CO-PO- PSO mapping matrices of all courses

Department of Electronics and Communication Engineering- Session 2023-24

PRIYADARSHINI COLLEGE OF ENGINEERING
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Department of Electronics & Communication Engineering

INDEX

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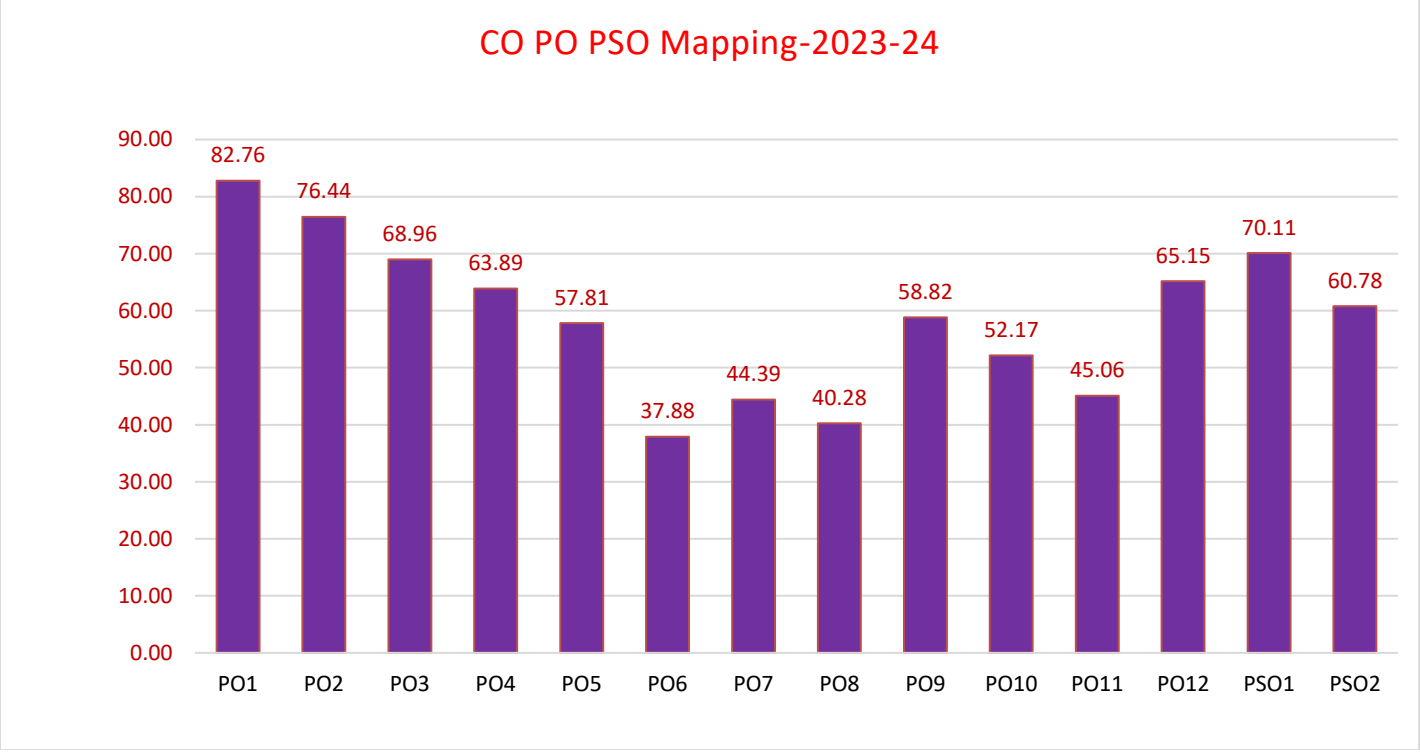
Department of Electronics & Communication Engineering

CO PO PSO Mapping -2023-24

PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO Mapping	2.48	2.29	2.07	1.92	1.73	1.14	1.33	1.21	1.76	1.57	1.35	1.95	2.10	1.82
% CO Mapping	82.76	76.44	68.96	63.89	57.81	37.88	44.39	40.28	58.82	52.17	45.06	65.15	70.11	60.78



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Department of Electronics & Communication Engineering

Year of study: 2023-24
CO-PO matrix of all courses

Course code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C101	3	2.5	2.17	1.5	1.5	-	-	-	-	1	-	-	-	-
C102	3	3	2.5	1.5	1.33	1.67	2.67	-	-	-	-	2.16	-	-
C102P	3	3	2.33	2	-	1	2.33	-	1	-	-	1	-	-
C103	3	2.83	2	2	2.83	-	-	-	-	2	2	2	2	2
C103P	3	2.66	2	2	2.66	-	-	-	-	2	2	2	2	2
C104	3	2.83	2	2	1	2	2	-	-	-	-	2	2.33	2.16
C104P	2	1.25	1.75	1	1	1	-	1	1	1	-	2	-	-
C105	-	-	-	-	-	1	2	-	-	-	-	1	-	-
C106	3	3	2	1	-	-	1.67	-	1	-	-	2	-	1
C107	3	2.67	1.83	2	1	-	-	-	-	1	-	-	-	-
C108	3	2	2.5	2.33	1.33	1.33	1.83	-	-	-	-	2.66	1	1
C108P	3	3	-	1.4	-	1	-	-	3	3	-	3	-	2
C109	3	3	3	3	2					2	1	2	-	-
C109P	2.00	1.00	3.00	3.00		2.00	1.00	2.25	2.00	3.00	1.00	1.00	-	-
C110	2.25	1.25	-	1	2	-	-	-	-	2	-	1	-	-
C110P	1.75	1	-	1	3	1	-	-	-	1	-	1.5	-	-
C111	2	1.75	1	1	-	-	-	-	-	1	-	2	2	2
C112	-	-	-	-	-	-	-	-	-	3	-	2	-	-
C112P	-	-	-	-	-	-	-	-	3	3	-	2	-	-
C113	3	3	2	1	-	-	1.67	-	1	-	-	2	-	-
C201	2.4	2	1	-	0.8	-	-	-	-	1	-	-	1.8	1.8
C202	2.8	2.4	1.4	-	-	-	-	-	-	1	-	2	2.4	1.8
C202P	3	2	2	3	2	1	-	-	3	-	2	3	3	3
C203	3	2	2	1	-	-	-	-	-	1	-	2	3	2
C203P	3	3	3	3	2	1	1	2	2	1	2	2	2	2
C204	3	2.4	-	0.2	-	-	-	-	-	-	-	0.2	3	0.6
C205	1.6	1.6	-	2	1	-	-	-	-	1	-	2	3	2
C206	2.2	2	2.2	-	-	-	-	-	-	-	-	-	0.2	-
C207P	3	3	3	3	3	1	-	-	3	3	2	3	3	3
C208	2	2	2		1.2	-	-	-	-	2		2	3	2
C208P	2	2	2	2	3	1	-	-	3	3	1	3	3	3
C209	2.2	2.2	-	-	-	-	0.2	-	-	-	-	0.4	3	1
C209P	3	3	3	3	1	1	-	-	2	2	2	2	2	2
C210	3	3	3	3	1	-	-	-	1	2	-	2	3	2
C211	3.0	2.0	1.0	1.0	-	-	-	-	-	-	-	2.0	1.0	-
C212	2	1.6	1.6	1	1.2	-	-	-	-	-	-	-	1.6	1.6
C213	1	0.2	0.4	0.4	0.4	0.4	-	-	0.4	0.4	0.4	0.8	0.8	1.2

