5	1	Knowledge in digital control system will help in the analysis and interpretation data and synthesis of the information to provide valid conclusions.
CO5 – PO12	2	Knowledge in digital control system will help in the lifelong learning in the broadest contest of technological changes.
CO5 – PSO1	3	Knowledge in digital control system will help in the design and development of a reliable digital signal processing system.
CO5 – PSO2	1	Knowledge in digital control system will help for the analysis of complex control systems.

Prepared by (Faculty Name & Signature) : DR. Gibu Jose 10/12/21

Verified by : Stream Coordination Committee 10/12/21 Dr. Arun. P.

10/12/2021 Dr. Gibu Jose DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Programme : **B.Tech**

Semester : **FIFTH**

Course Title Industrial Economics & Foreign Trade

Course Code : **HUT 300**

CO'S AND CO-PO MATRIX

No.	Course outcomes	Knowledge Level
CO1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare	**K2**
CO2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production	**K3**
CO3	Determine the functional requirement of a firm under various competitive conditions.	**K3**
CO4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society.	**K3**
CO5	Determine the impact of changes in global economic policies on the business opportunities of a firm	**K3**

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	-	-	-	-	-	-	-	-	-	3	-	-	-
CO2	2	2	-	-	2	2	3	-	-	-	3	-	-	-
CO3	2	2	1	-	-	-	-	-	-	-	3	-	-	-
CO4	2	2	1	-	-	1	-	-	-	-	3	-	-	-
CO5	2	2	1	-	-	-	-	-	-	-	3	-	-	-

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	2	By understanding the problem of scarcity of resources the students can apply knowledge of Mathematics to engineering problems.
CO2=PO1	2	By taking decisions regarding output and social cost of production the student will be able to apply the knowledge of mathematics and engineering sciences to complex real problems
CO2-PO2	2	Decisions regarding output and social cost of production will enable the students to have an understanding of the literature on research issues to solve engineering problems
CO2-PO5	2	By taking decisions regarding output and by evaluating social cost of production, students will be able to undertake research and literature review to arrive at solutions to complex engineering problems.
CO2-PO6	2	Output decisions and evaluation of social cost of production will enable the students to apply modern IT tools for the solution of engineering problems.
CO2-PO7	2	Decisions on output and social cost of production will help the students to understand the impact of solution of engineering problems on public health and environment.
CO3-PO1	2	By understanding the functional requirements of a firm under various competitive conditions, the students can apply the knowledge of mathematics and other sciences to solve engineering problems.
CO3-PO2	2	The functioning of the firm under various competitive conditions will enable the students to understand research issues on engineering problems
CO3PO3	1	By analyzing the various competitive conditions under which a firm operates, the student can apply the knowledge of research and literature review to understand the various dimensions of engineering problems.
CO4-PO1	2	By examining the overall performance of economy and understanding economic fluctuations, the students will be able to apply the knowledge of mathematics and other sciences to solve engineering problems.
CO4-PO2	2	By studying the impact of economic fluctuations on the overall performance of an economy, the student will be able to apply research knowledge and literature review on solutions to engineering problems.
CO4-PO3	1	By determining the impact of global economic policies on a firm's business opportunities, the student will be able to apply knowledge gained from research to solve engineering problems.
CO5-PO1	2	By studying the impact of changes in global economic policies on a firm's business opportunities, the student will be able to apply the knowledge of Mathematics and other physical sciences to solve engineering problems

CO5-PO2	2	By studying the impact of changes in global economic policies on a firm and its opportunities, the student will be able to apply the knowledge gained from research and review of literature to solve complex engineering issues.
CO5-PO3	1	By studying the impact of global economic policies on a firm, the student will be able to apply the relevant modern IT tools to solve engineering problems .

Prepared by (Faculty Name & Signature) : for Dr. Tessy. Varghese
5/12/21

Verified by : Stream Coordination Committee
5/12/21
SUNITHA. S. PILLAI

10/12/2021
Dr. Gibu Jose
DAC Convenor

ST.JOSEPH'S
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Programme : **B.Tech**

Semester : **FIFTH**

Course Title : **DISASTER MANAGEMENT**

Course Code : **MCN 301**

Course Outcome: After the successful completion of this course, the student will be able to:

MCN301.1	Define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the disaster management cycle
MCN301.2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment
MCN301.3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk.
MCN301.4	Explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community.
MCN301.5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions
MCN301.6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level.

3.1.2 CO-PO matrices of courses selected in 3.1.1

COURSE CODE: MCN 301			**COURSE NAME: DISASTER MANAGEMENT**									**SEMESTER: 5**		
CO	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO 1**	**PSO 2**
MCN301.1	-	2	-	-	-	2	-	-	-	2	-	2	1	1
MCN301.2	2	3	2	-	2	2	3	-	-	3	-	2	2	2
MCN301.3	2	3	2	2	2	2	3	-	-	3	-	2	2	2
MCN301.4	3	3	3	-	2	2	3	-	-	-	-	2	3	3

MCN301.5	3	3	-	-	2	2	3	-	-	-	-	2	2	2
MCN301.6	3	-	-	-	-	2	3	3	-	-	-	2	2	2
AVG.	**2.6**	**2.8**	**2.33**	**2**	**2**	**2**	**3**	**3**	**-**	**2.67**	**-**	**2**	**2.00**	**2**

JUSTIFICATION FOR CO-PO MAPPING:

CO	PO	LEVEL	REMARKS
MCN301.1	PO2	2	Understand the various Terminologies which help to grow professionally in technical aspect.
	PO6	2	Apply the knowledge gained to assess the disasters and take necessary measures.
	PO10	2	Help to document the Disasters for future reference.
	PO12	2	Recognize the need for Identification and proper management of Disaster.
	PSO1	1	Help to understand the various terminological aspects in industry.
	PSO2	1	Aid to prepare record of any Disasters.
MCN301.2	PO1	2	Sharpest weapon to win against disaster
	PO2	3	Enable to analyse and solve complex disaster related problems
	PO3	2	Development of new and sustainable measures to fight disaster.
	PO5	2	Hazard mapping to analyse the characteristics of Hazard.
	PO6	2	Apply the knowledge to assess the societal, health, safety and cultural issues.
	PO7	3	Apply the engineering solutions for the sustainable development.
	PO10	3	Communicate effectively with the society and professionals to give clear instructions and document in the context of disaster.
	PO12	2	Prepare to be updated everyday about the technological changes in assessment.
	PSO1	2	Aid to practice the knowledge gained in Disaster Management.
	PSO2	2	Help to grow professionally in technical aspect

MCN301.3	PO1	2	Apply the understanding of risk assessments in the advent of disasters.
	PO2	3	To put in appropriate methodologies to solve the after effects of Disasters.
	PO3	2	Design solutions with the assessment methodologies in the disaster scenario.
	PO4	2	Apply research methods and knowledge in the analysis and interpretation of Risks.
	PO5	2	Utilize appropriate methodologies to assess Risks
	PO6	2	Aware about the responsibilities and necessity of Risk assessment
	PO7	3	Utilization of Risk assessment in Societal and Environmental Context
	PO10	3	Efficient transfer of instructions regarding assessed risks and and to draft reports.
	PO12	2	To be aware of the recent technologies in risk assessment.
	PSO1	2	To develop sustainable solutions for the effective management of Disasters.
	PSO2	2	To develop technical and management skills.
MCN301.4	PO1	3	To utilize the knowledge Disaster Risk Management to solve complex disaster related issues.
	PO2	3	To identify and analyse the problems and develop possible measures to reduce disaster risks.
	PO3	3	Applying risk assessment methodologies with the proper consideration for public health and safety.
	PO5	2	Utilize the idea of phases of Disaster risk management and analyse its limitations
	PO6	2	Utilize the contextual knowledge to practice professional engineering.
	PO7	3	Recognize and demonstrate knowledge for Sustainable development
	PO12	2	Understand the need for updation of knowledge in Risk assessment measures.
	PSO1	3	Help to practice civil engineering in safeguarding the safety of environment and society
	PSO2	3	Enable career growth with the effective utilization of skills.

MCN301.5	PO1	3	Understand the nature of Disaster response and apply the knowledge to solve related problems
	PO2	3	Analyse the various disaster response actions
	PO5	2	Frame and apply Disaster response actions effectively
	PO6	2	Assess safety and health issues relevant to the disaster scenario
	PO7	3	Understand the effect of professional engineering solutions for effective management of disaster.
	PO12	2	Life long learning in the context of technological changes in the various disaster response actions
	PSO1	2	Aid to put in the knowledge to develop sustainable solutions in Practical working environment.
	PSO2	2	To be competent in work with the effective disaster response actions taken.
MCN301.6	PO1	3	Apply the knowledge of disaster management and risk reduction as solution for Disaster related problems.
	PO6	2	Apply contextual knowledge of various legislations to assess societal, safety, legal and cultural issues.
	PO7	3	practices for disaster management and risk reduction for sustainable development
	PO8	3	Apply disaster legislations maintaining ethical principles.
	PO12	2	Recognize the need for updating knowledge of risk reduction.
	PSO1	2	To practice the legislations and risk reduction measures at work in National and International levels.
	PSO2	2	Continual development of technical skills and management skills to work for disaster risk reduction globally.

Prepared by (Faculty Name & Signature) : 5/12/21 Deepa Abraham

5/12/21 SUNITHA S PILLAI

Verified by : Stream Coordination Committee

10/12/2021 Dr. Ruby Jose DAC convener

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC306: Antenna & Wave Propagation

Programme : **B.Tech**

Semester : **Sixth**

Course Title : **Antenna & Wave Propagation**

Course Code : **C312**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
C312.1	Understand the basic principles and parameters of antennas	K_2
C312.2	Describe retarded potential and measurement of antenna parameters	K_2
C312.3	Develop antenna arrays and their radiation patterns	K_3
C312.4	Explain principles and applications of different antennas and their radiation patterns	K_2
C312.5	Discuss micro-strip patch antennas, smart antennas, LPDA and other modern antenna	K_2
C312.6	Explain propagation of radio waves in the atmosphere	K_2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C312.1	2	1		-	-	-	-	-	-	-	-	-	2	-
C312.2	2	1	-	-	-	-	-	-	-	-	-	-	2	-
C312.3	3	2	-	-	-	-	-	-	-	-	-	-	2	-
C312.4	2	1	-	-	-	-	-	-	-	-	-	-	2	-
C312.5	2	1	-	-	-	-	-	-	-	-	-	-	2	-
C312.6	2	1	-	-	-	-	-	-	-	-	-	-	2	-
C312	2.17	1.17	-	-	-	-	-	-	-	-	-	-	2	-

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	2	Students are expected to apply engineering fundamentals to solve problems related to antennas.
CO1 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems in antenna theory.
CO1 - PSO1	2	Students are expected to apply fundamental knowledge of antennas in the design, analysis and development of various communication systems.
CO2 - PO1	2	Students are expected to apply the knowledge of engineering basics to the solution of problems related to retarded potential and antenna parameter measurement.
CO2 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems related to retarded potential and measurement of antenna parameters.
CO2 - PSO1	2	Students are expected to apply fundamental knowledge of retarded potential and antenna parameters in the design, analysis and development of various electronic systems.
CO3 - PO1	3	Students are expected to apply engineering fundamentals to develop antenna arrays and their radiation patterns.
CO3 - PO2	2	Students are expected to identify, formulate, review research literature, and analyze complex problems in antenna arrays and their radiation patterns.
CO3 - PSO1	2	Students are expected to apply fundamental knowledge of antenna arrays and their radiation patterns in the design, analysis and development of various electronic systems.
CO4 - PO1	2	Students are expected to apply engineering fundamentals to explain principles and applications of different antennas and their radiation patterns.
CO4 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems of different antennas and their radiation patterns.
CO4 - PSO1	2	Students are expected to apply fundamental knowledge of different antennas and their radiation patterns in the design, analysis and development of various communication systems.
CO5 - PO1	2	Students are expected to apply engineering fundamentals to explain micro-strip patch antennas, smart antennas, LPDA and other modern antennas.
CO5 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze micro-strip patch antennas, smart antennas, LPDA and

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC332: Communication Engineering Lab

Programme : **B.Tech**

Semester : **Sixth**

Course Title : **Communication Engineering Lab**

Course Code : **C332**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
C332.1	Use various keying and modulation methods of Communication (ASK, BPSK,AM,FM) for passing information (K3)	K_3
C332.2	Apply the basic concepts of circuits in communication systems (K3)	K_3
C332.3	Analyse commonly used method of Time division multiplexing and use in passing information over time (K4)	K_4
C332.4	Develop Pre- emphasis and de- emphasis to be used in communication (K3)	K_3
C332.5	Use shift registers to generate a PRBS (Pseudo Random Binary Sequence) commonly used (K3)	K_3
C332.6	Use basic concepts of delta modulation to design the circuit for the same.(K3)	K_3

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C332.1	3	2	1	1	-	-	-	-	-	-	-	-	3	3
C332.2	3	2	1	1	-	-	-	-	-	-	-	-	3	3
C332.3	3	3	2	2	1	-	-	-	-	-	-	-	3	3
C332.4	3	2	1	1	-	-	-	-	-	-	-	-	3	3
C332.5	3	2	1	1	-	-	-	-	-	-	-	-	3	3
C332.6	3	2	1	1	-	-	-	-	-	-	-	-	3	3
C332	3	2	1	1	1	-	-	-	-	-	-	-	3	3

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	2	Students are expected to apply engineering fundamentals to solve problems related to Communication Engineering
CO1 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems in Communication Engineering.
CO1 - PSO1	2	Students are expected to apply fundamental knowledge of Communication Engineering in the design, analysis and development of various Communication Engineering.
CO2 - PO1	2	Students are expected to apply the knowledge of engineering basics to the solution of problems related to Communication Engineering.
CO2 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems related to retarded potential and measurement of Communication Engineering.
CO2 - PSO1	2	Students are expected to apply fundamental knowledge of Communication Engineering in the design, analysis and development of various electronic systems.
CO3 - PO1	3	Students are expected to apply engineering fundamentals to develop Communication Engineering system.
CO3 - PO2	2	Students are expected to identify, formulate, review research literature, and analyze complex problems in Communication Engineering.
CO3 - PSO1	2	Students are expected to apply fundamental knowledge of Communication Engineering in the design, analysis and development of various electronic systems.
CO4 - PO1	2	Students are expected to apply engineering fundamentals to explain principles and applications of different Communication Engineering
CO4 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems of Communication Engineering.
CO4 - PSO1	2	Students are expected to apply fundamental knowledge of Communication Engineering in the design, analysis and development of various Communication Engineering.
CO5 - PO1	2	Students are expected to apply engineering fundamentals to explain Communication Engineering.
CO5 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze Communication Engineering.
CO5 - PSO1	2	Students are expected to apply fundamental knowledge of Communication Engineering in the design, analysis and development of various electronic Communication Engineering.
CO6 - PO1	2	Students are expected to apply engineering fundamentals to explain Communication Engineering.

CO6 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems in Communication Engineering.
CO6 - PSO1	2	Students are expected to apply fundamental knowledge of Communication Engineering in the design, analysis and development of various electronic Communication Engineering.