C213P	3	3	3	3	2	1	-	-	3	1	2	2	2	2
C301	2	1.8	0.8							2		3	2.6	1.8
C301P	3	3	3	3	3	1	-	-	3	2	1	3	3	3
C302	2.6	2	1	-	-	-	-	-	-	1	-	2	2	-
C303	2.8	3	04	2	-	-	-	-	-	1	-	2	3	1
C303P	3	3	3	3	2	1	-	-	3	1	1	2	2	2
C304	-	-	-	-	-	-	-	-	0.6	-	2.2	2	-	-
C305-i	1.0	1.0	-	-	-	-	-	-	-	-	-	2.0	-	2.0
C305-ii	2.2	2	2	-	-	-	-	-	-	-	-	-	1.4	1
C305-iii	3	2	2	-	-	-	-	-	-	2	-	2	2	2
C305-iv	1.8	1.6	3	1	-	-	-	-	-	1	-	3	3	1
C306P	3	3	3	3	2	1	-	-	3	1	1	2	2	2
C307	2	2	1	-	-	-	-	-	-	1	-	2	2	2
C307P	2	2	2	1	1	2	-	-	-	2	1	2	2	2
C308	0.8	0.8	0.8	0.4	0.4	0.4	-	-	-	2	0.4	1.6	2	1
C308P	2.3	2.3	2.3	2.3	3	2.1	0.6	0.3	3	3	1.3	3	3	3
C309	1.8	1.6	1.2	1	-	-	-	-	-	2	-	3	3	2
C309P	3	3	3	3	3	1	1	-	-	1	-	2	2	2
C310-i	3	2.8	-	1.4		-	-	-	-	1	-	2	1	1.2
C310-ii	2.0	1.6	1.8	1.0	2.0	-	-	-	-	-	-	1.4	2.4	-
C310-iii	3	3	3	2	1	-	-	-	1	2		2	2	1
C310-iv	3	3	3	3	1	1	1	-	1	2	-	2	1	-
C312	-	-	-	-	-	-	-	0.2	-	3	-	2	-	-
C401-i	3	2	1	-	-	-	-	-	-	1		2	2	-
C401-iP	3	3	3	3	3	1	1	-	-	1	-	2	2	2
C401-ii	2	2	1	-	-	-	-	-	1	1	-	2	2	2
C401-iiP	2	2	1	-	1	-	-	-	1	-	-	2	1	1
C401-iii	3	3	3	2.4	-	1	-	-	-	1	-	2	3	1
C401-iiiP	3	3	3	3	2	1	-	-	2	2	1	2	2	2
C401-iv	2	1	-	-	-		-	-	-	1	-	2	2	2
C401-ivP	3	3	3	3	3	1	1	-	1	1	2	2	2	2
C402-i	2.2	2	1	1	-		-	-	-	1	-	2	2	2
C402-iP	3	3	3	3	3	1	1		1	1	2	2	2	2
C402-ii	1.6	1	0.6	0.4	1.4	-	-	-	0.4	0.4	0.4	0.8	0.6	1.8
C402-iiP	3	3	3	3	2	1	-	-	2	2	1	2	2	2
C402-iii	1.8	1.6	1	2						-		1	2	
C402-iiiP	3	3	3	3	1	-	-	-	-	2	1	2	3	1
C402-iv	2	2	1	-	-	-	-	-	-	1	1	2	2	2
C402-ivP	2	2	1	-	1	-	-	-	1	-	-	2	1	1
C403-i	1.4	2.2	1.8	2.2	-	-	-	-	-	-	2	2.6	1.8	3
C403-ii	2.8	2.8	1.8	1.4	-	-	-	-	-	1	-	2	2	1

C403-iii	3	3	2	2	-	1	-	-	-	1	-	2	3	2.6
C403-iv	2.4	2.4	2	2.2	-	1	-	-	-	1	-	2	1	
C405-i	2	2	2	1	-	-	-	-	-	2	-	3	3	1
C405-ii	3	3	-	0.6	1	-	1	-	-	-	-	1	1	1.2
C405-iii	2.4	2.4	2.2	2.4	-	-	-	-	-	2.2	-	2.6	2	3
C406-i	3	3	2	-	-	-	-	-	-	1	-	2	2	-
C406-ii	2.2	2.2	-	-	-	-	1	-	-	-	-	1	2.6	-
C406-iii	1.5	3	2.3	-	2	-	-	-	-	-	-	1	-	2
C407-P	1.8	1.8	1.6	1.8	1	1.6	1.33	1.5	1.3	1.6	0.8	1.6	2.5	2.3
Average	**2.48**	**2.29**	**2.07**	**1.92**	**1.73**	**1.14**	**1.33**	**1.21**	**1.76**	**1.57**	**1.35**	**1.95**	**2.10**	**1.82**

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Program Outcomes

PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization for the solution of complex engineering problems.
PO2	**Problem analysis**: Identify, formulate, review research literature, and analyse 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 modelling 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 instruction.
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.

Program Specific Outcome

PSO1	To possess technical knowledge in the area of Communication, Signal Processing, Embedded System, Devices and Circuits and emerging technologies
PSO2	To demonstrate the technical skills and apply the knowledge of hardware and software tools in the field of Electronics and Communication.

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(SEMESTER – III)
List of III Semester Subjects with Subject Code

Corse Code as per RTMNU	Course Code	Subject
BEETC-301	C201	Applied Math's-III
BEETC-302T	C202	Components for Electronic circuit design
BEETC-302P	C202P	Components for Electronic circuit design Lab
BEETC-303T	C203	Digital System Design
BEETC-303P	C203P	Digital System Design Lab
BEETC-304P	C204	Network Theory
BEETC-305T	C205	Signals & System
BEETC-306T	C206	Measurement and Instrumentation
BEETC-307P	C207P	Electronics Workshop I Lab

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CO-PO- PSO matrices of all courses

Course Name: Applied Mathematics- C201 (III Sem):

After the completion of Course, the students will be able to:

CO	Statement
C201.1	Apply Laplace Transform to solve ordinary differential equations, Integral equations and Integro- differential equations .
C201.2	Apply Fourier series in the analysis of periodic functions in terms of sine and cosine encountered in engineering problems and Fourier transform to solve integral equations.
C201.3	Learn the concept of differentiating, integrating and expanding of analytic functions in complex numbers and their applications such as evaluation of integrals of complex functions.
C201.4	Solve partial differential equations of first order , higher order with constant coefficients and of second order using method of separation of variables.
C201.5	Analyze real world scenarios to recognize when matrices are appropriate , formulate problems about the scenarios , creatively model these scenarios in order to solve the problems using multiple approaches.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C201.1	3	2	1	-	-	-	1	-	-	1	-	-	2	2
C201.2	2	2	1	-	1	-	-	-	-	1	-	-	2	2
C201.3	2	2	1	-	1	-	-	-	-	1	-	-	1	1
C201.4	2	2	1	-	-	-	-	-	-	1	-	-	2	2
C201.5	3	2	1	-	2	-	-	-	-	1	-	-	2	2
Average	**2.4**	**2**	**1**	**-**	**0.8**	-	-	-	-	**1**	-	-	**1.8**	**1.8**

Name and Sign of Subject Teacher

Dr. Mrs. A. P. Rathkanthiwar
Head (ECE)

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels- MIII

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	3	Strongly mapped as student will able to gain the knowledge pertaining to Laplace Transform and apply it to solve complex Engineering problems.
	PO2	2	Moderately mapped as the students will be able to use principles of Laplace Transform to analyze complex Engineering problems.
	PO3	1	Slightly mapped as students will be able to find professional engineering solutions for environmental safety
	PO7	1	Slightly mapped as students will be able to apply knowledge for different environmental considerations.
	PO10	1	Slightly mapped as students will be able to explain and write about Application of Laplace Transform .
	PSO1	2	Moderately mapped as the students will be able to possess knowledge of Laplace Transform to solve various differential equations .
	PSO2	2	Moderately mapped as the students will be able to apply knowledge of Laplace Transform to solve various differential equations .
CO2	PO1	2	Moderately mapped as the students will be able to understand the analysis of periodic functions in terms of sine and cosine encountered in engineering problems
	PO2	2	Moderately mapped as the students will be able to apply the knowledge of Fourier series and Fourier transform to identify, formulate and analyze the complex Engineering problems.
	PO3	1	Slight mapped as students will be able to interpret solution of complex engineering problems for real time applications
	PO5	1	Slightly mapped as the students will be able to interpret and provide valid conclusions regarding complex Engineering activities .
	PO10	1	Slightly mapped as the students will be able to explain and write about application of Fourier series and Fourier transform .
	PSO1	2	Moderately mapped as student will be able to understand the need of periodic functions , Fourier series and Fourier transform in the field of engineering.
	PSO2	2	Moderately mapped as the students will be able to apply Fourier series and Fourier transform in the field of engineering.
CO3	PO1	2	Moderately mapped as the students will be able to understand the concept of complex functions.
	PO2	2	Moderately mapped as the students will be able to identify and evaluate integrals of complex functions. to solve complex Engineering problems
	PO3	1	Slightly mapped as the students will be able to apply the concepts of complex functions to design solutions of complex Engineering problems.
	PO5	1	Slightly mapped as the students will be able to interpret and provide valid conclusions regarding complex Engineering activities

	PO10	1	Slightly mapped as the students will be able to explain and write about complex functions .
	PSO1	1	Slightly mapped as student will able to possess the knowledge of complex functions .
	PSO2	1	Slightly mapped as the students will be able to apply the knowledge of evaluation of integrals of complex functions .
CO4	PO1	2	Moderately mapped as the students will be able to understand the partial differential equations
	PO2	2	Moderately mapped as the students will be able to identify and formulate different types of partial differential equations .
	PO3	1	Slightly mapped as the students will be able to interpret solution of complex engineering problems for real time applications .
	PO10	1	Slightly mapped as the students will be able to explain and write about partial differential equations .
	PSO1	2	Moderately mapped as student will be able to possess the knowledge of solving different types of partial differential equations .
	PSO2	2	Moderately mapped as the students will be able to implement the knowledge of solving different types of partial differential equations .
CO5	PO1	3	Strongly mapped as student will able to apply knowledge of matrices to solve complex Engineering problems .
	PO2	2	Moderately mapped as the students will be able to Analyze real world scenarios to recognize when matrices are appropriate and formulate problems about the scenarios .
	PO3	1	Slightly mapped as students will be able to interpret solution of complex engineering problems for real time applications .
	PO5	2	Moderately mapped as students will be able to creatively model real world scenarios in order to solve the problems using multiple approaches.
	PO10	1	Slightly mapped as the students will be able to explain and write about the application of Matrices .
	PSO1	2	Moderately mapped as student will be able to recognize when matrices are appropriate .
	PSO2	2	Moderately mapped as student will be able to apply knowledge of matrices to creatively model real world scenarios .