Prepared by (Faculty Name & Signature) : Manju James

Verified by : Stream Coordination Committee Tomson Devis

16/12/2019
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DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC 302: Digital Communication

Semester : 6

Course Title : Digital Communication

Course Code : EC 302

Course Outcomes (CO)

After the successful completion of this course, students will able

No.	Course outcomes	Knowledge Level
EC302.1	Relate random process and communication system, Illustrate the Digital representation of analog source and Compare the performance of various Digital Pulse Code Modulation Schemes.(K2)	K_2
EC302.2	Apply the knowledge of ISI problems in Digital communication to derive Nyquist criteria for zero ISI and Analyze the need for introducing ISI in Digital Communication in a controlled manner(K3)	K_3
EC302.3	Construct signal space representation of signal using Gram Schmidt orthonormalisation procedure and able to apply probability theory for receiver designing. (K3)	K_3
EC302.4	Compare the error probability for different digital modulation schemes like BPSK, BFSK, QPSK etc.(K2)	K_2
EC302.5	Describe the principle of spread spectrum communication and to illustrate the concept of FHSS and DSSS(K2)	K_2
EC302.6	Understand various Diversity Techniques and Multiple Access Techniques.(K2)	K_2

PROGRAM SPECIFIC OUTCOME (PSO)

The graduates of the department will accomplish:

PSO1: Apply Fundamental Knowledge of Electronics and Communication Engineering in the design, analysis and development of various electronic systems

PSO2: Use modern software and hardware tools in electronics engineering for the analysis of complex electronic systems

CO – PO - PSO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EC302.1	3	2	1	1	-	-	-	-	-	-	-	-	3	-
EC302.2	3	2	1	1	-	-	-	-	-	-	-	-	3	-
EC302.3	3	2	1	1	-	-	-	-	-	-	-	-	3	-
EC302.4	3	1	-	-	-	-	-	-	-	-	-	-	2	-
EC302.5	2	1	-	-	-	-	-	-	-	-	-	-	2	-
EC302.6	2	-	-	-	-	-	-	-	-	-	-		2	-

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping level (3/2/1)	Justifications
CO1-PO1	3	Students will be able to apply the knowledge of random process in finding complex digital communication solutions.
CO2-PO1	3	Students will be able to apply the knowledge of ISI and Nyquist criteria in finding complex digital communication solutions.
CO3-PO1	3	Students will be able to apply the knowledge of orthonormalization procedure and probability for receiver designing
CO4-PO1	3	Students will be able to apply the knowledge of various modulation schemes in finding complex digital communication solutions.
CO5-PO1	2	Students will be able to apply the knowledge of spread spectrum communication in finding complex digital communication solutions.
CO6-PO1	2	Students will be able to apply the knowledge of multiple access techniques in finding complex digital communication solutions
CO1-PO2	2	Students will be able to apply the knowledge of random process to analyse complex digital communication solutions.
CO2-PO2	2	Students will be able to apply the knowledge of ISI and Nyquist criteria to analyse complex digital communication solutions.
CO3-PO2	2	Students will be able to apply the knowledge of orthonormalization procedure and probability to analyse receiver design

CO4-PO2	1	Students will be able to apply the knowledge of various modulation schemes to analyse complex digital communication solutions.
CO5-PO2	1	Students will be able to apply the knowledge of spread spectrum communication to analyse complex digital communication solutions.
CO6-PO2	1	Students will be able to apply the knowledge of multiple access techniques to analyse complex digital communication solutions
CO1-PO3	1	Students will be able to apply the knowledge of random process to design complex digital communication solutions.
CO2-PO3	1	Students will be able to apply the knowledge of ISI and Nyquist criteria to design complex digital communication solutions.
CO3-PO3	1	Students will be able to apply the knowledge of orthonormalization procedure and probability for receiver designing
CO1-PO4	1	Helps in conducting investigation of complex problems in communication systems
CO2-PO4	1	Helps in conducting investigation of complex problems in communication systems
CO3-PO4	1	Helps in conducting investigation of complex problems in communication systems
CO1-PSO1	3	Students will be able to apply the knowledge of random process to develop complex digital communication systems
CO2-PSO1	3	Students will be able to apply the knowledge of ISI and Nyquist criteria to develop complex digital communication systems
CO3-PSO1	3	Students will be able to apply the knowledge of orthonormalization procedure and probability for developing receiver design
CO4-PSO1	2	Students will be able to apply the knowledge of various modulation schemes to develop complex digital communication systems
CO5-PSO1	2	Students will be able to apply the knowledge of spread spectrum communication to develop complex digital communication systems
CO6-PSO1	2	Students will be able to apply the knowledge of multiple access techniques to develop complex digital communication systems

Prepared by (Faculty Name & Signature) : Sreejith V

Verified by : Stream Coordination Committee

16/12/2019
Tomson Devis

16/12/2019
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC304 VLSI

Semester : VI

Course Title : **VLSI**

Course Code : EC 304

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
EC304.1	CO1: Describe the fabrication process and constraints associated with silicon wafer fabrication	K_2
EC304.2	CO2: Explain the various types of lithography techniques, epitaxy methods and component fabrication isolation methods used in IC fabrication	K_2
EC304.3	CO3: Develop mask layouts of logic gates and understand the CMOS inverter design consideration(K3)	K_3
EC304.4	CO4: Design logic circuits using different logic families. (K3)	K_3
EC304.5	CO5: Understand the design of ROM and RAM Memories and implement various logic function using PLAs and PLDs	K_2
EC304.6	CO6: Illustrate various adder and multiplier circuits (K2)	K_2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EC304.1	2	1	-	-	-	-	-	-	-	-	-	-	2	-
EC304.2	2	1	-	-	-	-	-	-	-	-	-	-	2	-
EC304.3	3	2	1	-	-	-	-	-	-	-	-	-	3	-
EC304.4	3	2	-	-	-	-	-	-	-	-	-	-	3	-
EC304.5	2	2	1	-	-	-	-	-	-	-	-	-	2	-
EC304.6	1	1	-	-	-	-	-	-	-	-	-	-	1	-
EC304	2.16	1.5	1	0	0	0	0	0	0	0	0	0	2	-

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	2	Graduates are able to apply engineering fundamentals related to semiconductor physics to understand the constraints associated with silicon fabrication.
CO1 – PO2	1	Graduates are able to identify the different techniques involved in fabrication and understand the constraints associated
CO1 – PSO1	2	Graduates will be able to understand engineering fundamentals to methods and consideration associated with fabrication of a device in electronic system design
CO2-PO1	2	Graduates able to apply engineering fundamentals to understand wafer etching and epitaxial layer growth the possible solutions adopted in IC fabrication
CO2 – PO2	1	Graduate will be able to analyze the constraints associated with device fabrication
CO2 – PSO1	2	Graduate will be able to identify the processes required for fabrication of devices in an electronic system
CO3 – PO1	3	Graduate will be able to apply necessary consideration in designing a CMOS inverter and also able to develop mask layout for CMOS logic circuits.
CO3 – PO2	2	Graduate will be able to analyze the designing issues related to CMOS inverter in VLSI systems
CO3-PO3	1	Graduate will be develop the mask layout for various CMOS circuits taking into account the various considerations.
CO3-PSO1	2	Graduate will be able to understand the considerations to be taken when designing new systems
CO4-PO1	3	Graduate will be able to apply the knowledge to design various CMOS logic circuits using different logic families for an electronic system
CO4-PO2	2	Graduate will be able to apply suitable logic styles to implement a logic functions
CO4-PSO1	2	Graduate will be able to design various logic functions using different logic families in an electronic system
CO5-PO1	3	Graduate will be able to in implementing various logic function using PAL,PLA and PLDs
CO5-PO2	2	Graduate will be able to apply identifying different memories and their requirement in complex electronic systems
CO5-PO3	1	Graduates will be able to implement various logic functions using PLDs and understand the design considerations of memories
CO5-PSO1	2	Graduates will be able to understand the purposes of memory system and different memories used in an electronic systems and also the purpose of PLDs in a systems.
CO6 - PO1	2	Graduates will be able to apply various adder circuit system based on the requirements related to an electronic system

CO6 – PO2	1	Graduates will be able to understand the techniques used in various adder circuits to help improve efficiency but has weak correlation towards synthesis of observation to deduce conclusions
CO6 – PSO1	1	Graduates will be able to understand the various aspects to be taken designing adder system in circuits.

Prepared by (Faculty Name & Signature) : Rincy Mariam Varkey

Verified by : Stream Coordination Committee

12/3/21 Suresh PR

16/12/2019
Dr. Giby Jose
DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC 366: RTOS

Semester : 6

Course title : Real Time Operating Systems

Course Code : EC 365

After the successful completion of the course students will be able to:

CO.1	Explain objectives, functions, types, and architecture of OS. (K2)
CO.2	Classify and exemplify various scheduling algorithms. (K2)
CO.3	Discuss the concept of concurrency, problems of synchronization and deadlock in RTOS (K2)
CO.4	Describe memory management techniques, memory allocation strategies and page replacement policies in RTOS. (K2)
CO.5	Discuss I/O management and disk scheduling in RTOS. (K2)
CO.6	Compare VX works and µCOS and explain RTOS for control systems. (K2)

Co-Po Matrix of Course

	PO1 (K3)	PO2 (K4)	PO3 (K5)	PO4 (K5)	PO5 (K6)	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1 (K3)	PSO2 (K3)
CO.1	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CO.2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO.3	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO.4	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO.5	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO.6	2	-	-	-	-	-	-	-	-	-	-	-	2	-
(Average)	2.67	2	-	-	-	-	-	-	-	-	-	-	2.67	-

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Justifications for CO – PO Mapping

Mapping	Mapping level (3/2/1)	Justifications
CO1-PO1	2	knowledge in OS basics helps to find solutions for problems in embedded system with RTOS
CO1-PSO1	2	knowledge in OS basics helps to find solutions for problems in embedded system with RTOS
CO2-PO1	3	knowledge in scheduling algorithms helps to find solutions for problems in embedded system with RTOS
CO2-PO2	2	knowledge in scheduling algorithms helps to analyze problems in embedded system with RTOS
CO2-PSO1	3	knowledge in scheduling algorithms helps to find solutions for problems in embedded system with RTOS
CO3-PO1	3	knowledge in the concept of concurrency, problems of synchronization and deadlock in RTOS helps to find solutions for problems in embedded system with RTOS
CO3-PO2	2	knowledge in the concept of concurrency, problems of synchronization and deadlock in RTOS helps to analze problems in embedded system with RTOS
CO3-PSO1	3	knowledge in concept of concurrency, problems of synchronization and deadlock in RTOS helps to find solutions for problems in embedded system with RTOS
CO4-PO1	3	knowledge memory management techniques, memory allocation strategies and page replacement policies in RTOS helps to find solutions for problems in embedded system with RTOS
CO4-PSO1	3	knowledge in memory management techniques, memory allocation strategies and page replacement policies in RTOS helps to find solutions for problems in embedded system with RTOS
CO5-PO1	3	knowledge in I/O management and disk scheduling in RTOS helps to find solutions for problems in embedded system with RTOS
CO5-PSO1	3	knowledge in I/O management and disk scheduling in RTOS helps to find solutions for problems in embedded system with RTOS
CO6-PO1	2	knowledge in VX works, µCOS and RTOS for control systems helps to find solutions for problems in embedded system with RTOS

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CO6-PSO1	2	knowledge in VX works, µCOS and RTOS for control systems helps to find solutions for problems in embedded system with RTOS

Prepared by (Faculty Name and signature):

Verified by Stream co-Ordinator

Dr. Arun P.

16/12/2019
Dr. Guiley Jose
DAC Convenor

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC 308: Embedded systems

Programme : **B.Tech**

Semester : **Sixth**

Course Title : **Embedded Systems**

Course Code : **EC 308**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
C404.1	Understand the basics of an embedded system.	**K2**
C404.2	Understand various serial and parallel communication standards and I/O devices.	**K2**
C404.3	Develop program for an embedded system.	**K3**
C404.4	Understand various popular RTOS.	**K2**
C404.5	Understand basic programming concepts for RTOS in µC/OS-II.	**K2**
C404.6	Design, Implement and test an embedded system.	**K4**

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C404.1	2	0	0	0	0	0	0	0	0	0	0	0	2	0
C404.2	2	0	0	0	0	0	0	0	0	0	0	0	2	0
C404.3	3	0	2	2	2	0	0	0	0	0	0	2	3	2
C404.4	2	0	0	0	0	0	0	0	0	0	0	2	2	0
C404.5	3	0	0	0	0	0	0	0	0	0	0	0	2	0
C404.6	3	2	3	2	1	0	0	0	0	0	0	3	3	3
C404	2.5	2	2	2	1.5	0	0	0	0	0	0	2.333	2.5	2.5

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	2	Graduates will be able to apply the knowledge of engineering fundamentals to design various embedded systems components.
CO1 - PSO1	2	Graduates will be able to apply the fundamental knowledge of embedded system components for the development of various electronic systems.
CO2 - PO1	2	Graduates will be able to apply the engineering knowledge to identify different ways of communication and I/O devices.
CO2 - PSO1	3	Graduates will be able to apply the fundamental knowledge of communication standards and I/O devices for the development of various electronic systems
CO3 - PO1	3	Graduates will be able to apply knowledge of mathematics to develop programs.
CO3 – PO3	2	Graduates are equipped to identify, formulate and develop problems that can occur during programming.
CO3 – PO4	2	Graduates will be able to develop program effectively by execution analysis and debugging of various experiments.
CO3 – PO5	2	Graduates will be able to develop programs using modern tools.
CO3 –PO12	2	Graduates are able to develop updated program through lifelong learning.
CO3 - PSO1	3	Graduates will be able to apply the basic knowledge of programming concepts for the development of various electronic systems.
CO3 - PSO2	2	Graduates will be able to use various hardware tools during execution and debugging of the software.
CO4 - PO1	2	Graduates are able to apply engineering knowledge for understanding various RTOS.
CO4 –PO12	2	Graduates are able to understand popular RTOS through lifelong learning.
CO4 - PSO1	2	Graduates will be able to apply the fundamental knowledge RTOS for designing various systems.
CO5 - PO1	3	Graduates are able to apply engineering fundamental knowledge to design real time embedded systems using the basic programming concepts of RTOS.

CO5 - PSO1	2	Graduates will be able to apply the basic knowledge of programming for the development of various electronic systems.
CO6 - PO1	3	Graduates are able to utilize engineering knowledge to understand the embedded system design process.
CO6 – PO2	2	Graduates are able to design embedded systems by identifying and formulating the complex problem solutions.
CO6 – PO3	3	Graduates are able to designing solutions for various complex engineering problems using the design process.
CO6 - PO4	2	Graduates are made capable of conducting investigation of various real time problems using the design process.
CO6 – PO5	1	For execution and debugging of the designed systems, modern tools are used.
CO6 – PO12	3	Graduates are able to design various embedded system through knowledge of all engineering areas and life-long learning.
CO6 - PSO1	3	Graduates will be able to apply the fundamental knowledge of design process for implementing an embedded system.
CO6 - PSO2	3	For execution and debugging of the designed systems, modern tools are used.

Prepared by (Faculty Name & Signature): Soya Treesa Jose 10/12/19

Verified by: Stream Coordination Committee 10/12/2019

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC 312 OOP

Semester : **Sixth**

Course Title : **OOP**

Course Code : **EC 312**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO1	A thorough understanding of the features of OOP like class,construction,polymorphism and inheritance of C++.	**K_2**
CO2	An understanding of advanced features of C++ such as templates, abstract classes and virtual functions .	**K_2**
CO3	Understanding of advanced features of C++ such as pointers to objects,virtual functions and virtual constructors.	**K_2**
CO4	Knowledge of advanced features of JAVA such as multithreading,packages and error management.	**K_2**
CO5	A thorough understanding of Android and its features.	**K_2**
CO6	Skills in debugging android applications	**K_3**

CO – PO Matrix

	PO 1(K3)	PO 2(K4)	PO 3(K5)	PO 4(K6)	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1 (K3)	PSO 2(K3)
CO1(K2)	2	1	1	0	1	0	0	0	0	0	0	1	0	2
CO2 (K2)	2	1	1	0	1	0	0	0	0	0	0	1	0	2
CO3(K2)	2	1	1	0	1	0	0	0	0	0	0	1	0	2
CO4(K2)	2	1	1	0	1	0	0	0	0	0	0	1	0	2
CO5(K2)	1	1	1	0	0	0	0	0	0	0	0	1	0	1
CO6(K3)	2	1	1	0	1	0	0	0	0	0	0	1	0	2
CO(average)	1.83	1	1	0	1	0	0	0	0	0	0	1		1.83

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1-PO1	2	Graduate is able to develop solutions to complex problems.
CO1-PO2	1	Graduate ia able to identify and analyze complex engg problems.
CO1-PO3	1	Graduate is able to develop solutions to complex problems using C++programming.
CO1-PO5	1	Programming with C++ helps to apply appropriate techniques to model complex engg activities.
CO1-PO12	1	By acquiring the knowledge in programming with C++ modern softwares can be easily studied and implemented.
CO1-PSO2	2	Knowledge in C++ programming can be used to analyze complex systems.
CO2-PO1	2	Graduate is able to develop solutions to complex problems with the knowledge in programming language C++.
CO2-PO2	1	Graduate ia able to identify and analyze complex engg problems.
CO2-PO3	1	Graduate is able to develop solutions to complex problems using C++programming.
CO2-PO5	1	Programming with C++ helps to apply appropriate techniques to model complex engg activities.
CO2-PO12	1	By acquiring the knowledge in programming with C++ ,modern softwares can be easily studied and implemented..
CO2-PSO2	2	Knowledge in C++ programming can be used to analyze complex systems.
CO3-PO1	2	Graduate is able to develop solutions to complex problems with the knowledge in programming language C++.
CO3-PO2	1	Graduate is able to identify and analyze complex engg problems.
CO3-PO3	1	Graduate is able to develop solutions to complex problems using C++programming.
CO3-PO5	1	Programming with C++ helps to apply appropriate techniques to model complex engg activities.
CO3-PO12	1	By acquiring the knowledge in programming with C++ ,modern softwares can be easily studied and implemented..

CO3-PSO2	2	Knowledge in C++ programming can be used to analyze complex systems.
CO4-PO1	2	Graduate is able to develop solutions to complex problems with the knowledge in programming language JAVA
CO4-PO2	1	Graduate is able to identify and analyze complex engg problems.
CO4-PO3	1	Graduate is able to develop solutions to complex problems using JAVA programming.
CO4-PO5	1	Programming with JAVA helps to apply appropriate techniques to model complex engg activities
CO4-PO12	1	By acquiring the knowledge in programming with JAVA ,modern softwares can be easily studied and implemented
CO4-PSO12	2	Knowledge in JAVA programming can be used to analyze complex systems.
CO5-PO1	1	Graduate is able to develop solutions to complex problems with the knowledge in programming language ANDROID
CO5-PO2	1	Graduate is able to identify and analyze complex engg problems.
CO5-PO3	1	Graduate is able to develop solutions to complex problems using ANDROID programming.
CO5-PO12	1	By acquiring the knowledge in ANDROID programming ,modern softwares can be easily studied and implemented
CO5-PSO2	1	Knowledge in ANDROID programming can be used to analyze complex systems.
CO6-PO1	2	Graduate is able to develop solutions to complex problems with the knowledge in programming language ANDROID
CO6-PO2	1	Graduate is able to identify and analyze complex engg problems.
CO6-PO3	1	Graduate is able to develop solutions to complex problems using ANDROID programming
CO6-PO5	1	Programming with ANDROID helps to apply appropriate techniques to model complex engg activities
CO6-PO12	1	By acquiring the knowledge in ANDROID programming ,modern softwares can be easily studied and implemented
CO6-PSO2	2	Knowledge in ANDROID programming can be used to analyze complex systems

Prepared by (Faculty Name & Signature) :Sunitha S Pillai

Verified by : Stream Coordination Committee SABARINATH G

16/12/2019
Dr. Gilda Dore
DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC 352 Comprehensive Exam

Semester : VI

Course Title : Comprehensive Exam

Course Code : EC 352

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 1	Memorise and recall the fundamentals of Electronics and Communication Engineering related subjects	K1
CO 2	Solve basic Engineering problems by applying domain knowledge	K3
CO 3	Communicate the solutions to the problems and defend effectively	K2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO 2	2	1	-	-	-	-	-	-	-	-	-	-	-	2
CO 3	-	-	-	-	-	-	-	-	-	2	-	-	-	-
CO	**2**	**1**	**1**	-	-	-	-	-	-	2	-	-	2	-

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO2 - PO1	2	Students are expected to apply the engineering fundamentals and mathematics to solve basic engineering problems
CO2 - PO2	1	Students are equipped to identify, formulate and analyze the problems that can occur during the implementation of various electronic systems

CO2-PSO2	1	Graduate can apply the knowledge of solving engineering problems in developing electronic system using modern tools
CO3 - PO10	2	Graduates will be able to apply knowledge in designing linear IC circuits for linear and non-linear application

Prepared by (Faculty Name & Signature) : Dr. Giby Jose

Verified by : Stream Coordination Committee

SUNITHA. S. PILLAI

16/12/2019
Dr. Giby Jose
DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Programme : **B.Tech**

Semester : **SIXTH**

Course Title : **MINIPROJECT**

Course Code : **ECD 334**

UNIVERSITY PRESCRIBED CO'S AND CO-PO MATRIX

No.	Course outcomes	Knowledge Level
CO1	Be able to practice acquired knowledge within the selected area of technology for project development.	**K2**
CO2	Identify, discuss and justify the technical aspects and design aspects of the project with a systematic approach	**K2**
CO3	Reproduce, improve and refine technical aspects for engineering projects.	**K3**
CO4	Work as a team in development of technical projects	**K3**
CO5	Communicate and report effectively project related activities and findings.	**K2**

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2	-	3	-	-	-	-	-	2	3	
CO2	3	3	3	2	-	3	-	-	-	-	3	2	3	2
CO3	3	3	3	2		3	-	-	-	-	3	2	3	2
CO4	-	-	-	-		-	-	3	-	3	3	2	3	2
CO5	-	-	-	-	-	-	-	3	3	3	-	2	3	2

Suggested changes is mentioned in page 2, please do consider and suggest suggestions, if any

Anusha PR

MODIFIED CO'S AND CO-PO MATRIX

No.	Course outcomes	Knowledge Level
CO1	Practice the acquired basic technical knowledge for the conceptualisation of engineering problem	K2
CO2	Identify, discuss and justify the technical aspects and design aspects of the project with a systematic approach	K2
CO3	Modify, validate and communicate the design with appropriate tools as a team.	K3
CO4	Develop a product based on the acquired knowledge by following quality, reliability, functionality, aesthetics and ergonomics considerations	K3
CO5	Develop technical writing and managerial skills as a team	K2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3	3	3	2	-	3	-	-	-	-	-	2	3	
CO2	3	3	3	2	-	3	-	-	-	-	3	2	3	2
CO3	3	3	3	2	2	3	-	-	-	-	3	2	3	2
CO4	-	-	-	-	2	-	-	3	-	3	3	2	3	2
CO5	-	-	-	-	-	-	-	3	3	3	-	2	3	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	3	Students are expected to apply the knowledge of Science and engineering fundamentals for the conceptualization of engineering problem

CO1 - PO2	3	Students are expected to Identify, formulate, review research literature the engineering problems using basic principles of mathematics, natural sciences, and engineering sciences for conceptualization of engineering problem
CO1-PO3	3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations as a team using appropriate tools.
CO1-PO4	2	Students are expected to conduct investigations based on knowledge of Science and engineering fundamentals for the conceptualization of engineering problem
CO1-PO6	3	Students are expected to assess societal ,health,safety,legal and cultural issues and consequent responsibilities based on knowledge of Science and engineering fundamentals for the conceptualization of engineering problem
CO1-PO12	2	Students are expected to apply the knowledge of Science and engineering fundamentals for the conceptualization of engineering problem thereby promoting independent learning skills.
CO1-PSO1	3	Students are expected to apply the fundamemtal knowledge for the conceptualization of engineering problem
CO2-PO1	3	Apply the knowledge of mathematics, science, engineering fundamentals, and identify technical aspects and design aspects of the project with a systematic approach
CO2-PO2	3	Students are expected to review research literature the engineering problems using basic principles of mathematics, natural sciences, and engineering sciences to identify technical aspects and design aspects of the project with a systematic approach
CO2-PO3	3	Design system components or processes and identify technical aspects and design aspects of the project with a systematic approach that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
CO2-PO4	2	Students are expected to conduct investigations to identify, discuss and justify the technical aspects and design aspects of the project with a systematic approach
CO2-PO6	3	Students are expected to assess societal ,health,safety,legal and cultural issues and consequent responsibilities to identify, discuss and justify the technical aspects and design aspects of the project with a systematic approach
CO2-PO11	3	Students are expected to identify, discuss and justify the technical aspects of the project with a systematic approach for the project management, resource management and time scheduling.
CO2-PO12	2	Students are expected to identify, discuss and justify the technical aspects of the project with a systematic approach thereby promoting independent learning skills
CO2-PSO1	3	Students are expected to apply the fundamemtal knowledge to identify, discuss and justify the technical aspects of the project
CO2-PSO2	2	Students are expected to apply modern software and hardware tools to identify, discuss and justify the technical aspects of the project

CO3 – PO1	3	Students are expected to apply the knowledge of Science and engineering fundamentals for the modification ,validation and communication of the design as a team.
CO3 – PO2	3	Students are expected to review research literature the engineering problems using basic principles of mathematics, natural sciences, and engineering sciences for the modification ,validation and communication of the design as a team
CO3-PO3	3	Modify, validate and communicate the design with appropriate tools as a team that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations
CO3-PO4	2	Students are expected to conduct investigations to modify, validate and communicate the design with appropriate tools as a team.
CO3-PO5	2	Students are expected to use various modern tools as applicable in design to modify, validate and communicate the design as a team.
CO3-PO6	3	Students are expected to assess societal ,health,safety,legal and cultural issues and consequent responsibilities for the modification ,validation and communication of the design as a team
CO3-PO11	3	Modify, validate and communicate the design with appropriate tools as a team for the project management, resource management and time scheduling.
CO3-PO12	2	Students are expected to modify, validate and communicate the design as a team thereby promoting independent learning skills
CO3-PSO1	3	Students are expected to apply the fundamental knowledge to modify, validate and communicate the design as a team
CO3-PSO2	2	Students are expected to apply modern software and hardware tools to modify, validate and communicate the design as a team
CO4-PO5	2	Students are expected to use various appropriate techniques and modern tools as applicable in design to develop a product based on the acquired knowledge by following quality, reliability, functionality, aesthetics and ergonomics considerations
CO4-PO8	3	Students are expected to respect publication ethics in preparing papers and reports and also develop a product by following quality, reliability, functionality, aesthetics and ergonomics considerations
CO4-PO10	3	Students are expected to prepare a technical report as a document and a technical paper for publication and effectively defend their findings before the assessment panel by following the reliability, aesthetics and ergonomics considerations.
CO4-PO11	3	Develop a product based on the acquired knowledge by following quality, reliability, functionality, aesthetics and ergonomics considerations for the project management, resource management and time scheduling.
CO4-PO12	2	Students are expected to to develop a product based on the acquired knowledge by following quality, reliability, functionality, aesthetics and ergonomics considerations thereby promoting independent learning skills

CO4-PSO1	3	Students are expected to apply the fundamental knowledge to develop a product based on the acquired knowledge by following quality, reliability, functionality, aesthetics and ergonomics considerations
CO4-PSO2	2	Students are expected to use various appropriate techniques and modern tools as applicable in design to develop a product based on the acquired knowledge by following quality, reliability, functionality, aesthetics and ergonomics considerations
CO5-PO8	3	Students are expected to respect publication ethics in preparing papers and reports and also develop their managerial skills as a team
CO5-PO9	3	Students are expected to prepare technical reports and publish technical papers working in the project team by promoting tam work.
CO5-PO10	3	Students are expected to prepare a technical report as a document and a technical paper for publication and effectively defend their findings before the assessment panel
CO5-PO12	2	Students are expected to develop technical writing and managerial skills as a team thereby promoting independent learning skills
CO5-PSO1	3	Students are expected to apply the fundamental knowledge to develop technical writing and managerial skills as a team
CO5-PSO2	2	Students are expected to use various appropriate techniques and modern tools as applicable in design to develop technical writing

Prepared by (Faculty Name & Signature) : Sruthi PR 1/6/22

Verified by : Stream Coordination Committee 1/6/22
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Semester :6
Course Title : COMMUNICATION LAB (ECL 332)
Course Code : ECL 332

Course Outcomes (COs)

After the successful completion of the course students will be able to

CO.1	Setup simple prototype circuits for waveform coding and digital modulation techniques working in a team.
CO.2	Simulate the error performance of a digital communication system using standard binary and M -ary modulation schemes
CO.3	Develop hands-on skills to emulate a communication system with software-designed-radio working in a team.

CO-PO matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO.1	3	3	3	2	3	-	-	-	3	2	-	1	3	3
CO.2	3	3	3	2	3	-	-	-	-	-	-	1	3	3
CO.3	3	3	3	3	3	-	-	-	3	2	-	3	3	3

Mapping	Low(1), med.(2), high(3)	JUSTIFICATION
CO1-PO1	3	Students are able to apply engineering fundamentals and find solutions for complex problems in communication systems by setting up simple prototype circuits for waveform coding and digital modulation techniques
CO1-PO2	3	Setting up simple prototype circuits for waveform coding and digital modulation techniques helps students to analyze problems in communication systems
CO1-PO3	3	Students are able to design and development solutions for engineering problems in communication systems by setting up simple prototype circuits for waveform coding and digital modulation techniques
CO1-PO4	2	Setting up simple prototype circuits for waveform coding and digital modulation techniques helps students to conduct investigations of problems in communication systems

CO1-PO5	3	Setting up simple prototype circuits for waveform coding and digital modulation techniques helps students to create, select and apply appropriate techniques in communication systems
CO1-PO9	3	Students are able to function effectively as individual and team by doing simple prototype circuits for waveform coding and digital modulation techniques
CO1-PO10	2	Students are able to communicate effectively on complex engineering activities with engineering community
CO1-PO12	1	Students are able to recognize the need for independent and lifelong learning by doing circuits for waveform coding and digital modulation techniques
CO1-PSO1	3	Students are able to apply fundamental knowledge of electronics and communication engineering in design and analysis of development of communication systems
CO1-PSO2	3	Students are able to use modern hardware tools in electronics engineering for analysis
CO2-PO1	3	Simulation of the error performance of a digital communication system using standard binary and M -ary modulation schemes helps students to find solutions for complex problems in microcontroller based electronic systems
CO2-PO2	3	Simulation of the error performance of a digital communication system helps students to analyze problems in communication systems
CO2-PO3	3	Simulation of the error performance of a digital communication system helps students to helps in developing solution for communication engineering problems
CO2-PO4	2	Simulation of the error performance of a digital communication system helps students to apply appropriate techniques to develop research based knowledge and methods in communication engineering
CO2-PO12	1	Simulation of the error performance of a digital communication system helps students to engage in independent and life long learning
CO3-PO1	3	By developing hands-on skills to emulate a communication system with software-designed-radio, more complex problems related to SDR can be studied and solutions can be developed
CO3-PO2	3	By developing hands-on skills to emulate a communication system with software-designed-radio helps to find solutions for complex problems in SDR based systems
CO3-PO3	3	By developing hands-on skills to emulate a communication system with software-designed-radio helps to apply appropriate techniques to design and develop SDR based systems
CO3-PO4	3	Students are able to find solutions for complex problems in communication engineering by emulating a communication system with software-designed-radio
CO3-PO5	3	Emulation of communication system with software-designed-radio helps to analyze problems in SDR based communication systems
CO3-PO9	3	Emulation of communication system with software-designed-radio helps students to function effectively as individual and as member of a team
CO3-PO10	2	Emulation of communication system with software-designed-radio as a team helps students to communicate effectively on complex engineering activities with engineering community
CO3-PO12	3	Emulation of communication system with software-designed-radio as a team helps students to recognize the need for life long learning and participate in it
CO3-PSO1	3	Students are able to apply fundamental knowledge of electronics and communication engineering in design and analysis of development of

		communication systems by emulation of communication system using SDR
CO3-PSO2	3	Students are able to use modern hardware and software tools in electronics engineering for analysis by emulating communication system using SDR hardware and SDR custom software