Name and Sign of Subject Teacher

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Course Name: Components for Electronic Circuit Design-C202 (III Sem)

After the completion of Course, the students will be able to:

CO	Statement
C202.1	Discuss and demonstrate the principles of semiconductor physics
C202.2	Discuss and demonstrate the principles of semiconductor diode.
C202.3	Explain construction and working of bipolar transistor and analyse it.
C202.4	Explain construction and working of unipolar transistors.
C202.5	Describe the process of Integrated Circuit Fabrication.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C202.1	2	2	-	-	-	-	-	-	-	1	-	2	2	1
C202.2	3	3	2	-	-	-	-	-	-	1	-	2	3	2
C202.3	3	3	2	-	-	-	-	-	-	1	-	2	3	2
C202.4	3	3	2	-	-	-	-	-	-	1	-	2	3	2
C202.5	3	2	1	-	-	-	-	-	-	1	-	2	2	2
Average	**2.8**	**2.4**	**1.4**	-	-	-	-	-	-	**1**	-	**2**	**2.4**	**1.8**

Name and Sign of Subject Teacher

Dr. Mrs. A. P. Rathkanthiwar
Head (ECE)

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels-CECD

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	2	Moderately mapped as student will able to gain the knowledge on semiconductor physics
	PO2	2	Moderately mapped as student will able to demonstrate the principal of semiconductor physics
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	**2**	Strongly mapped as student will able to use the gain knowledge in the real-world problems.
	PSO1	**2**	Strongly mapped as student will able to possess technical knowledge in the area of semiconductor physics leads to electronics devices and circuits.
	PSO2	1	Slightly mapped as student will able to apply the knowledge of semiconductor physics in hardware devices
CO2	PO1	3	Strongly mapped as student will able to use the fundamental concept of semiconductor diode.
	PO2	3	Strongly mapped as student will able to Identify engineering systems, variables, and parameters to solve the problems
	PO3	2	Moderately mapped Apply the knowledge of diode to design solution
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	2	Strongly mapped as student will able to use the gain knowledge in the real-world problems.
	PSO1	3	Strongly mapped as student will able to possess technical knowledge in the area of electronics devices and circuits.
	PSO2	2	Moderately mapped as student will able to apply the knowledge of hardware
CO3	PO1	3	Strongly mapped as student will able to Apply engineering concepts to solve engineering problems.
	PO2	3	Strongly mapped as student will able to Identify engineering systems, variables, and parameters of transistors to solve the engineering problems
	PO3	2	Moderately mapped Apply the knowledge of transistor to design solution
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	2	Moderately mapped as student will able to use the gain knowledge in the real-world problems.
	PSO1	3	Strongly mapped as student will able to possess technical knowledge in the area of electronics devices and circuits.
	PSO2	2	Moderately mapped as student will able to apply the knowledge of hardware

CO4	PO1	3	Strongly mapped as student will able to Apply engineering concepts to solve engineering problems.
	PO2	3	Strongly mapped as student will able to Identify engineering systems, variables, and parameters of transistors to solve the engineering problems
	PO3	2	Moderately mapped Apply the knowledge of transistor to design solution
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	2	Moderately mapped as student will able to use the gain knowledge in the real-world problems
	PSO1	3	Strongly mapped as student will able to possess technical knowledge in the area of electronics devices and circuits.
	PSO2	2	Moderately mapped as student will able to apply the knowledge of hardware
CO5	PO1	3	Strongly mapped as student will able to Apply engineering concepts to solve engineering problems
	PO2	2	Moderately mapped as student will able to explain the knowledge fabrication of IC
	PO3	1	Slightly mapped as student will able to use the concept while fabricating IC
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	2	Moderately mapped as student will able to use the gain knowledge in the real-world problems
	PSO1	2	Moderately mapped Apply the knowledge of IC to design solution
	PSO2	2	Moderately mapped as student will able to use the gain knowledge in the real-world problems

Name and Sign of Subject Teacher

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Course Name: Components for Electronic Circuit Design - C202(P) (III Sem)

After the completion of practical, the students will be able to:

CO	Statement
C202.1	Explain the basic concepts of semiconductor devices and their use of in different electronic circuits.
C202.2	Calculate different performance parameters of semiconductor devices and study its characteristics
C202.3	Design RC phase shift network

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C202.1	3	2	2	3	2	1	-	-	3	-	2	3	3	3
C202.2	3	2	2	3	2	1	-	-	3	-	2	3	3	3
C202.3	3	2	2	3	2	1	-	-	3	-	2	3	3	3
Average	**3**	**2**	**2**	**3**	**2**	**1**	**-**	**-**	**3**	**-**	**2**	**3**	**3**	**3**

Name and Sign of Subject Teacher

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Course Name: Digital System Design - C203 (III Sem)

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

CO	Statement
C203.1	Demonstrate the knowledge of: Logic gates, Boolean algebra including algebraic manipulation / simplification and Application of DeMorgan's Theorem, Karnaugh map reduction method.
C203.2	Develop basic combinational circuits and verify their functionalities.
C203.3	Illustrate and apply the knowledge of different flip flops to build sequential digital circuits.
C203.4	Classify different logic families and their characteristics.
C203.5	demonstrate and apply programming proficiency using the various addressing modes and instructions of the target microprocessor

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C203.1	3	2	2	1	-	-	-	-	-	1	-	2	3	2
C203.2	3	2	2	1	-	-	-	-	-	1	-	2	3	2
C203.3	3	2	2	1	-	-	-	-	-	1	-	2	3	2
C203.4	3	2	2	1	-	-	-	-	-	1	-	2	3	2
C203.5	3	2	2	1	-	-	-	-	-	1	-	2	3	2
Average	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**3**	**2**

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Course Name: Digital System Design - C203P (III Sem)

After the completion of practical, the students will be able to:

CO	Statement
C203.1	Demonstrate the different Boolean Laws & basics of K-map to realize combinational & sequential circuits.
C203.2	Identify the various digital ICs & understand their operation.
C203.3	Describe the operation & timing constraints for latches, registers, different sequential circuits and Microprocessor.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C202.1	3	3	3	3	2	1	1	2	2	1	2	2	2	2
C202.2	3	3	3	3	2	1	1	2	2	1	2	2	2	2
C202.3	3	3	3	3	2	1	1	2	2	1	2	2	2	2
Average	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**2**	**2**	**1**	**2**	**2**	**2**	**2**

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Course Name: Network Theory - C204 (III Sem)

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

CO	Statement
C204.1	Use mesh and node analysis to find solution of electrical circuits.
C204.2	Implement network theorems for the analysis of networks.
C204.3	Interpret the transient and steady-state response of electrical circuits.
C204.4	Execute Laplace transforms to analyze networks and Synthesize waveforms
C204.5	Interpret two port network behavior and different Network Functions

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C204.1	3	2	-	-	-	-	-	-	-	-	-	1	3	1
C204.2	3	2	-	-	-	-	-	-	-	-	-	-	3	1
C204.3	3	3	-	-	-	-	-	-	-	-	-	-	3	1
C204.4	3	2	-	1	-	-	-	-	-	-	-	-	3	-
C204.5	3	3	-	-	-	-	-	-	-	-	-	-	3	-
Average	**3**	**2.4**	-	**0.2**	-	-	-	-	-	-	-	**0.2**	**3**	**0.6**

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels-NT

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	3	Strongly mapped as students will be able to apply the knowledge of mathematics and science in Mesh & Nodal Analysis.
	PO2	2	Moderately mapped as students can find solution of network elements.
	PO12	1	Slightly mapped as student will able to apply the knowledge of basic concepts in life long learning.
	PSO1	3	Strongly mapped as student will able to investigate and solve the engineering problems using technical knowledge in the area of electronic/electrical circuits.
	PSO2	1	Slightly mapped as student will able to apply the knowledge of network elements in hardware devices.
CO2	PO1	3	Strongly mapped as student will able to use the different network theorem to analyze electronic/electrical circuit.
	PO2	2	Moderately mapped as student will able to analyze power transfer related, problems
	PSO1	3	Strongly mapped as student will able to investigate and solve the engineering problems using technical knowledge of different theorems in the area of electronic/electrical circuits.
	PSO2	1	Slightly mapped as student will able to apply the knowledge of network theorems in hardware devices.
CO3	PO1	3	Strongly mapped as student will able to apply the knowledge of engineering fundamentals to solve engineering problems.
	PO2	3	Strongly mapped as student will able to find R,L,C elements behavior in steady state and transient state
	PSO1	3	Strongly mapped as student will able to investigate and solve the engineering problems using technical knowledge of initial and final conditions in the area of RLC networks.
	PSO2	1	Slightly mapped as student will able to apply the knowledge of RLC network in hardware devices
CO4	PO1	3	Strongly mapped as students get the knowledge on analyzing the periodic waveforms.
	PO2	2	Moderately mapped as student will able to evaluate the Laplace transform techniques
	PO4	1	Slightly mapped as student will able to synthesize different waveforms.
	PSO1	3	Strongly mapped as student will able to investigate and solve the engineering problems using technical knowledge of Laplace Transform
CO5	PO1		Strongly mapped as students get the knowledge in of two port networks