Prepared by (Faculty Name and signature): Deepa Abraham 5/12/21

Stream Co-Ordinator 5/12/21 Tomson Devis

10/12/2021
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ST. JOSEPH'S
COLLEGE OF ENGINEERING
AND TECHNOLOGY,
- PALAI -

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ECT 302: Electromagnetics

Semester : 6

Course Title : Electromagnetics

Course Code : ECT 302

Course Outcomes (CO)

After the successful completion of this course, students will able

No.	Course outcomes	Knowledge Level
ECT 302.1	To summarize the basic mathematical concepts related to electromagnetic vector fields.	K_2
ECT 302.2	Analyse Maxwell's equation in different forms and apply them to diverse engineering problems.	K_3
ECT 302.3	To analyse electromagnetic wave propagation and wave polarisation	K_3
ECT 302.4	To analyze the characteristics of Transmission lines and to solve different transmission line problems using Smith's Chart	K_3
ECT 302.5	To analyse and evaluate the propagation of EM waves in Wave guides	K_3

PROGRAM SPECIFIC OUTCOME (PSO)

The graduates of the department will accomplish:

PSO1: Apply Fundamental Knowledge of Electronics and Communication Engineering in the design, analysis and development of various electronic systems

PSO2: Use modern software and hardware tools in electronics engineering for the analysis of complex electronic systems

CO – PO - PSO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EC303.1	3	3	1	1	-	-	-	-	-	-	-	2	1	-
EC303.2	3	3	1	1	-	-	-	-	-	-	-	2	1	-

EC303.3	3	3	1	1	-	-	-	-	-	-	-	2	1	-
EC303.4	3	3	1	1	-	-	-	-	-	-	-	2	1	-
EC303.5	3	3	1	1	-	-	-	-	-	-	-	2	1	-

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping level (3/2/1)	Justifications
CO1-PO1	3	Helps in applying knowledge on mathematical fundamentals in Engineering
CO2-PO1	3	Helps in applying mathematical models in complex engineering problems
CO3-PO1	3	Helps in analysing complex communication engineering problems
CO4-PO1	3	Helps in analysing and solving complex communication engineering problems
CO5-PO1	3	Helps in analysing and solving complex communication engineering problems
CO1-PO2	3	Helps in applying knowledge on mathematical fundamentals in Engineering
CO2-PO2	3	Helps in applying mathematical models in complex engineering problems
CO3-PO2	3	Helps in analysing complex communication engineering problems
CO4-PO2	3	Helps in analysing and solving complex communication engineering problems
CO5-PO2	3	Helps in analysing and solving complex communication engineering problems
CO1-PO3	1	Helps in designing solutions to communication engineering problems meeting specifications
CO2-PO3	1	Helps in designing solutions to communication engineering problems meeting specifications
CO3-PO3	1	Helps in designing solutions to communication engineering problems meeting specifications
CO4-PO3	1	Helps in designing solutions to communication engineering problems meeting specifications
CO5-PO3	1	Helps in designing solutions to communication engineering problems meeting specifications
CO1-PO4	1	Helps in design, analysis and interpretation of mathematical models for engineering applications
CO2-PO4	1	Helps in design, analysis and interpretation of mathematical models for engineering applications

CO3-PO4	1	Helps in design, analysis and interpretation of mathematical models for communication engineering applications
CO4-PO4	1	Helps in design, analysis and interpretation of mathematical models for communication engineering applications
CO5-PO4	1	Helps in design, analysis and interpretation of mathematical models for communication engineering applications
CO1-PO12	2	Helps in preparation for independent life long learning in the communication engineering domain
CO2-PO12	2	Helps in preparation for independent life long learning in the communication engineering domain
CO3-PO12	2	Helps in preparation for independent life long learning in the communication engineering domain
CO4-PO12	2	Helps in preparation for independent life long learning in the communication engineering domain
CO5-PO12	2	Helps in preparation for independent life long learning in the communication engineering domain
CO1-PSO1	1	Helps in understanding the fundamental mathematical concepts of communication engineering for further analysis and development
CO2-PSO1	1	Helps in understanding the fundamental mathematical concepts of communication engineering for further analysis and development
CO3-PSO1	1	Helps in understanding the fundamental concepts of communication engineering for further analysis and development
CO4-PSO1	1	Helps in understanding the fundamental concepts of communication engineering for further analysis and development
CO5-PSO1	1	Helps in understanding the fundamental concepts of communication engineering for further analysis and development

Prepared by (Faculty Name & Signature) : Sabarinath

5/12/21 SABARINATH-C

Verified by : Stream Coordination Committee

5/12/21 Tomson Devis

10/12/2021
Dr. Gibu Jose
DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ECT 304 VLSI Circuit Design (2019 scheme)

Semester: VI
Course Title: VLSI circuit design
Course Code : ECT 304

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
ECT304.1	Explain the various methodologies in ASIC and FPGA design	K1
ECT304.2	Design VLSI logic circuits with various MOSFET logic families	K3
ECT304.3	Compare different types of memory elements	K2
ECT304.4	Design and analyze data path elements such as adders and multipliers	K2
ECT304.5	Explain MOSFET fabrication techniques and design rules	K2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
ECT304.1	2		2										1	
ECT304.2	3	2	1										2	
ECT304.3	2	1											2	
ECT304.4	3	2	3										2	
ECT304.5	3		2										2	
ECT304	3	1.6	2										1.8	

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	2	Graduate need to apply knowledge of engineering fundamentals and engineering specialization to develop solutions using ASIC and FPGA
CO1 – PO3	2	Graduate need to have an in depth understanding in ASIC and FPGA architecture to develop/ design systems
CO1 - PSO1	1	Graduate need to apply fundamental knowledge to develop various electronic system
CO2 – PO1	3	Graduate will be able to apply the knowledge to design various CMOS logic circuits using different logic families for an electronic system
CO2-PO2	2	Graduate will be able to apply suitable logic styles to implement a logic functions
CO2-PO3	1	Graduate need understand the technique to design logic circuits using appropriate logic families
CO2-PSO1	2	Graduate need to apply the knowledge related to CMOS logic families to develop appropriate circuits in various electronic system
CO3-PO1	2	Graduate need to apply knowledge of engineering fundamentals and engineering specialization to understand various memory types and their working
CO3-PO2	1	Graduate will have to identify the architecture of various types of memories
CO4-PO1	3	Graduate need to apply knowledge of engineering fundamentals and engineering specialization to understand the architecture of adders and multiplier circuits to apply in system design
CO4-PO2	2	Graduate will have to identify various adder circuits and multiplier circuit and analyses their performances to implement them in systems
CO4-PO3	3	Graduates needs to design various adder circuits based on specified number of input bits
CO4-PSO1	2	Graduate need to apply the knowledge related to working of various adder and multiplier circuits in developing an electronic system
CO5-PO1	3	Graduate need to apply knowledge of engineering fundamentals and engineering specialization to understand the technique behind device fabrication and to develop mask layout for CMOS logic circuits.
CO5-PO3	2	Graduate will be develop the mask layout for various CMOS circuits
CO5-PSO1	2	Graduates will be able to understand engineering fundamentals to methods and consideration associated with fabrication of a device in electronic system design as well as understand the physical design involved in developing the system

Prepared by (Faculty Name & Signature) : Rincy Merin Varky

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Verified by : Stream Coordination Committee

5/12/21

Nitha. M. Biju.

8/5
10/12/2021
Dr. Gibu Jose
DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ECT 306: Information Theory and Coding

Semester : 6

Course Title : Information Theory and Coding

Course Code : ECT 306

Course Outcomes (CO)

After the successful completion of this course, students will able

No.	Course outcomes	Knowledge Level
ECT 306.1	Explain measures of information – entropy, conditional entropy, mutual information	K_2
ECT 306.2	Apply Shannon's source coding theorem for data compression.	K_3
ECT 306.3	Apply the concept of channel capacity for characterize limits of error-free transmission.	K_3
ECT 306.4	Apply linear block codes for error detection and correction	K_3
ECT 306.5	Apply algebraic codes with reduced structural complexity for error correction	K_3
ECT 306.6	Understand encoding and decoding of covolutional and LDPC codes	K_2

PROGRAM SPECIFIC OUTCOME (PSO)

The graduates of the department will accomplish:

PSO1: Apply Fundamental Knowledge of Electronics and Communication Engineering in the design, analysis and development of various electronic systems

PSO2: Use modern software and hardware tools in electronics engineering for the analysis of complex electronic systems

CO – PO - PSO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EC306.1	3	3	-	-	-	-	-	-	-	-	-	-	1	-
EC306.2	3	3	2	3	-	-	-	-	-	-	-	-	1	-
EC306.3	3	3	2	3	2	-	-	-	-	-	-	-	1	-
EC306.4	3	3	2	3	2	-	-	-	-	-	-	-	1	-
EC306.5	3	3	2	3	2	-	-	-	-	-	-	-	1	-
EC306.6	3	3	2	3	2	-	-	-	-	-	-	-		

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping level (3/2/1)	Justifications
CO1-PO1	3	Helps in applying knowledge on mathematical fundamentals in Engineering
CO2-PO1	3	Helps in applying mathematical models in complex engineering problems
CO3-PO1	3	Helps in analysing complex communication engineering problems
CO4-PO1	3	Helps in analysing and solving complex communication engineering problems
CO5-PO1	3	Helps in analysing and solving complex communication engineering problems
CO6-PO1	3	Students are expected to analyse and solve complex engineering problems by understanding the encoding and decoding of covolutional and LDPC codes
CO1-PO2	3	Helps in applying knowledge on mathematical fundamentals in Engineering

CO2-PO2	3	Helps in applying mathematical models in complex engineering problems
CO3-PO2	3	Helps in analysing complex communication engineering problems
CO4-PO2	3	Helps in analysing and solving complex communication engineering problems
CO5-PO2	3	Helps in analysing and solving complex communication engineering problems
CO2-PO3	2	Helps in designing solutions to communication engineering problems meeting specifications
CO3-PO3	2	Helps in designing solutions to communication engineering problems meeting specifications
CO4-PO3	2	Helps in designing solutions to communication engineering problems meeting specifications
CO5-PO3	2	Helps in designing solutions to communication engineering problems meeting specifications
CO6-PO3	2	Helps in designing solutions to communication engineering problems meeting specifications
CO2-PO4	3	Helps in design, analysis and interpretation of mathematical models for engineering applications
CO3-PO4	3	Helps in design, analysis and interpretation of mathematical models for communication engineering applications
CO4-PO4	3	Helps in design, analysis and interpretation of mathematical models for communication engineering applications
CO5-PO4	3	Helps in design, analysis and interpretation of mathematical models for communication engineering applications
CO6-PO4	3	Helps in design, analysis and interpretation of mathematical models for communication engineering applications
CO3-PO5	2	By applying the concept of channel capacity for error-free transmission students are expected to create, select and apply appropriate coding techniques and resources.
CO4-PO5	2	By applying linear block codes for error correction and detection students are expected to create, select and apply appropriate coding techniques and resources.
CO5-PO5	2	By applying algebraic codes with reduced structural complexity for error correction students are expected to create, select and apply appropriate coding techniques and resources.
CO6-PO5	2	By Understanding encoding and decoding of convolutional and LDPC codes students will be able to create, select and apply appropriate coding techniques and resources
CO1-PSO1	1	By understanding measures of information students are able to learn the fundamental concepts of communication engineering for further analysis and development
CO2-PSO1	1	Helps in understanding the fundamental mathematical concepts of communication engineering for further analysis and development
CO3-PSO1	1	Helps in understanding the concepts of communication engineering for further analysis and development

CO4-PSO1	1	Helps in understanding the concepts of communication engineering for further analysis and development
CO5-PSO1	1	Helps in understanding the fundamental concepts of communication engineering for further analysis and development

Prepared by (Faculty Name & Signature) : Deepa Abraham 5/12/21

Verified by : Stream Coordination Committee 5/12/21 Tomson Devis

10/12/2021
Dr. Sinby Jose
DAC Convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ECT 308 Comprehensive Exam

Semester : VI

Course Title : Comprehensive Course Exam

Course Code : ECT 308

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 1	Apply the knowledge of circuit theorems and solid state physics to solve the problems in electronic Circuits	**K3**
CO 2	Design a logic circuit for a specific application	K3
CO 3	Design linear IC circuits for linear and non-linear circuit applications.	**K3**
CO 4	Explain basic signal processing operations and Filter designs	**K2**
CO 5	Explain existent analog and digital communication systems	**K2**

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	3	3	1	-	-	-	-	-	-	-	-	2	2	1
CO 2	3	3	1	-	-	-	-	-	-	-	-	2	2	1
CO 3	3	3	1	-	-	-	-	-	-	-	-	2	2	1
CO 4	3	2		-	-	-	-	-	-	-	-	2	1	-
CO 5	3	2	1	-	-	-	-	-	-	-	-	2	1	-
CO	**3**	**2.6**	**1**	-	-	-	-	-	-	-	-	**2**	1.8	1

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	3	Graduate has to apply the knowledge of circuit theorems and solid state physics to solve the problems in electronic Circuits.
CO1 - PO2	3	Graduate to understand and analyze the constraints associated with device and circuit design
CO1– PO3	1	Graduates need to find solution for complex engineering problems based on the understanding on circuit theorems and solid state physics
CO1 - PO12	2	Graduate will be able to use their understanding towards life long learning
CO1-PSO1	2	Graduate can apply the knowledge of circuit theorems and solid state physics in designing electronic system
CO1-PSO2	1	Graduate can apply the knowledge of circuit theorems and solid state physics in developing electronic system using modern tools
CO2 - PO1	3	Graduates will be able to apply knowledge in desining logic circuit for specific application
CO2 - PO2	3	Graduate to understand and analyze the constraints associated with logic digital system design
CO2– PO3	1	Graduates need to find solution for complex engineering problems based on the understanding in digital logic design
CO2- PO12	2	Graduate will be able to use their understanding towards life long learning
CO2-PSO1	2	Graduate can apply the knowledge digital system design in designing electronic system
CO2-PSO2	1	Graduate can apply the knowledge of digital system design in developing electronic system using modern tools
CO3 - PO1	3	Graduates will be able to apply knowledge in designing linear IC circuits for linear and non-linear application
CO3 - PO2	3	Graduate to understand and analyze the constraints associated with designing linear IC systems for complex application
CO3– PO3	1	Graduates need to find solution for complex engineering problems based on the understanding constraints associated with designing linear IC systems

CO3- PO12	2	Graduate will be able to use their understanding towards life long learning
CO3-PSO1	2	Graduate can apply the knowledge Linear IC design in designing application specific electronic systems
CO3-PSO2	1	Graduate can apply the knowledge on linear and non linear system design using modern tools
CO4-PO1	3	Graduates will be able to apply knowledge in understanding signal processing operations and Filter designs
CO4 – PO2	2	Graduate to understand and analyze the constraints associated with designing Filters for complex application
CO4 – PO12	2	Graduate will be able to use their understanding towards lifelong learning
CO4– PSO1	1	Graduate can apply the knowledge on signal operation and filter design in designing application specific electronic systems

CO5 - PO1	3	Graduates will be able to apply knowledge in understanding analog and digital communication system
CO5 - PO2	2	Graduate to understand and analyze the constraints associated with analog and digital communication system design
CO5– PO3	1	Graduates need to find solution for complex engineering problems based on the understanding in analog and digital communication system
CO5- PO12	2	Graduate will be able to use their understanding towards life long learning
CO5-PSO1	1	Graduate can apply the knowledge analog and digital communication system in designing electronic system