	PO2		Moderately mapped as students calculate the network parameters for all types of networks
	PSO1		Strongly mapped as student will able to investigate and solve the two port network engineering problems

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Course Name: Signals and System - C205 (III Sem)

After the completion of Course, the students will be able to:

CO	Statement
C205.1	Classify different types of signals and systems.
C205.2	Illustrate the concept of Linear Time Invariant (LTI) system and its properties.
C205.3	Analyze continuous time periodic and aperiodic signals.
C205.4	Analyze continuous time systems using Laplace Transform.
C205.5	Analyze DT signals and systems in frequency domain using Fourier Transform.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C205.1	2	1	-	2	1	-	-	-	-	2	-	2	3	2
C205.2	2	1	-	2	1	-	-	-	-	2	-	2	3	2
C205.3	2	2	-	2	1	-	-	-	-	2	-	2	3	2
C205.4	2	2	-	2	1	-	-	--	-	2	-	2	3	2
C205.5	2	2	-	2	1	-	-	-	-	2	-	2	3	2
Average	**1.6**	**1.6**	**-**	**2**	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**3**	**2**

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels-SS

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	2	Moderately mapped. Students apply engineering science techniques for the solution of engineering problems.
	PO2	1	Slightly mapped.Students identify engineering systems, parameters to solve problems.
	PO4	2	Moderately mapped.Students use the knowledge gained from course content for analysis and interpretation of data and synthesize it to make valid conclusions.
	PO5	1	Slightly mapped. As students may learn to use descipline specific tools such as MATLAB/Scilab for modelling and simulation.
	PO10	2	Moderately mapped. Students can read , understand, interpret technical and nontechnical information.
	PO12	2	Highly mapped. Students will be able to analyse sourced technical and popular information for feasibility, viability and sustainability.
	PSO1	3	Highly mapped.Student gain technical knowledge in the area of communication and signal processing.
	PSO2	2	Moderately mapped. Students demstrate technical skills and apply the knowledge in the field of Elctronics & Communication.
CO2	PO1	2	Moderately mapped. Students apply engineering science techniques for the solution of engineering problems.
	PO2	1	Slightly mapped.Students identify engineering systems, parameters to solve problems.
	PO4	2	Moderately mapped.Students use the knowledge gained from course content for analysis and interpretation of data and synthesize it to make valid conclusions.
	PO5	1	Slightly mapped. As students may learn to use descipline specific tools such as MATLAB/Scilab for modelling and simulation.
	PO10	2	Moderately mapped. Students can read , understand, interpret technical and nontechnical information.
	PO12	2	Highly mapped. Students will be able to analyse sourced technical and popular information for feasibility, viability and sustainability.
	PSO1	3	Highly mapped.Student gain technical knowledge in the area of communication and signal processing.
	PSO2	2	Moderately mapped. Students demstrate technical skills and apply the knowledge in the field of Elctronics & Communication.
CO3	PO1	2	Moderately mapped. Students apply engineering science techniques for the solution of engineering problems.
	PO2	1	Slightly mapped.Students identify engineering systems, parameters to solve problems.
	PO4	2	Moderately mapped.Students use the knowledge gained from course content for analysis and interpretation of data and synthesize it to make valid conclusions.
	PO5	1	Slightly mapped. As students may learn to use descipline specific tools such as MATLAB/Scilab for modelling and simulation.
	PO10	2	Moderately mapped. Students can read , understand, interpret technical and nontechnical information.

	PO12	2	Highly mapped. Students will be able to analyse sourced technical and popular information for feasibility, viability and sustainability.
	PSO1	3	Highly mapped.Student gain technical knowledge in the area of communication and signal processing.
	PSO2	2	Moderately mapped. Students demonstrate technical skills and apply the knowledge in the field of Electronics & Communication.
CO4	PO1	2	Moderately mapped. Students apply engineering science techniques for the solution of engineering problems.
	PO2	1	Slightly mapped.Students identify engineering systems, parameters to solve problems.
	PO4	2	Moderately mapped.Students use the knowledge gained from course content for analysis and interpretation of data and synthesize it to make valid conclusions.
	PO5	1	Slightly mapped. As students may learn to use descipline specific tools such as MATLAB/Scilab for modelling and simulation.
	PO10	2	Moderately mapped. Students can read , understand, interpret technical and nontechnical information.
	PO12	2	Highly mapped. Students will be able to analyse sourced technical and popular information for feasibility, viability and sustainability.
	PSO1	3	Highly mapped. Student gain technical knowledge in the area of communication and signal processing.
	PSO2	2	Moderately mapped. Students demonstrate technical skills and apply the knowledge in the field of Electronics & Communication.
CO5	PO1	2	Moderately mapped. Students apply engineering science techniques for the solution of engineering problems.
	PO2	1	Slightly mapped.Students identify engineering systems, parameters to solve problems.
	PO4	2	Moderately mapped.Students use the knowledge gained from course content for analysis and interpretation of data and synthesize it to make valid conclusions.
	PO5	1	Slightly mapped. As students may learn to use descipline specific tools such as MATLAB/Scilab for modelling and simulation.
	PO10	2	Moderately mapped. Students can read , understand, interpret technical and nontechnical information.
	PO12	2	Highly mapped. Students will be able to analyse sourced technical and popular information for feasibility, viability and sustainability.
	PSO1	3	Highly mapped.Student gain technical knowledge in the area of communication and signal processing.
	PSO2	2	Moderately mapped. Students demstrate technical skills and apply the knowledge in the field of Elctronics & Communication.

Name and Sign of Subject Teacher

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Course Name: Measurement & Instrumentation - C206 (III Sem)

After the completion of Course, the students will be able to:

CO	Statement
C206.1	Identify and use precise/accurate instrument for measurement of various electrical Parameters and to Understand its technical specifications.
C206.2	Identify and minimize errors in electrical/electronic measurement
C206.3	Classify and select suitable transducer for measurement of physical parameters.
C206.4	Analyze the data using statistical analysis.
C206.5	Explain modern trends in data acquisition systems

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C206.1	3	3	3	-	-	-	-	-	-	-	-	-	-	-
C206.2	2	1	2	-	-	-	-	-	-	-	-	-	1	-
C206.3	2	2	2	-	-	-	-	-	-	-	-	-	-	-
C206.4	2	2	2	-	-	-	-	-	-	-	-	-	-	-
C206.5	2	2	2	-	-	-	-	-	-	-	-	-	-	-
Average	**2.2**	**2**	**2.2**	-	-	-	-	-	-	-	-	-	**0.2**	-

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels- M&I

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	3	Basic knowledge of various instruments and their selection with study of errors Understand different types of measuring instruments and error compensations.
	PO2	3	Choose appropriate instruments for the measurement of voltage, current in ac and dc measurements
	PO3	3	Basic conceptd on measurement Parameters
CO2	PO1	2	Analysing the method of correcting errors range of ammeters and volmeters
	PO2	1	Basic knowledge on AC bridges To understand bridge balancing technique to measure the unknown parameters/components
	PO3	2	Applying knowledge of science and engineering to overcome the problems associated with conventional meters by using electronic meters and various Bridges
	PSO1	1	Outline the concept of DC and AC bridges for the measurement of resistance, inductance & capacitance
CO3	PO1	2	Fundamental of frequency and power factor
	PO2	2	Analyse the measurement of power factor and frequency by modern meters
	PO3	2	Basic knowledge on digital meters
CO4	PO1	2	Analyze the measurement of various parameters by using digital metes
	PO2	2	Examine the concepts of power and energy measurement by using wattmeter and energy meter.
	PO3	2	Graduates will be able to learn the fundamentals and applications of various signal generators
CO5	PO1	2	Understand the operating principles of basic building blocks of digital systems, recording and display units
	PO2	2	To learn the fundamentals and understand the concept of measurement of energy
	PO3	2	Understand the principles of operation of variousmeasurement systems

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Course Name: Electronics Workshop-I- C207(P) (III Sem)

After the completion of practical, the students will be able to:

CO	Statement
C207.1	Explain Different Performance Parameters of Active and Passive Devices and the Datasheets.
C207.2	Use Semiconductor Devices in Different Electronic Circuits and Projects.
C207.3	Implement the project based on above components

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C207.1	3	3	3	3	3	1	-	-	3	3	2	3	3	3
C207.2	3	3	3	3	3	1	-	-	3	3	2	3	3	3
C207.3	3	3	3	3	3	1	-	-	3	3	2	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**1**	**-**	**-**	**3**	**3**	**2**	**3**	**3**	**3**

Name and Sign of Subject Teacher

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(SEMESTER – IV)

List of IV Semester Subjects with Subject Code

Course Code as per RTMNU	Course Code	Subject
BEETC-401T	C208	Microcontrollers & Applications
BEETC-401P	C208P	Microcontrollers & Applications Lab
BEETC-402T	C209	Analog & Digital Communications
BEETC-403P	C209P	Analog and Digital Electronics Lab
BEETC-404T	C210	Analog System Design
BEETC-405T	C211	Data structure & Algorithm
BEETC-406T	C212	Numerical Mathematics and Probability Using MATLAB
BEETC-407T	C213	Programming for problem solving
BEETC-407P	C213P	Programming for problem solving Lab
BEETC-408I	C214	Internship
BEETC-409A	C215	Universal human values