Prepared by (Faculty Name & Signature) : Rini Mervin Varkey 5/12/21

Verified by : Stream Coordination Committee 5/12/21
SUNITHA S PILLAI

10/12/2021
Dr. Guby Jose
DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

ESL 130 : ELECTRICAL & ELECTRONICS WORKSHOP

Programme : **B.Tech**

Semester : **01/02**

Course Title : **ELECTRICAL & ELECTRONICS WORKSHOP**

Course Code : **ESL 130**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
ESL130.1	Demonstrate safety measures against electric shocks	K_2
ESL130.2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols	K_2
ESL130.3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings	K_2
ESL130.4	Identify and test various electronic components	K_2
ESL130.5	Draw circuit schematics with EDA tools	K_2
ESL130.6	Assemble and test electronic circuits on boards	K_2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
ESL130.1						3						1		
ESL130.2	2									1				
ESL130.3	2			1		1		1	2	2		2		
ESL130.4	3				1				2			2	1	1
ESL130.5	3				2			2	2			2	1	1
ESL130.6	3				2				2			1	1	
ESL130														

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO4 - PO1	3	Students are expected to utilize engineering knowledge for the identification and testing of various electronic components
CO4 - PO5	1	Students are expected to identify certain problems by understanding the testing of various electronic components
CO4 - PO9	2	Students are expected to function effectively as an individual and in a team during the identification and testing of various electronic components
CO4 – PO12	2	Identification and testing of various electronic components will help the students to develop the ability to engage in independent and life-long learning, in the broadest context of technological change.
CO4 - PSO1	1	Students are expected to apply the fundamental knowledge in identifying and testing of various electronic components, for the development of basic electronic systems
CO4 - PSO2	1	The usage of various instruments for testing the components will familiarize the students to use certain hardware tools
CO5 - PO1	3	Students are expected to apply the electronic circuit knowledge to draw the circuit schematic
CO5 - PO5	2	Students are expected to utilize the appropriate EDA softwares effectively to draw the circuit schematic.
CO5 - PO8	2	Students are expected to apply the ethical rules and commit to professional ethics in the laboratory.
CO5 - PO9	2	Students are expected to function effectively as an individual to obtain the expected outcome
CO5 - PO12	2	Use of the software tools enable the students to engage in independent and lifelong learning
CO5 – PSO1	1	Students are expected to apply fundamental knowledge of Electronics and Communication in electronic circuit design
CO5 - PSO2	1	Students are expected to use EDA software tools for the design of electronic circuits
CO6 - PO1	3	Students are expected to apply knowledge of Electronic circuits to rectify problems while assembling and testing electronic circuits on board.
CO6 - PO5	2	Students are expected to create, select, and apply appropriate techniques and resources, to assemble and test electronic circuits on board.
CO6 – PO9	2	Students are expected to design documentation of the various electronic circuit experiments, effectively as an individual and in a team.

CO6 - PO12	1	Students are expected to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the area of electronic circuits.
CO6 - PSO1	1	Students are expected to apply fundamental knowledge of Electronics circuits in the design, analysis and development of various electronic systems

Prepared by (Faculty Name & Signature) : DR. Giby Jose 10/10/20

Verified by : Stream Coordination Committee

10/10/20 Nithe. M. Biju

20/10/2020
Dr. Giby Jose
DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EST 130 Basics of Electronics Engineering

Semester : **Two**

Course Title : **Basics of Electronics Engineering**

Course Code : **EST 130**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 1	Understand basic knowledge of components used in electronics	K1
CO 2	Describe working of a voltage amplifier	K2
CO 3	Outline the principle of an electronic instrumentation system	K1
CO 4	Explain the principle of radio and cellular communication	K2
CO 5	Simulate basic electronic circuits	K2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	1	1	-	-	-	-	-	-	-	-	-	-	1	-
CO 2	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CO 3	2	-	-	-	-	-	-	-	-	-	-	2	1	-
CO 4	2	-	-	-	-	-	-	-	-	-	-	2	2	-
CO 5	2	-	-	-	2	-	-	-	-	-	-	2	-	2
EST 130	**1.8**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1.5**	**2**

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 – PO1	1	Knowledge in electronic components will improve engineering skills.
CO 1 – PO2	1	Knowledge in electronic components will help to formulate engineering problems.
CO1 – PSO1	1	Fundamental knowledge in electronic components will help in the design, analysis and development of various electronic systems.
CO2 – PO1	2	Fundamental knowledge in voltage amplifier can be applied to the solution of various engineering problems.
CO2 – PSO1	2	Fundamental knowledge in voltage amplifiers will help in the design, analysis and development of various electronic systems.
CO3 – PO1	2	Basic knowledge in electronic instrumentation systems will help to find various problems in engineering fields.
CO3 – PO12	2	Motivate the students to improve their knowledge to adapt to technological changes.
CO3 – PSO1	1	Will help to design and analyze electronic systems.
CO4 – PO1	2	Knowledge in the principle of radio and cellular communication will improve engineering skills.
CO4 – PO12	2	Motivate the students to improve their knowledge to adapt technological changes.
CO4 – PSO1	2	Will help to design and develop communication systems.
CO5 – PO1	2	Will help to finding solutions for complex engineering problems.
CO5 – PO5	2	Will help to model complex electronic circuits.
CO5 – PO12	2	Motivate the students to improve their knowledge to adapt technological changes.
CO5 – PSO2	2	Will help to analyze complex electronic circuits

Prepared by (Faculty Name & Signature) : DR. GIBY JOSE 10/10/20

Verified by : Stream Coordination Committee 10/10/20 Nithe. M. Biju.

20/10/2020
Dr. Giby Jose
DAL convenor

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Department of Electronics & Communication Engineering

Programme : Bachelor of Technology | Course Code: HUT 310

Course Name: Management for Engineers | Semester: 6

COURSE OUTCOMES

The students will be able to:

CO	Course outcome	Knowledge level
HUT310.1	Explain the characteristics of management in the contemporary context.	K2
HUT310.2	Describe the functions of management.	K2
HUT310.3	Demonstrate ability in decision making process and productivity analysis.	K2
HUT310.4	Illustrate project management technique and develop a project schedule.	K3
HUT310.5	Summarize the functional areas of management.	K2
HUT310.6	Comprehend the concept of entrepreneurship and create business plans.	K2

CO - PO - PSO MAPPING

PO / CO	Programme outcomes												PSO	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	1	2	2	2	-	2	1	1	-	-
CO2	2	-	-	-	1	1	-	2	1	2	1	1	-	-
CO3	2	2	2	2	1	-	-	-	-	-	-	-	-	-
CO4	2	2	2	2	1	-	-	-	-	-	2	1	-	-
CO5	2	-	-	-	-	1	1	-	1	2	1	-	-	-
CO6	-	2	2	2	1	1	1	1	1	1	1	1	-	-
AVG	2	2	2	2	1	1.25	1.33	1.66	1	1.75	1.2	1	-	-

Correlation : 1-Low, 2-Moderate, No Correlation '-'

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Department of Electronics & Communication Engineering

JUSTIFICATION

CO-PO-PSO	LEVEL (Low/Moderate/High)	JUSTIFICATION
HUT310.1-PO1	M	Understanding the characteristics of management, students are expected to apply the engineering knowledge in order to become astounding professional managers in an organization.
HUT310.1-PO5	L	With the knowledge gained from the characteristics of management, students are expected to use modern tools with respective to the scenario they confront for enhancing the managerial roles.
HUT310.1-PO6	M	After the completion of course, students are expected to become competent managers by utilizing the principles of efficiency and effectiveness for the growth and development of the society.
HUT310.1-PO7	M	Understanding the characteristics of management, students are expected to work as dedicated managers for the sustainable growth and the protection of the environment.
HUT310.1-PO8	M	With the knowledge gained from the characteristics of management, students are expected to portray ethical values like integrity, transparency, accountability, impartiality and equity which are inevitable for the organizational growth.
HUT310.1-PO10	M	After the completion of course, students are expected to communicate with different levels of managers and team for the enormous progression of the organization.
HUT310.1-PO11	L	Understanding the characteristics of management, students are expected to manage projects efficiently by regulating the finance for creating a surplus in an organization.
HUT310.1-PO12	L	With the knowledge gained from the characteristics of management, students are expected to acquire the significance and principles of management for personal and professional growth.
HUT310.2-PO1	M	Understanding the functions of management, students are expected to apply the engineering knowledge in order to become astounding professional managers in an organization.
HUT310.2-PO5	L	With the knowledge gained from the functions of management, students are expected to use modern

		tools with respective to the scenario they confront for enhancing the managerial roles.
HUT310.2-PO6	L	Understanding the functions of management, students are expected to become competent managers by utilizing the principles of efficiency and effectiveness for the growth and development of the society.
HUT310.2-PO8	M	With the knowledge gained from the functions of management, students are expected to portray ethical values like integrity, transparency, accountability, impartiality and equity which are inevitable for the organizational growth.
HUT310.2-PO9	L	Understanding the functions of management, students are expected to work both individually and team for the betterment of the organization irrespective of the gender.
HUT310.2-PO10	M	With the knowledge gained from the functions of management, students are expected to communicate with different levels of managers and team for the enormous progression of the organization.
HUT310.2-PO11	L	After the completion of course, students are expected to manage projects efficiently by regulating the finance for creating a surplus in an organization.
HUT310.2-PO12	L	Understanding the functions of management, students are expected to acquire the significance and principles of management for personal and professional growth.
HUT310.3-PO1	M	Understanding the decision-making process and productivity analysis, students are expected to apply the engineering knowledge in order to become astounding professional managers in an organization.
HUT310.3-PO2	M	With the knowledge gained from the decision-making process and productivity analysis, students are expected to analyze both simple and crucial problems confronted by the employee in an organization as well as the organization as a whole.
HUT310.3-PO3	M	Understanding the decision-making process and productivity analysis, students are expected to develop proper and timely solutions to each and every problem for the smooth functioning of an organization.
HUT310.3-PO4	M	With the knowledge gained from the decision-making process and productivity analysis, students are expected to conduct precise investigations of complex problems in order to address it

		appropriately for the advancement of an organization.
HUT310.3-PO5	L	Understanding the decision-making process and productivity analysis, students are expected to use modern tools with respective to the scenario they confront for enhancing the managerial roles.
HUT310.4-PO1	M	With the knowledge gained from the project management technique, students are expected to apply the engineering knowledge in order to become astounding managers in an organization.
HUT310.4-PO2	M	Understanding the project management technique, students are expected to analyze both simple and crucial problems confronted by the employee in an organization as well as the organization as a whole.
HUT310.4-PO3	M	With the knowledge gained from the project management technique, students are expected to develop proper and timely solutions to each and every problem for the smooth functioning of an organization.
HUT310.4-PO4	M	Understanding the project management technique, students are expected to conduct precise investigations of complex problems in order to address it appropriately for the advancement of an organization.
HUT310.4-PO5	L	After the completion of course, students are expected to use modern tools with respective to the scenario they confront for enhancing the managerial roles.
HUT310.4-PO11	M	With the knowledge gained from the project management technique, students are expected to manage projects efficiently by regulating the finance for creating a surplus in an organization.
HUT310.4-PO12	L	Understanding the project management technique, students are expected to acquire the significance and principles of management for personal and professional growth.
HUT310.5-PO1	M	With the knowledge gained from the functional areas of management, students are expected to apply the engineering knowledge in order to become astounding professional managers in an organization.
HUT310.5-PO6	L	Understanding the functional areas of management, students are expected to become competent managers by utilizing the principles of efficiency and effectiveness for the growth and development of the society.
HUT310.5-PO7	L	After the completion of course, students are expected to work as dedicated managers for the

		sustainable growth and the protection of the environment.
HUT310.5-PO9	L	With the knowledge gained from the functional areas of management, students are expected to work both individually and team for the betterment of the organization irrespective of the gender.
HUT310.5-PO10	M	Understanding the functional areas of management, students are expected to communicate with different levels of managers and team for the enormous progression of the organization.
HUT310.5-PO11	L	After the completion of course, students are expected to manage projects efficiently by regulating the finance for creating a surplus in an organization.
HUT310.6-PO2	M	With the knowledge gained from the concept of entrepreneurship, students are expected to analyze both simple and crucial problems confronted by the employee in an organization as well as the organization as a whole.
HUT310.6-PO3	M	Understanding the concept of entrepreneurship, students are expected to develop proper and timely solutions to each and every problem for the smooth functioning of an organization.
HUT310.6-PO4	M	With the knowledge gained from the concept of entrepreneurship, students are expected to conduct precise investigations of complex problems in order to address it appropriately for the advancement of an organization.
HUT310.6-PO5	L	Understanding the concept of entrepreneurship, students are expected to use modern tools with respective to the scenario they confront for enhancing the managerial roles.
HUT310.6-PO6	L	After the completion of course, students are expected to become competent managers by utilizing the principles of efficiency and effectiveness for the growth and development of the society.
HUT310.6-PO7	L	With the knowledge gained from the concept of entrepreneurship, students are expected to work as dedicated managers for the sustainable growth and the protection of the environment.
HUT310.6-PO8	L	Understanding the concept of entrepreneurship, students are expected to portray ethical values like integrity, transparency, accountability, impartiality and equity which are inevitable for the organizational growth.
HUT310.6-PO9	L	After the completion of course, students are expected to work both individually and team for the

Department of Electronics & Communication Engineering

		betterment of the organization irrespective of the gender.
HUT310.6-PO10	L	With the knowledge gained from the concept of entrepreneurship, students are expected to communicate with different levels of managers and team for the enormous progression of the organization.
HUT310.6-PO11	L	Understanding the concept of entrepreneurship, students are expected to manage projects efficiently by regulating the finance for creating a surplus in an organization.
HUT310.6-PO12	L	After the completion of course, students are expected to acquire the significance and principles of management for personal and professional growth.

Preema Theresa Varghese
Course handling Faculty

5/12/21
SUNITHA S PILLAI
Stream coordinator

10/12/2021 Dr. Gibu Jose
DAC Convenor
Signature of ~~HOD~~

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC405: Optical Communication

Programme : **B.Tech**

Semester : **Seventh**

Course Title : **Optical Communication**

Course Code : **C405**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
C405.1	Know the working and types of optical fiber. (K2)	K_2
C405.2	Compare the performance of various optical sources. (K2)	K_2
C405.3	Apply the knowledge of optical detectors in the design of optical receivers.(K3)	K_3
C405.4	Analyze the performance of optical soliton links.(K3)	K_3
C405.5	Know the concept of optical amplifiers.(K1)	K_1
C405.6	Know the concept of optical amplifiersDescribe the principle of WDM and LiFi.(K2)	K_2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C405.1	2	1	-	-	-	-	-	-	-	-	-	-	2	-
C405.2	2	1	-	-	-	-	-	-	-	-	-	-	2	-
C405.3	3	2	1	1	-	-	-	-	-	-	-	-	2	-
C405.4	2	3	1	1	-	-	-	-	-	-	-	-	2	-
C405.5	1	-	-	-	-	-	-	-	-	-	-	-	2	-
C405.6	2	1	-	-	-	-	-	-	-	-	-	-	2	-
C405	2	2	1	1	-	-	-	-	-	-	-	-	2	-

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	2	Students are expected to apply engineering fundamentals to solve problems related to optical communication
CO1 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems in optical communication.
CO1 - PSO1	2	Students are expected to apply fundamental knowledge of optical communication in the design, analysis and development of various communication systems.
CO2 - PO1	2	Students are expected to apply the knowledge of engineering basics to the solution of problems related to optical communication.
CO2 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems related to retarded potential and measurement of optical communication.
CO2 - PSO1	2	Students are expected to apply fundamental knowledge of optical communication in the design, analysis and development of various electronic systems.
CO3 - PO1	3	Students are expected to apply engineering fundamentals to develop optical communication system.
CO3 - PO2	2	Students are expected to identify, formulate, review research literature, and analyze complex problems in optical communication.
CO3 - PSO1	2	Students are expected to apply fundamental knowledge of optical communication in the design, analysis and development of various electronic systems.
CO4 - PO1	2	Students are expected to apply engineering fundamentals to explain principles and applications of different optical communication
CO4 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems of optical communication.
CO4 - PSO1	2	Students are expected to apply fundamental knowledge of optical communication in the design, analysis and development of various communication systems.
CO5 - PO1	2	Students are expected to apply engineering fundamentals to explain optical communication.
CO5 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze optical communication.
CO5 - PSO1	2	Students are expected to apply fundamental knowledge of optical communication in the design, analysis and development of various electronic communication systems.
CO6 - PO1	2	Students are expected to apply engineering fundamentals to explain optical communication.

CO6 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems in optical communication.
CO6 - PSO1	2	Students are expected to apply fundamental knowledge of optical communication in the design, analysis and development of various electronic communication systems.

Prepared by (Faculty Name & Signature) : Manju James

Verified by : Stream Coordination Committee Tomson Devis

5/3/2020
Dr. Guby Jose
DAC convenor



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DEPARTMENT OF ELECTRONICS AND COMMUNICATION SYSTEMS

EC431: Communication Systems Lab

Programme : **B.Tech**

Semester : **Seventh**

Course Title : **Communication Systems Lab**

Course Code : **C431**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
C431.1	Demonstrate characteristics of microwave sources (K3)	K_3
C431.2	Apply microwave measurement procedures to measure different parameters (K3)	K_3
C431.3	Find the radiation pattern of antenna. (K3)	K_3
C431.4	Test the characteristics of microwave components (K1)	K_1
C431.5	Understand to align light waves into small optical components with high precision (K2)	K_2
C431.6	Understand the reliability issues of the delicate optical devices (K2)	K_2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C431.1	3	2	1	1	-	-	-	-	-	-	-	-	3	3
C431.2	3	2	1	1	-	-	-	-	-	-	-	-	3	3
C431.3	3	2	1	1	-	-	-	-	-	-	-	-	3	3
C431.4	1	-	-	-	-	-	-	-	-	-	-	-	1	1
C431.5	2	1	-	-	-	-	-	-	-	-	-	-	2	2
C431.6	2	1	-	-	-	-	-	-	-	-	-	-	2	2
C431	2	2	1	1	-	-	-	-	-	-	-	-	2	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	2	Students are expected to apply engineering fundamentals to solve problems related to Communication Systems
CO1 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems in Communication Systems.
CO1 - PSO1	2	Students are expected to apply fundamental knowledge of Communication Systems in the design, analysis and development of various Communication Systems.
CO2 - PO1	2	Students are expected to apply the knowledge of engineering basics to the solution of problems related to Communication Systems.
CO2 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems related to retarded potential and measurement of Communication Systems.
CO2 - PSO1	2	Students are expected to apply fundamental knowledge of Communication Systems in the design, analysis and development of various electronic systems.
CO3 - PO1	3	Students are expected to apply engineering fundamentals to develop Communication Systems system.
CO3 - PO2	2	Students are expected to identify, formulate, review research literature, and analyze complex problems in Communication Systems.
CO3 - PSO1	2	Students are expected to apply fundamental knowledge of Communication Systems in the design, analysis and development of various electronic systems.
CO4 - PO1	2	Students are expected to apply engineering fundamentals to explain principles and applications of different Communication Systems
CO4 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems of Communication Systems.
CO4 - PSO1	2	Students are expected to apply fundamental knowledge of Communication Systems in the design, analysis and development of various Communication Systems.
CO5 - PO1	2	Students are expected to apply engineering fundamentals to explain Communication Systems.
CO5 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze Communication Systems.
CO5 - PSO1	2	Students are expected to apply fundamental knowledge of Communication Systems in the design, analysis and development of various electronic Communication Systems.
CO6 - PO1	2	Students are expected to apply engineering fundamentals to explain Communication Systems.

CO6 - PO2	1	Students are expected to identify, formulate, review research literature, and analyze complex problems in Communication Systems.
CO6 - PSO1	2	Students are expected to apply fundamental knowledge of Communication Systems in the design, analysis and development of various electronic Communication Systems.

Prepared by (Faculty Name & Signature) : Manju James

Verified by : Stream Coordination Committee Tomson Devis

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC 401 Control Systems

Semester : **Seven**

Course Title : Information Theory and Coding

Course Code : **EC 401**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 1	Understand information and its basic concepts	**K2**
CO 2	Understand limits of error free representation of information signals and transmission of such signals over a noisy channel	**K2**
CO 3	Design and analyze data compression techniques with varying efficiencies as per requirements	**K3**
CO 4	Understand the concept of various theorems as proposed by Shannon for efficient data compression and reliable transmission	**K2**
CO 5	Analyse different coding techniques for reliable data transmission	**K2**
CO 6	Design an optimum decoder for various coding schemes used	**K3**

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	2	1	-	-	-	-	-	-	-	-	-	-	2	2
CO 2	2	1	-	-	-	-	-	-	-	-	-	-	2	2
CO 3	3	2	1	1	-	-	-	-	-	-	-	-	3	3
CO 4	2	1	-	-	-	-	-	-	-	-	-	-	2	2
CO 5	2	1	-	-	-	-	-	-	-	-	-	-	2	2
CO 6	3	2	1	1									3	3

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 – PO1	2	Understanding information and its basic concepts helps in solving many engineering problems.
CO1 – PO2	1	Understanding information and its basic concepts helps will help to identify and formulate engineering problems.
CO1 – PSO1	2	Understanding information and its basic concepts will help in the applying fundamental knowledge of electronics and communication in design, analysis and development of various systems.
CO1 – PSO2	2	Understanding information and its basic concepts will help in analysis of complex communication systems
CO2 – PO1	2	Understanding limits of error free representation of information signals and transmission of such signals over a noisy channel will help in applying engineering knowledge to communication engineering
CO2 – PO2	1	Understanding limits of error free representation of information signals and transmission of such signals over a noisy channel help to identify and formulate engineering problems in communication systems.
CO2 – PSO1	2	Understanding limits of error free representation of information signals and transmission of such signals over a noisy channel will help in the applying fundamental knowledge of electronics and communication in design, analysis and development of various systems
CO2 – PSO2	2	Understanding limits of error free representation of information signals and transmission of such signals over a noisy channel will help in analysis of complex communication systems
CO3 – PO1	3	Designing and analyzing data compression techniques with varying efficiencies helps in solving many engineering problems.
CO3 – PO2	2	Designing and analyzing data compression techniques with varying efficiencies help to identify and formulate engineering problems in communication systems.
CO3 – PO3	1	Designing and analyzing data compression techniques with varying efficiencies helps students to design solutions of complex communication engineering problems
CO3 – PO4	1	Designing and analyzing data compression techniques with varying efficiencies helps students to conduct investigations of complex problems in communication engineering
CO3 – PSO1	3	Designing and analyzing data compression techniques with varying efficiencies will help in communication system design, analysis and development of various systems
CO4 – PSO2	3	Designing and analyzing data compression techniques with varying efficiencies will help in analysis of complex communication systems
CO4 – PO1	2	Understanding various theorems as proposed by Shannon for efficient data compression and reliable transmission will help in finding solutions to complex engineering problems

CO4 – PO2	1	Understanding Shannon's theorems for efficient data compression and reliable transmission help in identifying and formulating solutions for communication engineering
CO4 – PSO1	2	Students are able to apply fundamental knowledge of electronics and communication engineering by understanding various theorems proposed by Shannon
CO4 – PSO2	2	Students are able to analyse complex communication engineering systems by understanding various theorems proposed by Shannon
CO5 – PO1	2	By analysing different coding techniques for reliable data transmission students are able to find solutions to problems in communication engineering
CO5 – PO2	1	By analysing different coding techniques for reliable data transmission students are able to identify, formulate problems pertaining to communication engineering
CO5 – PSO1	2	By analysing different coding techniques for reliable data transmission students are able to apply fundamental knowledge of communication engineering in the design and development of various electronic systems
CO5 – PSO2	2	By analysing different coding techniques for reliable data transmission students are able to analyse complex systems in communication engineering
CO6 – PO1	3	Students are able to apply knowledge of mathematics and engineering by designing an optimum decoder for various coding schemes .
CO6 – PO2	2	By designing an optimum decoder for various coding schemes students are able to identify, formulate and analyze complex engineering problems.
CO6 – PO3	1	By designing an optimum decoder for various coding schemes students are able to design and development solutions for complex engineering solutions.
CO6 – PO4	1	Students are able to conduct investigations of complex engineering problems by designing an optimum decoder for various coding schemes
CO6 – PSO1	3	Students are able to apply fundamental knowledge of communication engineering by designing an optimum decoder for various coding schemes
CO6 – PSO2	3	Students are able to analyse complex communication engineering by designing an optimum decoder for various coding schemes

Prepared by (Faculty Name & Signature) : Deepa Abraham

Verified by : Stream Coordination Committee Tomson Devis

5/03/2020
Dr. Gibu Jose
DAC convenor

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

UNIVERSITY PRESCRIBED CO'S AND CO-PO MATRIX

Programme : **B.Tech**

Semester : **Seventh**

Course Title : **Microwave and Radar Engineering**

Course Code : **EC403**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
C403.1	Explain different types of microwave resonant cavities, microwave vacuum amplifiers, and microwave sources	K2
C403.2	Analyse the performance factors of Reflex Klystron oscillators and Magnetron oscillators	K3
C403.3	Explain the working and derive the performance factors of TWT and also Illustrate different measurement techniques for impedance, frequency and power of microwave signals.	K2
C403.4	Explain and derive the S-parameters of different microwave circuits	K2
C403.5	Differentiate different types of solid-state devices such as microwave transistor, tunnel diode and Gunn diode.	K2
C403.6	Understand the basic concepts, types, working of radar and describe radar transmitters and receivers	K2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1 K3	PSO 2 K3
C403.1	2	1	-	-	-	-	-	-	-	-	-	-	2	2
C403.2	3	2	1	1	1	-	-	-	-	-	-	-	3	3
C403.3	2	1	-	-	-	-	-	-	-	-	-	-	2	2
C403.4	2	1	-	-	-	-	-	-	-	-	-	-	2	2
C403.5	2	1	-	-	-	-	-	-	-	-	-	-	2	2
C403.6	2	1	-	-	-	-	-	-	-	-	-	-	2	2
C403 (Average)	2	1	1	1	1	-	-	-	-	-	-	-	2	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	2	Students are expected to apply the engineering fundamentals to understand the basic concepts of microwave devices
CO1 - PO2	1	Students are equipped to identify and formulate problems based on the concepts of various microwave devices
CO1 – PSO1	2	Students are expected to select and apply the fundamental knowledge of microwave devices for the development of various microwave circuits
CO1 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various microwave circuits
CO2 - PO1	3	Students are expected to apply the engineering fundamentals to understand the basic concepts of klystron and magnetron amplifiers
CO2 – PO2	2	Students are equipped to identify and formulate problems based on the concepts of various klystron and magnetron amplifiers
CO2 – PO3	1	Students are expected to design solutions for engineering problems on various klystron and magnetron amplifiers
CO2 – PO4	1	Students are equipped to conduct investigations on the problems based on klystron and magnetron amplifiers
CO2– PO5	1	Students are expected to select and apply various modern tools for modelling klystron and magnetron amplifiers
CO2 – PSO1	3	Students are expected to select and apply the fundamental knowledge of microwave devices for the development of klystron and magnetron amplifiers
CO2 – PSO2	3	Students are expected to use modern software and hardware tools for the analysis of various klystron and magnetron amplifiers
CO3– PO1	2	Students are expected to apply the engineering fundamentals to understand the basic concepts of travelling wave tubes and microwave measurements
CO3 – PO2	1	Students are equipped to identify and formulate problems based on the concepts of various microwave measurements and travelling wave tubes
CO3 – PSO1	2	Students are expected to select and apply the fundamental knowledge of microwave devices for the development of travelling wave tubes
CO3 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various microwave measurements
CO4– PO1	2	Students are expected to apply the engineering fundamentals to understand the basic concepts of scattering parameters
CO4 – PO2	1	Students are equipped to identify and formulate problems based on the concepts of various scattering parameters of different microwave circuits
CO4 – PSO1	2	Students are expected to select and apply the fundamental knowledge of microwave devices for the development of various scattering parameters

CO4 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various scattering parameters
CO5– PO1	2	Students are expected to apply the engineering fundamentals to understand the basic concepts of microwave solid state devices
CO5 – PO2	1	Students are equipped to identify and formulate problems based on the concepts of various microwave solid state devices
CO5 – PSO1	2	Students are expected to select and apply the fundamental knowledge of microwave devices for the development of various microwave solid state devices
CO5 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various microwave solid state devices
CO6– PO1	2	Students are expected to apply the engineering fundamentals to understand the basic concepts of radar transmitters and receivers
CO6 – PO2	1	Students are equipped to identify and formulate problems based on the concepts of various types of radar transmitters and receivers
CO6 – PSO1	2	Students are expected to select and apply the fundamental knowledge of microwave devices for the development of radar transmitters and receivers
CO6 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various radar transmitters and receivers

Prepared by (Faculty Name & Signature): Tomsm Revis

Verified by: Stream Coordination Committee

5/03/2020
Dr. Gibu Jose
DAC convenor

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC 409 Control Systems

Semester : **Seven**

Course Title : Control Systems

Course Code : **EC 409**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO 1	Represent mathematically a system and deriving their transfer function model.	**K2**
CO 2	Analyse the time response and frequency response of the system for any input.	**K3**
CO 3	Find the stability of system.	**K3**
CO 4	Design a control system with suitable compensation technique.	**K3**
CO 5	Analyse a digital control system.	**K3**
CO 6	Analyse state space representation of control system.	**K3**

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO 1	2	1	-	-	-	-	-	-	-	-	-	-	2	2
CO 2	3	2	1	1	-	-	-	-	-	-	-	-	3	3
CO 3	3	2	1	1	-	-	-	-	-	-	-	-	3	3
CO 4	3	2	1	1	-	-	-	-	-	-	-	-	3	3
CO 5	3	2	1	1	-	-	-	-	-	-	-	-	3	3
CO 6	3	2	1	1									3	3
ECT 204	**3**	**2**	**1**	**1**	-	-	-	-	-	-	-	-	**3**	**3**

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 – PO1	2	Knowledge in transfer function of a system will help to the solution for many engineering problems.
CO 1 – PO2	1	Knowledge in transfer function of a system will help to identify and formulate engineering problems.
CO1 – PSO1	2	Fundamental knowledge in transfer function of a system will help in the design, analysis and development of various control systems.
CO2 – PO1	1	Knowledge in the standard input signals will help to identify and formulate engineering problems.
CO2 – PO2	2	Knowledge in the standard input signals will help to formulate and analyze complex engineering problems.
CO2 – PO3	1	Knowledge in the standard input signals can be applied to the development of solution for complex engineering problems.
CO2 – PO4	1	Knowledge in the standard input signals will help in the analysis and interpretation data and synthesis of the information to provide valid conclusions.
CO2 – PSO1	3	Knowledge in the standard input signals will help in the design, analysis and development of various electronic systems.
CO3 – PO1	3	Knowledge in stability can be applied to the solution of various engineering problems.
CO3 – PO2	2	Knowledge in stability will help to formulate and analyze complex engineering problems.
CO3 – PO3	1	Knowledge in stability can be applied to the development of solution for complex engineering problems.
CO3 – PO4	1	Knowledge in stability will help in the analysis and interpretation data and synthesis of the information to provide valid conclusions.
CO3 – PSO1	3	Knowledge in stability will help in the design, analysis and development of various electronic systems.
CO4 – PO1	3	Knowledge in compensation techniques will help to design LTI system.
CO4 – PO2	2	Knowledge in compensation techniques will help to formulate and analyze specifications of LTI system.
CO4 – PO3	1	Knowledge in compensation techniques can be applied to the development of solution for complex engineering problems.
CO4 – PO4	1	Knowledge in compensation techniques help in the analysis and interpretation data and synthesis of the information to provide valid conclusions.
CO4 – PSO1	1	Knowledge in compensation techniques will help in the design, analysis and development of various electronic systems.
CO5 – PO1	3	Knowledge in digital control system can be applied to design a reliable digital signal processing system.
CO5 – PO2	2	Knowledge in digital control system can be used to formulate a reliable digital signal processing system.