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Course Name: Microcontrollers and Application - C208 (IV Sem)

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

CO	Statement
C208.1	Demonstrate the programming model of 8051 microcontroller.
C208.2	Design and develop 8051 microcontroller-based systems for various applications
C208.3	Illustrate programming model of AVR & programming in Integrated Development environment.
C208.4	Design and develop advanced processor/controllers like MSP-430 based systems for various applications.
C208.5	Design and develop Arduino based embedded system applications.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C208.1	2	2	2	-	1	-	-	-	-	2	-	2	3	2
C208.2	2	2	2	-	1	-	-	-	-	2	-	2	3	2
C208.3	2	2	2	-	1	-	-	-	-	2	-	2	3	2
C208.4	2	2	2	-	1	-	-	-	-	2	-	2	3	2
C208.5	2	2	2	-	2	-	-	-	-	2	-	2	3	2
Average	**2**	**2**	**2**		**1.2**	-	-	-	-	**2**		**2**	**3**	**2**

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels-MCA

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	2	Moderately mapped. Students can apply fundamental engineering concepts studied in the course for the solution of engineering problems.
	PO2	2	Moderately mapped. Students can identify the hardware requirements and can formulate a programming logic for the solution of engineering problem.
	PO3	2	Moderately mapped. Students can determine design objectives,functional requirements and find required specifications.
	PO10	2	Moderately mapped. Students can read, understand and interprete technical contents of the course.
	PO12	2	Moderately mapped. Students can engage in further studies and research in the embedded system area.
	PSO1	3	Highly mapped. Students possess technical knowledge about various microocntrollers and Embedded systems in general.
	PSO2	2	moderately mapped. Students get the base for programming concept using assembly language.
CO2	PO1	2	Moderately mapped.Students apply fundamental and branch specific engineering concepts for solving engineering problems.
	PO2	2	Moderately mapped. Students can identify engineering and other course specific knowledge that can be applied to given problem.
	PO3	2	Moderately mapped.Students should be able to determine design objectives and can also give alternative design solution.
	PO5	1	Slightly mapped. Students can write embedded C based programming and can run those using appropriate hardware/software tools.
	PO10	2	Moderately mapped.Students can read, understand and interpret technical contents of the course.
	PO12	2	Moderately mapped. As students can find and comprehend technical information available for this course (e.g.through NPTEL/Video lectures)
	PSO1	3	Highly mapped. Students possess technical knowledge about various micro controllers and Embedded systems in general.
	PSO2	2	Moderately mapped. Students get the base for programming concept using assembly language and embedded C programming.
CO3	PO1	2	Moderately mapped. As students can apply fundamental and Electronics and communication engineering concepts for AVR microcontroller based design problems.
	PO2	2	Moderately mapped. Students can identify engineering and other course specific knowledge that can be applied to given problem.
	PO3	2	Moderately mapped. Students can determine design objectives,functional requirements and find required specifications , components for the given problem/application.

	PO5	1	Slightly mapped. As students study descipline specific and course specific tools for programming and simulation.
	PO10	2	Moderately mapped.Students can read, understand and interprete technical contents of the course.
	PO12	2	Moderately mapped. As students can find and comprehend technical information available for this course (e.g.through NPTEL/Video lectures) and learn to create AVR family based applications.
	PSO1	3	Highly mapped. Students possess technical knowledge about various microcontrollers and Embedded systems in general.
	PSO2	2	Moderately mapped. Students get the base for programming concept using assembly language and embedded C programming.
CO4	PO1	2	Moderately mapped. Students apply fundamental and branch specific engineering concepts for solving engineering problems.
	PO2	2	Moderately mapped. Students can identify engineering and other course specific knowledge that can be applied to given problem.
	PO3	2	Moderately mapped. Students should be able to determine design objectives and can also give alternative design solution.
	PO5	1	Slightly mapped. As students study discipline specific and course specific tools for programming and simulation.
	PO10	2	Moderately mapped. Students can read, understand and interpreted technical contents of the course.
	PO12	2	Moderately mapped. As students can find and comprehend technical information available for this course (e.g. Through NPTEL/Video lectures)
	PSO1	3	Highly mapped. Students possess technical knowledge about various microcontrollers and Embedded systems in general.
	PSO2	2	Moderately mapped. Students get the base for programming concept using assembly language and embedded C programming.
CO5	PO1	2	Moderately mapped.Students apply fundamental and branch specific engineering concepts for solving engineering problems.
	PO2	2	Moderately mapped. Students can identify engineering and other course specific knowledge that can be applied to given problem.
	PO3	2	Moderately mapped.Students should be able to determine design objectives and can also give alternative design solution.
	PO5	2	Moderately mapped. As students study descipline specific and course specific tools like arduino programming and simulation in Arduino IDE environment.
	PO10	2	Moderately mapped.Students can read, understand and interprete technical contents of the course.
	PO12	2	Moderately mapped. As students can find and comprehend technical information available for this course (e.g.through NPTEL/Video lectures) for a project/application development.
	PSO1	3	Highly mapped. Students possess technical knowledge about various microcontrollers and Embedded systems in general.

	PSO2	2	Moderately mapped. Students get the base for programming concept using assembly language, embedded C and Arduino programming.

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Department of Electronics & Communication Engineering

Course Name: Microcontrollers and Application - C208(P) (IV Sem)

After the completion of practical, the students will be able to:

Course Name	Statement
C208.1	Demonstrate the concept of assembly languages and higher-level languages programming.
C208.2	Interface various peripherals with 8051, Atmega32 and msp430 and Arduino.
C208.3	Simulate the programs on different software platforms.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C208.1	2	2	2	2	3	1	-	-	3	3	1	3	3	3
C208.2	2	2	2	2	3	1	-	-	3	3	1	3	3	3
C208.3	2	2	2	2	3	1	-	-	3	3	1	3	3	3
Average	**2**	2	2	**2**	**3**	**1**	**-**	**-**	**3**	**3**	**1**	**3**	**3**	**3**

Name and Sign of Subject Teacher

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Course Name: Analog and Digital Communication - C209 (IV Sem)

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

CO	Statement
C209.1	Demonstrate a basic need of modulation and various types of amplitude and angle modulation techniques required for analog communication.
C209.2	Analyze various AM - FM receivers, along with the effect of noise on analog communication systems.
C209.3	Explain the designing of digital communication systems by applying knowledge of the various pulse modulation techniques.
C209.4	Describe various digital modulation techniques and various parameters associated with it.
C209.5	Identify different types of channel coding techniques and analyze the different spread spectrum methods.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C209.1	2	2	-	-	-	-	1	-	-	-	-	1	3	1
C209.2	2	2	-	-	-	-	-	-	-	-	-	-	3	1
C209.3	2	2	-	-	-	-	-	-	-	-	-	-	3	1
C209.4	2	2	-	-	-	-	-	-	-	-	-	-	3	1
C209.5	3	3	-	-	-	-	-	-	-	-	-	1	3	1
Average	2.2	2.2	-	-	-	-	0.2	-	-	-	-	0.4	3	1

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels-ADC

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	2	Moderately mapped as students will be able to apply the knowledge of mathematics and science in the analog modulation systems.
	PO2	2	Moderately mapped as students can find solution of power requirement for analog modulation
	PO7	1	Slightly mapped as student will able to apply the knowledge of basic concepts of height of an antenna in societal & environmental context
	PO12	1	Slightly mapped as student will able to apply the knowledge of basic concepts of analog modulation in life long learning.
	PSO1	3	Strongly mapped as student will able to possess technical knowledge in the area of AM,FM & PM
	PSO2	1	Slightly mapped as student will able to know the circuits of different types of modulators
CO2	PO1	2	Moderately mapped as student will able to apply the engineering knowledge about different demodulators
	PO2	2	Moderately mapped as student will able to analyze signal to noise ratio
	PSO1	3	Strongly mapped as student will able to investigate and solve the engineering problems using technical knowledge of different types of radio receivers
	PSO2	1	Slightly mapped as student will able to apply the technical knowledge of different detectors and receivers
CO3	PO1	2	Moderately mapped as student will able to apply the knowledge of pulse modulation techniques to solve engineering problems.
	PO2	2	Moderately mapped as student will able to find aliasing effect
	PSO1	3	Strongly mapped as student will able to investigate and solve the engineering problems using technical knowledge of pulse modulation methods
	PSO2	1	Slightly mapped as student will able to know the circuits of different types of pulse modulators
CO4	PO1	2	Moderately mapped as students get the knowledge on analyzing the different digital modulation techniques
	PO2	2	Moderately mapped as student will able to apply Huffman & LZ encoding algorithms
	PSO1	3	Strongly mapped as student will able to understand the rate distortion theory for optimum quantization
	PSO2	1	Slightly mapped as student will able to know the circuits of different shift keying techniques

CO5	PO1	3	Strongly mapped as students get the knowledge of error detection & correction coding in communication.
	PO2	3	Strongly mapped as students calculate error detection for different types of block codes.
	PO12	1	Slightly mapped as student will able to apply the knowledge of basic concepts of block codes & spread spectrum techniques
	PSO1	3	Strongly mapped as student will able to investigate and solve the block coding problems
	PSO2	1	Slightly mapped as student will able to know the circuits of PN sequence generators

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Course Name: Analog and Digital Electronics - C209(P) (IV Sem)

After the completion of practical, the students will be able to:

CO	Statement
C209.1	Explain the practical aspects of linear and non-linear applications of OP-AMP
C209.2	Design the various wave-shaping circuits, oscillators, signal conditioners and various application-based circuits using OP-AMP and Transistors
C209.3	Demonstrate and explain various concepts of analog and digital communication
C209.4	Develop an application-based project using industry-based OP--Amp.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C209.1	3	3	3	3	1	1	-	-	2	2	2	2	2	2
C209.2	3	3	3	3	1	1	-	-	2	2	2	2	2	2
C209.3	3	3	3	3	1	1	-	-	2	2	2	2	2	2
C209.4	3	3	3	3	1	1	-	-	2	2	2	2	2	2
Average	**3**	**3**	**3**	**3**	**1**	**1**	**-**	**-**	**2**	**2**	**2**	**2**	**2**	**2**

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Course Name: Analog System Design - C210 (IV Sem)

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

CO	Statement
C210.1	Describe and explain the basic concepts of OPAMP.
C210.2	Demonstrate and analyze various linear applications of OPAMP.
C210.3	Demonstrate and analyze various non-linear applications of OPAMP.
C210.4	Illustrate and design DC Regulated Power Supply.
C210.5	Evaluate and design various types of oscillators and filters.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C210.1	3	3	3	3	1	-	-	-	1	2	-	2	3	2
C210.2	3	3	3	3	1	-	-	-	1	2	-	2	3	2
C210.3	3	3	3	3	1	-	-	-	1	2	-	2	3	2
C210.4	3	3	3	3	1	-	-	-	1	2	-	2	3	2
C210.5	3	3	3	3	1	-	-	-	1	2	-	2	3	2
Average	3	3	3	3	1	-	-	-	1	2	-	2	3	2

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CO	PO/PSO	CL	Justification
CO1	PO1	3	Strongly mapped as the students will be able to apply the knowledge of mathematics for finding the solutions of complex engineering problem.
	PO2	3	Strongly mapped as the students will be able to identify and formulate the problem based on the principles of mathematics.
	PO3	3	Strongly mapped as the students will be able to design system components for the problem based on the specified need.
	PO4	3	Strongly mapped as the students will be able to interprete the data and investigate the problems based on the principles of mathematics.
	PO5	1	Slightly mapped as the students will be able to find a solution with an understanding of the limitations.
	PO9	1	Slightly mapped as the students will be able to work as an individual or leader in a group.
	PO10	2	Moderately mapped as the students will be able to give effective presentation and documentation.
	PO12	2	Moderately mapped as the students will be able to engage in lifelong learning.
	PSO1	3	Strongly mapped as the students will be able to possess the technical knowledge of Op Amps.
	PSO2	2	Moderately mapped as the students will be able to describe the knowledge of software and hardware tools.
CO2	PO1	3	Strongly mapped as the students will be able to demonstrate and analyze the problem to be implemented
	PO2	3	Strongly mapped as the students will be able to demonstrate and analyse various linear applications of Op-Amp based on the principles of mathematics.
	PO3	3	Strongly mapped as the students will be able to analyse and formulate the problem based on the principles of mathematics
	PO4	3	Strongly mapped as the students will be able to demonstrate the data and investigate the problems based on the principles of mathematics.
	PO5	1	Slightly mapped as the students will be able to select appropriate technique to find a solution with an understanding of the limitations.
	PO9	1	Slightly mapped as the students will be able to work as an individual or leader in a group.
	PO10	2	Moderately mapped as the students will be able to give effective presentation and documentation on the linear applications of Op-Amp.
	PO12	2	Moderately mapped as the students will be able to engage in lifelong learning.
	PSO1	3	Strongly mapped as the students will be able to possess and analyse the technical knowledge of Op Amps and its emerging technologies.
	PSO2	2	Moderately mapped as the students will be able to demonstrate and analyse the knowledge of software and hardware tools.
CO3	PO1	3	Strongly mapped as the students will be able to demonstrate and analyze the problem to be implemented

	PO2	3	Strongly mapped as the students will be able to demonstrate and analyse various non-linear applications of Op-Amp based on the principles of mathematics.
	PO3	3	Strongly mapped as the students will be able to analyse and formulate the problem based on the principles of mathematics
	PO4	3	Strongly mapped as the students will be able to demonstrate the data and investigate the problems based on the principles of mathematics.
	PO5	1	Slightly mapped as the students will be able to select appropriate technique to find a solution with an understanding of the limitations.
	PO9	1	Slightly mapped as the students will be able to work as an individual or leader in a group.
	PO10	2	Moderately mapped as the students will be able to give effective presentation and documentation on the non-linear applications of Op-Amp.
	PO12	2	Moderately mapped as the students will be able to engage in lifelong learning.
	PSO1	3	Strongly mapped as the students will be able to possess and analyse the technical knowledge of Op Amps and its emerging technologies.
	PSO2	2	Moderately mapped as the students will be able to demonstrate and analyse the knowledge of software and hardware tools.
CO4	PO1	3	Strongly mapped as the students will be able to demonstrate and analyze the problem to be implemented
	PO2	3	Strongly mapped as the students will be able to identify, analyse and formulate series voltage regulators and dc power supplies based on the principles of mathematics.
	PO3	3	Strongly mapped as the students will be able to design and develop solutions of the problem with the specified needs.
	PO4	3	Strongly mapped as the students will be able to use research-based knowledge for designing DC Regulated Power Supply using the principles of mathematics.
	PO5	1	Slightly mapped as the students will be able to model complex engineering solutions with an understanding of the limitations.
	PO9	1	Slightly mapped as the students will be able to function as an individual or leader in a group.
	PO10	2	Moderately mapped as the students will be able to give effective presentation and documentation on Regulators and Power supplies.
	PO12	2	Moderately mapped as the students will be able to engage in lifelong learning.
	PSO1	3	Strongly mapped as the students will be able to possess the technical knowledge of Regulators and Power supplies
	PSO2	2	Moderately mapped as the students will be able to demonstrate and analyse the knowledge of software and hardware tools associated with it.
CO5	PO1	3	Strongly mapped as the students will be able to demonstrate and analyze the problem to be implemented
	PO2	3	Strongly mapped as the students will be able to formulate and analyse oscillators and filters based on the principles of mathematics.

	PO3	3	Strongly mapped as the students will be able to design and develop solutions of the problem with the specified needs.
	PO4	3	Strongly mapped as the students will be able to use research-based knowledge for identification of various types of Oscillators and Filters using Op-Amp based on the principles of mathematics.
	PO5	1	Slightly mapped as the students will be able to model complex engineering solutions with an understanding of the limitations.
	PO9	1	Slightly mapped as the students will be able to function as an individual or leader in a group.
	PO10	2	Moderately mapped as the students will be able to give effective presentation and documentation on Oscillators and Filters using Op-Amps.
	PO12	2	Moderately mapped as the students will be able to engage in lifelong learning.
	PSO1	3	Strongly mapped as the students will be able to possess the technical knowledge of Oscillators and Filters
	PSO2	2	Moderately mapped as the students will be able to demonstrate and evaluate the methods for the implementation of software and hardware tools associated with it.

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Department of Electronics & Communication Engineering

Course Name: Data Structure and Algorithm - C211 (IV Sem)

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

CO	Statement
C211.1	Choose appropriate data structure based on the specified problem definition and analyze the algorithm.
C211.2	Describe and use operations like searching, insertion, deletion, traversing mechanism etc. on various data structures
C211.3	Apply concepts learned in various domains like Operating Systems, DBMS etc.
C211.4	Use linear and non-linear data structures like stacks, queues, linked list, trees etc.
C211.5	Use various advanced algorithm based on data structure.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C211.1	3		-	-	-	-	-	-	-	-	-	2	1	-
C211.2	3	2	1	1	-	-	-	-	-	-	-	2	1	-
C211.3	3	2	1	1	-	-	-	-	-	-	-	2	1	-
C211.4	3	2	1	1	-	-	-	-	-	-	-	2	1	-
C211.5	3		-	-	-	-	-	-	-	-	-	2	1	-
Average	**3.0**	**2.0**	**1.0**	**1.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.0**	**1.0**	-

Name and Sign of Subject Teacher

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Course Name: Numerical Analysis with MATLAB - C212 (IV Sem)