CO5 – PO3	1	Knowledge in digital control system can be applied to the development of solution for complex engineering problems.
CO5 – PO4	1	Knowledge in digital control system will help in the analysis and interpretation data and synthesis of the information to provide valid conclusions.
CO5 – PSO1	3	Knowledge in digital control system will help in the design and development of a reliable digital signal processing system.
CO6 – PO1	3	Knowledge in state space representation of control system can be applied to design a reliable digital signal processing system.
CO5 – PO2	2	Knowledge in state space representation of control system can be used to formulate a reliable digital signal processing system.
CO5 – PO3	1	Knowledge in state space representation of control system can be applied to the development of solution for complex engineering problems.
CO5 – PO4	1	Knowledge in state space representation of control system will help in the analysis and interpretation data and synthesis of the information to provide valid conclusions.
CO5 – PSO1	3	Knowledge in state space representation of control system will help in the design and development of a reliable digital signal processing system.
CO5 – PSO2	3	Knowledge in state space representation of control system will help in the analysis of complex control systems.

Prepared by (Faculty Name & Signature) : Dr. Giby Jose

Verified by : Stream Coordination Committee

4/3/2020

5/3/2020
Dr. Giby Jose
DAC Convenor

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC 451 Seminar and Project Preliminary

Semester: VII
Course Title: Seminar and Project Preliminary
Course Code : EC451

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
EC451.1 (CO1)	**Identify** topics of current relevance in the field of Electronics Engineering for giving seminars.	K3
EC451.2 (CO2)	**Survey** information available in the literature on selected topics and systematically consolidate the knowledge content.	K4
EC451.3 (CO3)	**Identify** Projects of current relevance in the field of Electronics Engineering for solving by demonstrating teamwork.	K3
EC451.4 (CO4)	**Formulate** Hypothesis/Design/Methodology/Work plan to solve problems in the field of Electronics and Allied Engineering after conducting systematic analysis of the problem at hand	K6
EC451.5 (CO5)	**Make use of** software tools like UML/CAD tools/SPICE, Project Management tools like Gantt Chart/CPM/PERT and presentation tools like LaTeX/PPT	K3
EC451.6 (CO6)	**Develop** Presentation/Writing skills on technical matter	K3

CO – PO - PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EC451.1 (CO1)	3	-	-	-	-	-	2	2	-	-	-	-	3	-
EC451.2 (CO2)	-	2	-	2	-	2	-	-	-	-	-	-	-	-
EC451.3 (CO3)	-	2	-	-	-	-	-	2	2	3	-	2	-	-
EC451.4 (CO4)	-	3	3	2	-	-	-	-	3	-	2	-	3	-
EC451.5 (CO5)	-	-	-	-	3	-	-	-	-	-	1	2	-	3
EC451.6 (CO6)	-	2	-	-	-	-	-	2	2	3	-	2	-	-
EC451	3	2.25	3	2	3	2	2	2	2.33	3	1.5	2	3	3

JUSTIFICATION FOR CO-PO-PSO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	3	The students are expected to topics of current relevance in the field of Electronics Engineering for giving seminars.
CO1 – PO7	2	The students are expected to clearly Understand the impact of the topics proposed by them in societal and environmental context and Demonstrate their knowledge in arriving at sustainable presentations to the extent possible.
CO1 - PO8	2	The students are expected to respect and Apply principles of Professional Ethics while selecting the topic and to present.
CO1 - PSO1	3	The students are expected to Apply fundamental knowledge in Electronics Engineering to present electronic systems or related items as seminars.
CO2 - PO2	2	The students are expected to survey information available in the literature on selected topics and systematically consolidate the knowledge content.
CO2 – PO4	2	The students are expected to conduct surveys based on available solutions and data to arrive at a solution for the problem selected by the project group.
CO2 - PO6	2	The students are expected to assess societal, health, safety, legal and cultural issues and consequent responsibilities while doing literature for their study and implementation.
CO3 - PO2	2	The students are expected to Apply their fundamental knowledge in Engineering, and Science to solve the Engineering Problem at hand.
CO3 - PO8	2	The students are expected to clearly Understand the impact of the solutions proposed by them in societal and environmental context and Demonstrate their knowledge in arriving at sustainable solutions to the extent possible.
CO3 - PO9	2	The students are expected to prepare technical reports and publish technical papers working in the project team, by promoting teamwork.
CO3 - PO10	3	The students are expected to respect and Apply principles of Professional Ethics while designing solutions and carrying out the project work.
CO3 - PO12	2	The students are expected to Apply fundamental knowledge in Electronics Engineering to develop electronic systems.
CO4-PO2	3	The students are expected to do peripheral analysis of the Problem and stakeholder requirements for arriving at an Optimal Solution for the specific problem for the project.
CO4 - PO3	3	The students are expected to Design and Develop Optimal Solutions for the specific problem at hand.
CO4 – PO4	2	The students are expected to conduct investigations based on available solutions and data to arrive at a solution for the problem selected by the project group.
CO4 - PO9	3	The students are expected to demonstrate Individual and Teamwork in problem solving within their project group and between different project groups encouraging healthy exchange of ideas.
CO4 - PO11	2	The students are expected to demonstrate basic understanding of management principles and financial management in time bound execution of the Project preliminary work.
CO4 - PSO1	3	The students are expected to apply fundamental knowledge while encouraging innovative thinking to formulate optimal solutions.

CO5 - PO5	3	The students are expected to use various modern tools as applicable in design, analysis, management and design documentation.
CO5 - PO11	1	The students are expected to use appropriate tools for the Project Management, resource management and time scheduling
CO5 - PO12	2	The students are expected to investigate and identify the right tool from available and accessible tools for problem solving thereby promoting independent learning skills.
CO5 - PSO2	3	The students are expected to apply modern Software and Hardware tools for development and analysis of the Systems designed by them as a solution for the problem selected.
CO6 - PO2	2	The students are expected to analyse the solution arrived at in comparison with available solutions proposed by the peer groups and to publish their findings/contributions as a technical paper.
CO6 - PO8	2	The students are expected to respect publication ethics in preparing technical papers and reports.
CO6 - PO9	2	The students are expected to prepare technical reports and publish technical papers working in the project team, by promoting teamwork.
CO6 - PO10	3	The students are expected to prepare a technical report as a document and a technical paper for publication and effectively defend their findings before the assessment panel.
CO6 - PO12	2	The students are expected to apply self-learning skills to probe into various literature related to their work and publish the unique content in their work.

Prepared by (Faculty Name & Signature) : 27/9/2021 Dr. Anus. P

Verified by : Stream Coordination Committee:

10/12/2021
Dr. Ajay Jose
DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

UNIVERSITY PRESCRIBED CO'S AND CO-PO MATRIX

Programme : **B.Tech**

Semester : **SEVEN**

Course Title : **MEMS**

Course Code : **EC465**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
CO1	Understand the working principle of micro sensors and actuator.	K2
CO2	Understanding the mechanical concept in design of microsystems.	K2
CO3	Infer the application of scaling laws in the design of microsystems.	K2
CO4	Identify the typical materials used for fabrication of micro systems.	K2
CO5	Understand the principles of standard micro fabrication techniques	K2
CO6	Infer the challenges in the design and fabrication of microsystems.	K2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	1	-	-	-	-	-	-	-	-	-	-	2	2
CO2	2	1	-	-	-	-	-	-	-	-	-	-	2	2
CO3	2	1	-	-	-	-	-	-	-	-	-	-	2	2
CO4	2	1	-	-	-	-	-	-	-	-	-	-	2	2
CO5	2	1	-	-	-	-	-	-	-	-	-	-	2	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	2	Students are expected to understand the basic concepts of MEMS.
CO1 - PO2	1	Students remember the blocks involved in microsystems.
CO1 - PSO1	2	Students are expected to understand the fundamental knowledge in different MEMS system.
CO1 – PSO2	2	Students are expected to use modern software and hardware tools for the modelling of MEMS system.
CO2 - PO1	2	Students are expected to understand the engineering fundamentals and mathematics to understand the various design of microsystems.
CO2 - PO2	1	Students are equipped to remember the equations related with design of microsystems.
CO2 - PSO1	2	Students are expected to understand the fundamental knowledge of design of microsystems for the development of various MEMS based electronic systems.
CO2– PSO2	2	Students are expected to use modern software and hardware tools for the modelling of MEMS design of microsystems
CO3 - PO1	2	Students are expected to understand the engineering fundamentals and mathematics to understand the various geometry involved in the design.
CO3 - PO2	1	Students are equipped to remember the equations related with sacling laws.
CO3 - PSO1	2	Students are expected to understand the fundamental knowledge of scaling for the development of various MEMS based electronic systems.
CO3 – PSO2	2	Students are expected to use modern software and hardware tools for the modelling of MEMS system scaling.
CO4- PO1	2	Students are expected to understand the engineering fundamentals to understand the various fabrication techniques of micro systems.
CO4- PO2	1	Students are equipped to remember the equations related with sacling laws.
CO4 - PSO1	2	Students are expected to understand the fundamental knowledge of scaling for the development of various fabrication techniques of micro systems.
CO4 – PSO2	2	Students are expected to use modern software and hardware tools for the modelling in fabrication techniques of micro systems.
CO5- PO1	2	Students are expected to understand the engineering fundamentals to understand the various fabrication techniques of micro systems.
CO5 - PO2	1	Students are equipped to remember the equations related with and fabrication techniques of micro systems.
CO5 - PSO1	2	Students are expected to understand the fundamental knowledge of scaling for the development of various fabrication techniques of micro systems.
CO5– PSO2	2	Students are expected to use modern software and hardware tools for the modelling in fabrication techniques of micro systems.

CO6- PO1	2	Students are expected to understand the engineering fundamentals to understand the various challenges in the design and fabrication techniques of micro systems.
CO6- PO2	1	Students are equipped to remember the equations related with challenges in the design and fabrication techniques of micro systems.
CO6 - PSO1	2	Students are expected to understand the fundamental knowledge of scaling for the development of various challenges in the design and fabrication techniques of micro systems.
CO6 – PSO2	2	Students are expected to use modern software and hardware tools for the modelling various challenges in the design and fabrication techniques of micro systems.

Prepared by (Faculty Name & Signature) : Anto Mercud

Verified by : Stream Coordination Committee Nitha. M. Biju.

5/3/2020
Dr. Gibu Jose
DAC convenor

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

C410 : Nanoelectronics

Programme : **B.Tech**

Semester : **Eighth**

Course Title : **Nanoelectronics**

Course Code : **EC 402**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
C410.1	Understand the basic concepts of quantum wells, wires and dots	K2
C410.2	Illustrate the method of fabrication of nanolayers and nanoparticles	K2
C410.3	Explain the characterization of nanostructures	K2
C410.4	Explain quantum nanostructures and superlattices and derive Kronig-Penney model super lattice	K2
C410.5	Explain the transport of charge in nanostructures under electric field and magnetic field and derive equation to model them	K2
C410.6	Discuss different nanostructure devices	K2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C410.1	2	1	-	-	-	-	-	-	-	-	-	-	2	-
C410.2	2	1	-	-	-	-	-	-	-	-	-	-	2	-
C410.3	2	1	-	-	-	-	-	-	-	-	-	-	2	-
C410.4	2	2	1	0	-	-	-	-	-	-	-	-	2	-
C410.5	2	2	1	0	-	-	-	-	-	-	-	-	2	-
C410.6	2	1	-	-	-	-	-	-	-	-	-	-	2	-
C410	2	1	1	0	-	-	-	-	-	-	-	-	2	-

CO5 - PSO1	2	Students are expected to apply the fundamental knowledge of transport of charge in nanostructures and electric field and magnetic field for the development of various electronic systems
CO6 - PO1	2	Students are expected to utilise engineering knowledge to understand the concepts of various nanoelectronic devices
CO6 - PO2	1	Students are expected to analyze basic problems in nanoscale devices by understanding the different nanoelectronic devices
CO6 - PSO1	2	Students are expected to apply the fundamental knowledge of different nanoelectronic devices for the development of various electronic systems

Prepared by (Faculty Name & Signature) : Shilpa Lizbeth George

Verified by : Stream Coordination Committee Nitha. M. Biju.

16/12/2019
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

C411: Advanced Communication Systems

Programme : **B.Tech**

Semester : **Eighth**

Course Title : **Advanced Communication Systems**

Course Code : **EC 404**

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
C411.1	Discuss technical details of microwave radio communication systems	K2
C411.2	Analyse various video modulation schemes and display technologies	K3
C411.3	Analyse satellite communication systems and its components	K3
C411.4	Understand the architecture and operation of basic cellular system and discrete wireless networking systems	K2
C411.5	Summarize the principles and applications of mobile communication Systems	K2
C411.6	To appreciate the contribution of wireless technology to overall growth in the communication stream	K2

CO – PO Matrix

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1 K3	PSO 2 K3
C411.1	2	1	-	-	-	-	-	-	-	-	-	-	2	2
C411.2	3	2	1	1	-	-	-	-	-	-	-	-	3	3
C411.3	3	2	1	1	-	-	-	-	-	-	-	-	3	3
C411.4	2	1	-	-	-	-	-	-	-	-	-	-	2	2
C411.5	2	1	-	-	-	-	-	-	-	-	-	-	2	2
C411.6	2	1	-	-	-	-	-	-	-	-	-	-	2	2
C411	2	1	-	-	-	-	-	-	-	-	-	-	2	2

JUSTIFICATIONS FOR CO-PO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	2	Students are expected to apply the engineering fundamentals to understand the basic concepts of microwave radio communication systems
CO1 - PO2	1	Students are equipped to identify and formulate problems based on the concepts of microwave radio communication systems
CO1 - PSO1	2	Students are expected to apply the fundamental knowledge of microwave communication systems for the development of various electronic systems
CO1 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various microwave radio communication systems
CO2 - PO1	3	Students are expected to apply the engineering fundamentals to understand the basic concepts of video modulation and display technologies
CO2 - PO2	2	Students are equipped to identify and formulate problems based on the concepts of video modulation and display technologies
CO2 – PO3	1	Students are expected to design solutions for engineering problems on various video modulation and display technologies
CO2 – PO4	1	Students are equipped to conduct investigations on the problems based on video modulation and display technologies
CO2 - PSO1	3	Students are expected to apply the fundamental knowledge of microwave communication systems for the development of various video modulation schemes
CO2 – PSO2	3	Students are expected to use modern software and hardware tools for the analysis of various video modulation schemes
CO3 - PO1	3	Students are expected to apply the engineering fundamentals to understand the basic concepts of satellite communication systems
CO3 - PO2	2	Students are equipped to identify and formulate problems based on the concepts of satellite communication systems
CO3 – PO3	1	Students are expected to design solutions for engineering problems on various satellite communication systems
CO3 – PO4	1	Students are equipped to conduct investigations on the problems based on satellite communication systems
CO3- PSO1	3	Students are expected to apply the fundamental knowledge of microwave communication systems for the development of various satellite communication systems
CO3 – PSO2	3	Students are expected to use modern software and hardware tools for the analysis of various satellite communication systems
CO4 - PO1	2	Students are expected to apply the engineering fundamentals to understand the basic concepts of cellular and wireless networking systems