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

CO	Statement
C212.1	Apply MATLAB models to solve problems of Numerical Methods, Z-Transform and Probability.
C212.2	Apply Numerical Techniques to solve Algebraic equating and Transcendental Equation and use of MATLAB commands to solve it.
C212.3	Apply Numerical Techniques to solve first order first degree differential equations and use of MATLAB commands to solve it.
C212.4	Use Z-Transform technique to solve differece equation which applied in signal system problems and use of MATLAB commands to solve it.
C212.5	Apply probability concept to discrete and continuous variables to solve scientific and engineering problems use of MATLAB commands to solve it.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C212.1	3	2	1	1	1	-	-	-	-	-	-	-	1	1
C212.2	1	2	2	1	1	-	-	-	-	-	-	-	2	2
C212.3	2	2	2	1	1	-	-	-	-	-	-	-	2	1
C212.4	1	1	1	1	2	-	-	-	-	-	-	-	2	2
C212.5	3	1	2	1	1	-	-	-	-	-	-	-	1	2
Average	2	1.6	1.6	1	1.2	-	-	-	-	-	-	-	1.6	1.6

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Course Name: Programming for Problem Solving - C213 (IV Sem)

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

CO	Statement
C213.1	Explain the basic concepts of Object Oriented Programming and design simple java programs.
C213.2	Apply the knowledge of Inheritance in program development.
C213.3	Design programs using polymorphism and interfaces.
C213.4	Apply various exceptions using concepts of exception handling.
C213.5	Explain and implement concepts on file streams and operations in java programming for a given application programs.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C213.1	1	1	-	-	-	-	-	-	-	-	-	2	1	-
C213.2	1	-	2	-	2	-	-	-	-	-	-	-	-	2
C213.3	1	-	-	2	-	-	-	-	2	-	-	-	3	-
C213.4	1	-	-	-	-	2	-	-	-	2	-	-	-	2
C213.5	1	-	-	-	-	-	-	-	-	-	**2**	2	-	2
Average	**1**	**0.2**	**0.4**	**0.4**	**0.4**	**0.4**	**-**	**-**	**0.4**	**0.4**	**0.4**	**0.8**	**0.8**	**1.2**

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	1	Slightly mapped as students will be able to apply the theory and principles of computer science engineering, i.e., object-oriented concepts, to write a simple Java program.
	PO2	1	Slightly mapped as students will be able to evaluate problem statements to identify the objective of designing simple Java programs using class and object concepts.
	PO12	2	Moderately mapped as students may gain knowledge in code reusability, flexibility, solve redundancy, and ease in troubleshooting codes by using the OOPS concept, which may be a base for professional development.
	PSO1	1	Slightly mapped as students will be able to possess technical knowledge in the area of Programming.
CO2	PO1	1	Slightly mapped as students will apply the knowledge of inheritance in Java program development.
	PO3	2	Moderately mapped as students will design solutions using inheritance, addressing specified needs with appropriate consideration for various constraints.
	PO5	2	Moderately mapped as students will use mo
	PSO2	2	Moderately mapped as students will demonstrate technical skills and apply knowledge of software tools in program development.
CO3	PO1	1	Slightly mapped as students will use polymorphism and interfaces in program design.
	PO4	2	Moderately mapped as students will investigate problems and provide valid solutions using polymorphism and interfaces.
	PO9	2	Moderately mapped as students will work effectively in teams while designing programs with polymorphism and interfaces.
	PSO1	3	Strongly mapped as students will enhance their technical knowledge in programming.
CO4	PO1	1	Slightly mapped as students will apply various exceptions using the concepts of exception handling.
	PO6	2	Moderately mapped as students will assess and address safety and legal issues in their programs through exception handling.
	PO10	2	Moderately mapped as students will communicate their understanding of exception handling in their programs.
	PSO2	2	Moderately mapped as students will apply technical skills in handling exceptions using software tools.

CO5	PO1	1	Slightly mapped as students will explain and implement concepts on file streams and operations in Java programming for a given application program.
	PO11	2	Moderately mapped as students will demonstrate knowledge of project management principles while working on file operations.
	PO12	2	Moderately mapped as students will engage in life-long learning by exploring advanced file operations in Java.
	PSO2	2	Moderately mapped as students will use hardware and software tools in file stream operations.

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Course Name: Programming for Problem Solving - C213(P) (IV Sem)

After the completion of practical, the students will be able to:

CO	Statement
C213.1	Able to choose appropriate data structure based on the specified problem definition and analysis the algorithm
C213.2	Apply the knowledge of Inheritance in program development.
C213.3	Develop programs using polymorphism and interfaces.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C213.1	3	3	3	3	2	1	-	-	3	1	2	2	2	2
C213.2	3	3	3	3	2	1	-	-	3	1	2	2	2	2
C213.3	3	3	3	3	2	1	-	-	3	1	2	2	2	2
Average	**3**	**3**	**3**	**3**	**2**	**1**	**-**	**-**	**3**	**1**	**2**	**2**	**2**	**2**

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Course Name: Internship- C214 (IV Sem)

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

	CO	Statement
C213.1	**CO1**	Construct the compony profile by compiling brief history, management structure, products/ service offered, key achievements and market performance for his/her organization of internship.
C213.2	**CO2**	Assess its strength, weaknesses, opportunities and threats (SWOT)
C213.3	**CO3**	Determine the challenges and future potential for his/her internship organization in particular and sector in general

	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C213.1	**CO1**	3	3	3	3	2	1	-	1	3	1	2	2	2	2
C213.2	**CO2**	3	3	3	3	2	1	-	1	3	1	2	2	2	2
C213.3	**CO3**	3	3	3	3	2	1	-	1	3	1	2	2	2	2
Average		**3**	**3**	**3**	**3**	**2**	**1**	**-**	**1**	**3**	**1**	**2**	**2**	**2**	**2**

Name and Sign of Subject Teacher

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(SEMESTER – V)
List of V Semester Subjects with Subject Code

Course Code as per RTMNU	Couse Code	Subject
BEETC-501T	C301	Embedded System Design
BEETC-501P	C301P	Embedded System Design Lab
BEETC-502T	C302	Electromagnetic Waves
BEETC-503T	C303	Digital Signal Processing
BEETC-503P	C303P	Digital Signal Processing Lab
BEETC-504OT	C304	HSC: IEED(Economics)
BEETC-505PE	C305	PEC-I
BEETC-506P	C306P	Electronic Workshop II

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Course Name: Embedded System Design - C301 (V Sem)

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

CO	Statement
C301.1	Describe and analyse the requirements & design issues of Embedded systems.
C301.2	Apply the knowledge of architecture and programming for development of simple applications.
C301.3	Describe and demonstrate the interfacing of various peripherals with ARM Processor.
C301.4	Describe and demonstrate the interfacing of various analog and digital subsystems with ARM Processor.
C301.5	Explain the concept of Real Time Operating System for embedded system design.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C301.1	2	2	-	-	-	-	-	-	-	2	-	3	3	2
C301.2	2	2	-	-	-	-	-	-	-	2	-	3	3	2
C301.3	3	3	2	-	-	-	-	-	-	2	-	3	3	2
C301.4	2	2	2	-	-	-	-	-	-	2	-	3	3	2
C301.5	1	-	-	-	-	-	-	-	-	2	-	3	1	1
Average	**2**	**1.8**	**0.8**							**2**		**3**	**2.6**	**1.8**

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels-ESD

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	2	Moderately mapped as student will be able to describe requirements and design metrics of the embedded system.
	PO2	2	Moderately mapped as student will be able to anlyze theroticaly the design issues of embedded system.
	PO10	2	Moderately mapped as student will be able to listen and comprehend the information about basics of Embedded System
	PO12	3	Strongly mapped as student will be able to recognize the need and clearly explain the importance and recent trends of embedded systems.(Pi 12.2.2)
	PSO1	3	Strongly mapped as student will be able to possess technical knowledge in the area of Embedded system.
	PSO2	1	Slightly mapped as student will be able to explain the basic knowledge embedded system used in the field of electronics and communication engineering.
CO2	PO1	2	Moderately mapped as the student will be able to apply the knowledge of architecture in simple programming.(Pi 1.4)
	PO2	2	Moderately mapped as the student will be able to Identify the various parameters of ARM7 microcontroller.(like context switching,ISR,various special function registers)
	PO10	2	Moderately mapped as student will be able to listen and comprehend the information about the architectural details of ARM7.
	PO12	3	Strongly mapped as the student will be able to comprehend and explain Architecture of ARM 7 in detail.(Pi 12.2.2)
	PSO1	3	Strongly mapped as student will be able to possess technical knowledge of architecture and programming model of ARM7 which helps to design embedded system.
	PSO2	2	Moderately mapped as student will be able to apply the knowledge of hardware to design embedded system.
CO3	PO1	3	Strongly mapped as student will be able to understand the fundamentals of ARM7 instruction set and apply the same to solve engineering problem.
	PO2	3	Strongly mapped as the student will be able to Identify the existing instructions in ARM7 instruction set and able to write the program to solve the given problem.
	PO3	2	Moderately mapped as the student will be able to design variety of solution to solve simple problems using ARM7 assembly and embedded C code to interface the hardware devices. ARM7 processor