CO4 - PO2	1	Students are equipped to identify and formulate problems based on the concepts of cellular and wireless networking systems
CO4 - PSO1	2	Students are expected to apply the fundamental knowledge of microwave communication systems for the development of various wireless networking systems
CO4 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various wireless networking systems
CO5 - PO1	2	Students are expected to apply the engineering fundamentals to understand the basic concepts of mobile communication systems
CO5 - PO2	1	Students are equipped to identify and formulate problems based on the concepts of mobile communication systems
CO5 - PSO1	2	Students are expected to apply the fundamental knowledge of microwave communication systems for the development of various mobile communication systems
CO5 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various mobile communication systems
CO6 - PO1	2	Students are expected to apply the engineering fundamentals to understand the basic concepts of advanced wireless technologies
CO6 - PO2	1	Students are equipped to identify and formulate problems based on the concepts of advanced wireless technologies
CO6 - PSO1	2	Students are expected to apply the fundamental knowledge of microwave communication systems for the development of various advanced wireless technologies
CO6 – PSO2	2	Students are expected to use modern software and hardware tools for the analysis of various advanced communication systems

Prepared by (Faculty Name & Signature): Tomson Revis

Verified by: Stream Coordination Committee

16/12/2019
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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

Semester : **8**
Course Title : Cyber Security
Course Code : EC 466

Course Outcomes (COs)

After the successful completion of the course students will have the ability to

1. Understand vulnerability scanning in computer networks (k2)
2. Understand various types of vulnerability scanning methods on a given network (k2)
3. Understand different network defense tools in computer networks like firewall and packet filters (k2)
4. Understand various web application tools for network security (k2)
5. Learn about various cyber crimes and the laws regarding cyber security (k2)
6. Familiarize different types of cyber attacks and its defensive technique (k2)

CO-PO matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	1	1	1	1	-	1	-	1	-	-	-	2	1	1
CO 2	1	2	1	2	2	2	-	2	-	-	-	2	2	2
CO 3	2	2	1	1	1	1	-	1	-	-	-	2	2	2
CO 4	1	1	1	1	2	2	-	2	-	-	-	2	1	1
CO5	1	1	-	-	-	1	-	-	-	-	-	2	-	1
CO 6	2	2	-	2	1	-	-	1	-	-	-	2	2	2

Mapping	LOW(1), MEDIUM(2), HIGH(3)	JUSTIFICATION
CO1-PO1	LOW	Knowledge in vulnerability scanning in computer networks helps to find solutions for complex problems in computer system and computer networks
CO1-PO2	LOW	Knowledge in vulnerability scanning in computer networks helps to analyse complex problems in computer networks
CO1-PO3	LOW	Knowledge in vulnerability scanning in computer networks helps to develop solutions for the issues in a computer network
CO1-PO4	LOW	Knowledge in vulnerability scanning in computer networks helps to do analysis and interpretation of data in networked systems

CO1-PO6	LOW	knowledge in vulnerability scanning in computer networks will enable the students to perform reasoning informed by the contextual knowledge.
CO1-PO8	LOW	Getting the idea of vulnerability scanning reflects the professional ethics and responsibilities of the engineering practices in network security.
CO1-PO12	MEDIUM	Getting the idea of vulnerability scanning is necessary for the research and life long learning in computer security domain.
CO1-PSO1	LOW	knowledge in vulnerability scanning in computer networks helps to find solutions for complex network related issues
CO1-PSO2	LOW	knowledge in vulnerability scanning in computer networks helps to analyse complex problems in computer networks
CO2-PO1	LOW	knowledge in vulnerability scanning methods in computer networks helps to find solutions for complex problems in computer networks
CO2-PO2	MEDIUM	knowledge in vulnerability scanning methods in computer networks helps to analyse complex problems in computer networks
CO2-PO3	LOW	knowledge in vulnerability scanning methods in computer networks helps to develop solutions for complex problems in computer networks
CO2-PO4	MEDIUM	knowledge in vulnerability scanning methods in computer networks helps to do analysis and interpretation of data in network security domain
CO2-PO5	MEDIUM	knowledge in vulnerability scanning methods in computer networks helps to modelling solutions to complex network issues with the understanding of limitations
CO2-PO6	MEDIUM	knowledge in vulnerability scanning methods in computer networks will enable the students to perform reasoning informed by the contextual knowledge.
CO2-PO8	MEDIUM	understanding the network vulnerability scanning methods reflects the professional ethics and responsibilities of the engineering practices in network security.
CO2-PO12	MEDIUM	Getting the idea of vulnerability scanning methods is necessary for the research and life long learning in computer security domain.
CO2-PSO1	MEDIUM	knowledge in vulnerability scanning methods in computer networks helps to find solutions for complex network related issues
CO2-PSO2	MEDIUM	knowledge in vulnerability scanning methods in computer networks helps to analyse complex problems in computer networks
CO3-PO1	MEDIUM	The knowledge of different network defense tools in computer networks like firewall and packet filters helps to find solutions for complex problems in computer networks
CO3-PO2	MEDIUM	The knowledge of different network defense tools in computer networks like firewall and packet filters helps to analyse complex problems in computer networks
CO3-PO3	LOW	The knowledge of different network defense tools in computer networks like firewall and packet filters helps to develop solutions for complex problems in computer networks
CO3-PO4	LOW	The knowledge of different network defense tools in computer networks like firewall and packet filters helps to do analysis and interpretation of data in network domain
CO3-PO5	LOW	The knowledge of different network defense tools in computer networks like firewall and packet filters helps to modelling solutions to complex network issues with the understanding of limitations

CO3-PO6	LOW	The knowledge of different network defense tools in computer networks like firewall and packet filters will enable the students to perform reasoning informed by the contextual knowledge.
CO3-PO8	LOW	The knowledge of different network defense tools in computer networks like firewall and packet filters reflects the professional ethics and responsibilities of the network security practice
CO3-PO12	MEDIUM	The knowledge of different network defense tools in computer networks like firewall and packet filters is necessary for the research and life long learning in computer security domain.
CO3-PSO1	MEDIUM	The knowledge of different network defense tools in computer networks like firewall and packet filters helps to find solutions for complex network related issues
CO3-PSO2	MEDIUM	The knowledge of different network defense tools in computer networks like firewall and packet filters helps to analyse complex problems in computer system and networks
CO4-PO1	LOW	Understanding various web application tools for network security helps to analyse complex problems in computer networks
CO4-PO2	LOW	Understanding various web application tools for network security helps to analyse complex problems in computer networks
CO4-PO3	LOW	Understanding various web application tools for network security helps to develop solutions for complex problems in computer networks
CO4-PO4	LOW	Understanding various web application tools for network security helps to do analysis and interpretation of data in network domain
CO4-PO5	MEDIUM	Understanding various web application tools for network security helps to modelling solutions to complex network issues with the understanding of limitations
CO4-PO6	MEDIUM	Understanding various web application tools for network security will enable the students to perform reasoning informed by the contextual knowledge.
CO4-PO8	MEDIUM	Understanding various web application tools for network security reflects the professional ethics and responsibilities of the network security practice
CO4-PO12	MEDIUM	Understanding various web application tools for network security is necessary for the research and life long learning in computer security domain.
CO4-PSO1	LOW	Understanding various web application tools for network security helps to find solutions for complex network related issues
CO4-PSO2	LOW	Understanding various web application tools for network security helps to analyse complex problems in computer networks in computer networks
CO5-PO1	LOW	knowledge about various cyber crimes and the laws regarding cyber security helps to find solutions for complex problems in computer system and computer networks
CO5-PO2	LOW	knowledge about various cyber crimes and the laws regarding cyber security helps to analyse complex problems in computer networks
CO5-PO6	LOW	knowledge about various cyber crimes and the laws regarding cyber security will enable the students to perform reasoning informed by the contextual knowledge.

CO5-PO12	MEDIUM	knowledge about various cyber crimes and the laws regarding cyber security is necessary for the research and life long learning in computer security domain.
CO5-PSO2	LOW	knowledge about various cyber crimes and the laws regarding cyber security helps to analyse complex problems in computer networks in computer networks
CO6-PO1	MEDIUM	Familiarization of different types of cyber attacks and its defensive technique helps to analyse complex problems in computer networks
CO6-PO2	MEDIUM	Familiarization of different types of cyber attacks and its defensive technique helps to analyse complex problems in computer networks
CO6-PO4	MEDIUM	Familiarization of different types of cyber attacks and its defensive technique helps to do analysis and interpretation of data in network domain
CO6-PO5	LOW	Familiarization of different types of cyber attacks and its defensive technique helps to modelling solutions to complex network issues with the understanding of limitations
CO6-PO8	LOW	Familiarization of different types of cyber attacks and its defensive technique reflects the professional ethics and responsibilities of the network security practice
CO6-PO12	MEDIUM	Familiarization of different types of cyber attacks and its defensive technique is necessary for the research and life long learning in computer security domain.
CO6-PSO1	MEDIUM	Familiarization of different types of cyber attacks and its defensive technique helps to find solutions for complex network related issues
CO6-PSO2	MEDIUM	Familiarization of different types of cyber attacks and its defensive technique helps to analyse complex problems in computer networks in computer networks

16/12/19

Prepared by (Faculty Name and signature):

Jacob Thomas

Stream coordinator (Name and Signature)

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC 468 - SECURE COMMUNICATION

Semester: VIII **Course Title: Secure Communication** **Course Code: EC 468**

Course Outcomes (CO)

After the successful completion of this course, students will be able to

Sl No	Description
EC468.1	Understand the various issues related to secure communications and methods to overcome the issues **(K2)**
EC468.2	Understand the mathematical and logical principles required to perform cryptography **(K2)**
EC468.3	Explain the various types of classical cryptographic techniques and compute cipher texts based on these algorithms **(K3)**
EC468.4	Understand and Explain the various block cipher techniques currently in use **(K2)**
EC468.5	Explain and Compute simple cipher based on Public Key Cryptosystems **(K3)**
EC468.6	Describe and Illustrate Intrusion Detection Techniques and Password Management Strategies **(K2)**

Course Outcome – Programme Outcome Matrix (CO – PO – PSO Mapping)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	-	-	-	-	1	-
CO2	3	1	-	-	-	-	-	-	-	-	-	-	2	-
CO3	2	2	1	-	-	-	-	-	-	-	-	-	1	1
CO4	3	1	-	-	-	-	-	-	-	-	-	-	2	-
CO5	2	2	1	-	-	-	-	-	-	-	-	-	2	1
CO6	2	1	-	-	-	-	-	-	-	-	-	-	1	-

Justifications to CO-PO-PSO mapping

CO1	PO1	2	Helps in understanding the fundamentals of cryptography
CO1	PO2	1	Helps in identifying the complex problem of cryptography
CO1	PSO1	1	applies fundamental knowledge in designing cryptographic systems
CO2	PO1	3	understanding the mathematical concept of cryptography
CO2	PO2	1	analyzing the complex problem of cryptography
CO2	PSO1	2	applies fundamental knowledge in analyzing cryptographic systems
CO3	PO1	2	Helps in understanding the fundamentals of cryptography
CO3	PO2	2	Helps in identifying the complex problem of cryptography
CO3	PO3	1	helps in developing cryptographic solutions using classical algorithms
CO3	PSO1	1	applies the fundamental knowledge in designing and analyzing cryptographic systems
CO3	PSO2	1	uses modern software tools to understand classical cryptographic systems

CO4	PO1	3	Helps in understanding the fundamentals of cryptography
CO4	PO2	1	Helps in identifying the complex problem of cryptography
CO4	PSO1	2	applies the fundamental knowledge in designing and analyzing cryptographic systems
CO5	PO1	2	Helps in understanding the fundamentals of cryptography
CO5	PO2	2	Helps in identifying the complex problem of cryptography
CO5	PO3	1	helps in developing cryptographic solutions using modern cryptographic algorithms
CO5	PSO1	2	applies the fundamental knowledge in designing and analyzing cryptographic systems
CO5	PSO2	1	uses modern software tools to understand modern cryptographic systems
CO6	PO1	2	Helps in understanding the fundamentals of cryptography
CO6	PO2	1	Helps in identifying the complex problem of cryptography
CO6	PSO1	1	applies the fundamental knowledge in analyzing cryptographic systems

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Verified by: Tinesm Devis

16/12/2019
Dr. Gibu Jose
DAC convenor

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

EC 492 PROJECT

Semester: VIII
Course Title: Project
Course Code : EC492

Course Outcomes (CO)

After the successful completion of this course, students will able to

No.	Course outcomes	Knowledge Level
EC492.1 (CO1)	**Apply** acquired fundamental knowledge in real life Engineering Problem solving	K3
EC492.2 (CO2)	**Formulate** optimal solutions to practical problems based on set criteria, encouraging innovative thinking and teamwork.	K6
EC492.3 (CO3)	**Make use of** software tools like UML/CAD tools/SPICE, Project Management tools like Gantt Chart/CPM/PERT and presentation tools like LaTeX	K3
EC492.4 (CO4)	**Develop** presentation/writing skills on technical matters	K4

CO – PO - PSO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
EC492.1 (CO1)	3	-	-	-	-	-	2	2	-	-	-	-	3	-
EC492.2 (CO2)	-	-	3	2	-	2	-	-	3	-	2	-	3	-
EC492.3 (CO3)	-	-	-	-	3	-	-	-	-	-	1	2	-	3
EC492.4 (CO4)	-	2	-	-	-	-	-	2	2	3	-	2	-	-
EC492	3	2	3	2	3	2	2	2	2.5	3	1.5	2	3	3

JUSTIFICATIONS FOR CO-PO-PSO MAPPING

Mapping	Mapping Level (3/2/1)	Justifications
CO1 - PO1	3	The students are expected to Apply their fundamental knowledge in Engineering, and Science to solve the Engineering Problem at hand.
CO1 – PO7	2	The students are expected to clearly Understand the impact of the solutions proposed by them in societal and environmental context and Demonstrate their knowledge in arriving at sustainable solutions to the extent possible.
CO1 - PO8	2	The students are expected to respect and Apply principles of Professional Ethics while designing solutions and carrying out the project work.
CO1 - PSO1	3	The students are expected to Apply fundamental knowledge in Electronics Engineering to develop electronic systems.

CO2 - PO3	3	The students are expected to Design and Develop Optimal Solutions for the specific problem at hand.
CO2 – PO4	2	The students are expected to conduct investigations based on available solutions and data to arrive at a solution for the problem selected by the project group.
CO2 - PO6	2	The students are expected to assess societal, health, safety, legal and cultural issues and consequent responsibilities while solving the problem taken for their study and implementation.
CO2 - PO9	3	The students are expected to demonstrate Individual and Teamwork in problem solving within their project group and with different project groups encouraging healthy exchange of ideas.
CO2 - PO11	2	The students are expected to demonstrate basic understanding of management principles and financial management in time bound execution of the Project work.
CO2 - PSO1	3	The students are expected to apply fundamental knowledge while encouraging innovative thinking to formulate optimal solutions.
CO3 - PO5	3	The students are expected to use various modern tools as applicable in design, analysis, management and design documentation.
CO3 - PO11	1	The students are expected to use appropriate tools for the Project Management, resource management and time scheduling
CO3 - PO12	2	The students are expected to investigate and identify the right tool from available and accessible tools for problem solving thereby promoting independent learning skills.
CO3 - PSO2	3	The students are expected to apply modern Software and Hardware tools for development and analysis of the Systems designed by them as a solution for the problem selected.
CO4 - PO2	2	The students are expected to analyse the solution arrived at in comparison with available solutions proposed by the peer groups and to publish their findings/contributions as a technical paper.
CO - PO8	2	The students are expected to respect publication ethics in preparing technical papers and reports.
CO4 - PO9	2	The students are expected to prepare technical reports and publish technical papers working in the project team, by promoting teamwork.
CO4 - PO10	3	The students are expected to prepare a technical report as a document and a technical paper for publication and effectively defend their findings before the assessment panel.
CO4 - PO12	2	The students are expected to apply self learning skills to probe into various literature related to their work and publish the unique content in their work.

Prepared by (Faculty Name & Signature) : 29/7/2020

Verified by : Stream Coordination Committee:

CO2 : For finding an optimal solution, the students are expected to review various solutions and analyse them properly. Hence committee is of opinion that the evaluation may be done at least with moderate level mapping between CO2 and PO2.

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08/08/2020