	PO10	2	Moderately mapped as student will be able to read, understand and interprete technical information of instruction set of ARM7 and various peripheral devices.
	PO12	3	Strongly mapped as student will be able to uderstand and explain the fundamentals of ARM7 assembly and embedded C coding and hardware interfacing.
	PSO1	3	Strongly mapped as student will be able to possess technical knowledge in the area of interfacing various devices for designing simple applications.
	PSO2	2	Moderately mapped as student will be able to apply the knowledge of hardware and software for designing the simple embedded system.
CO4	PO1	2	Moderately mapped as student will be able to understand the fundamentals of interfacing of analog and digital modules with ARM7.
	PO2	2	Moderately mapped as student will be able toIdentify the existing interface instructions in ARM7 instruction set and use the same to interface the hardware devices.
	PO3	2	Moderately mapped as student will be able to write a program to interface analog and digital hardware devices with ARM7 processor.
	PO10	2	Moderately mapped as student will be able to read, understand and interprete technical information about analog and digital hardware devices with ARM7 processor.
	PO12	3	Strongly mapped as the student will be able to uderstand and explain the hardware interfacing of various modules.
	PSO1	3	Strongly mapped as student will able to possess technical knowledge in the area of interfacing various hardware devices in embedded system.
	PSO2	2	Moderately mapped as student will be able to apply the knowledge of hardware and software for designing the simple embedded system.
CO5	PO1	1	Slightly mapped as student will be able to describe the need of RTOS in embedded system.
	PO10	2	Moderately mapped as student will be able to read, understand and interprete the importance and role of RTOS in Embedded System.
	PO12	3	Strongly mapped as student learn and remember the fundamental concepts of RTOS .
	PSO1	1	Slightly mapped as student will be able to possess knowledge of RTOS used in the area of Embedded system.
	PSO2	1	Slightly mapped as student will be able to explain the basics of RTOS in embedded system used in the field of electronics and Communication Engineering. communication engineering.

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Course Name: Embedded System Design - C301(P) (V Sem)

After the completion of practical, the students will be able to:

CO	Statement
C301.1	Apply the knowledge of Instruction skill for the Development of Simple and Complex Programs.
C301.2	Apply the programming skill for the Development of Simple application.
C301.3	Apply and Demonstrate the Concept of Interfacing for the Development of Embedded System.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C301.1	3	3	3	3	3	1	-	-	3	2	1	3	3	3
C301.2	3	3	3	3	3	1	-	-	3	2	1	3	3	3
C301.3	3	3	3	3	3	1	-	-	3	2	1	3	3	3
Average	**3**	**3**	**3**	**3**	**3**	**1**	**-**	**-**	**3**	**2**	**1**	**3**	**3**	**3**

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Course Name: Electromagnetic Wave theory - C302 (V Sem)

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

CO	Statement
C302.1	Explain the different coordinate system & analyze theorems of electric Field.
C302.2	Explain magnetic fields, Apply the Maxwell's equations to solve problems in electromagnetic field theory.
C302.3	Analyze the propagation of wave in different transmission media.
C302.4	Analyze various parameters and characteristics of the rectangular waveguide.
C302.5	Describe principle of radiation and radiation characteristics of an antenna.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C302.1	2	2	1	-	-	-	-	-	-	1	-	2	2	-
C302.2	3	2	1	-	-	-	-	-	-	1	-	2	2	-
C302.3	3	2	1	-	-	-	-	-	-	1	-	2	2	-
C302.4	3	2	1	-	-	-	-	-	-	1	-	2	2	-
C302.5	2	2	1	-	-	-	-	-	-	1	-	2	2	-
Average	**2.6**	**2**	**1**	**-**	**-**	-	**-**	**-**	-	**1**	**-**	**2**	**2**	**-**

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels-EWT

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	2	Moderately mapped as student will able to apply engineering fundamental like coordinate system concept to solve engineering problems.
	PO2	2	Moderately mapped as student will able to identify engineering coordinate system variables and parameters to solve the problem
	PO3	**1**	Slightly mapped as student will able to apply the knowledge to design the solution.
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	**2**	Moderately mapped as student will able to use the knowledge of laws of electric field in technological change
	PSO1	2	Moderately mapped as student will able to possess technical knowledge in the area of Communication
CO2	PO1	3	Highly mapped as student will able to apply engineering fundamental like Maxwells Laws to solve engineering problems.
	PO2	2	Moderately mapped as student will able to identify engineering system variables and parameters to solve the problem
	PO3	1	Slightly mapped as student will able to apply the knowledge to design the solution.
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	2	Moderately mapped as student will able to use the knowledge of laws of Magnetic field in technological change
	PSO1	2	Moderately mapped as student will able to possess technical knowledge in the area of Communication
CO3	PO1	3	Highly mapped as student will able to apply engineering fundamental concept to solve engineering problems.
	PO2	2	Highly mapped as student will able to identify engineering coordinate system variables and parameters to solve the problem
	PO3	1	Slightly mapped as student will able to apply the knowledge to design the solution.
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	2	Moderately mapped as student will able to use the knowledge of wave equation in technological change
	PSO1	2	Moderately mapped as student will able to possess technical knowledge in the area of Communication
CO4	PO1	3	Highly mapped as student will able to apply engineering fundamental concept to solve engineering problems.

	PO2	2	Moderately mapped as student will able to identify engineering coordinate system variables and parameters to solve the problem
	PO3	1	Slightly mapped as student will able to apply the knowledge to design the solution.
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	2	Moderately mapped as student will able to use the gain knowledge in technological change
	PSO1	2	Moderately mapped as student will able to possess technical knowledge in the area of Communication
CO5	PO1	2	Highly mapped as student will able to apply engineering fundamental concept to solve engineering problems.
	PO2	2	Highly mapped as student will able to identify engineering coordinate system variables and parameters to solve the problem
	PO3	1	Slightly mapped as student will able to apply the knowledge to design the solution.
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	2	Moderately mapped as student will able to use the gain knowledge in technological change
	PSO1	2	Moderately mapped as student will able to possess technical knowledge in the area of Communication

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Course Name: Digital Signal Processing - C303 (V Sem)

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

CO	Statement
C303.1	Interpret, represent and process discrete time signals and systems.
C303.2	Apply discrete Fourier transform, its properties & analyze the discrete time signals & systems in frequency domain.
C303.3	Apply Z- transform, its properties & analyze the discrete time signals & systems in Z domain.
C303.4	Draw the structures of various discrete time systems in DFI, DFII, cascade and parallel form.
C303.5	Design IIR and FIR digital filters

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C303.1	3	3	-	2	-	-	-	-	-	1	-	2	3	1
C303.2	3	3	-	2	-	-	-	-	-	1	-	2	3	1
C303.3	3	3	-	2	-	-	-	-	-	1	-	2	3	1
C303.4	2	3	1	2	-	-	-	-	-	1	-	2	3	1
C303.5	3	3	1	2	-	-	-	-	-	1	-	2	3	1
Average	**2.8**	**3**	**04**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**3**	**1**

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Course Name: Digital Signal Processing - C303(P) (V Sem)

After the completion of practical, the students will be able to:

CO	Statement
C303.1	Analyze different properties of discrete Time Fourier transform.
C303.2	Analyze and process the signals in the discrete domain.
C303.3	Design and analyze the filters using simulation tools (MATLAB).

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C303.1	3	3	3	3	2	1	-	-	3	1	1	2	2	2
C303.2	3	3	3	3	2	1	-	-	3	1	1	2	2	2
C303.3	3	3	3	3	2	1	-	-	3	1	1	2	2	2
Average	**3**	**3**	**3**	**3**	**2**	**1**	**-**	**-**	**3**	**1**	**1**	**2**	**2**	**2**

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Course Name: IEED(Economics) - C304 (V Sem)

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

CO	Statement
C304.1	Develop basic knowledge different types of business structure.
C304.2	Acquire the knowledge of different market structures and new economic policy.
C3043	Grasp the functions of banks, taxations system and implications of inflation.
C304.4	Identify various sources of finance.
C304.5	Analyse the problems of Small Scale industries and government's policies for them.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C304.1	-	-	-	-	-	-	-	-	-	-	2	2	-	-
C304.2	-	-	-	-	-	-	-	-	1	-	2	2	-	-
C3043	-	-	-	-	-	-	-	-	-	-	2	2	-	-
C304.4	-	-	-	-	-	-	-	-	1	-	2	2	-	-
C304.5	-	-	-	-	-	-	-	-	1	-	3	2	-	-
Average	-	-	-	-	-	-	-	-	**0.6**	-	**2.2**	2	-	-

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co relation Levels-IEED

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO11	2	Moderately mapped as students will be able to apply the knowledge of basic economics in project management.
	PO12	2	Moderately mapped as students will keep on enhancing the knowledge of basic economics throughout their life.
CO2	PO9	1	Slightly mapped as students will acquire the knowledge of different market structures which work in collaboration with each other.
	PO11	2	Moderately mapped as students will be able to apply the knowledge of different market structures in project management.
	PO12	2	Moderately mapped as students will keep on enhancing the knowledge of market structures throughout their life.
CO3	PO11	2	Moderately mapped as students will able to grasp the implications of banking system, taxation and inflation in projects.
	PO12	2	Moderately mapped as students will keep on understanding the changes in banking and taxation system throughout their life.
CO4	PO9	1	Slightly mapped as students will understand the importance of team work in arranging finance.
	PO11	2	Moderately mapped as students will get the knowledge various sources of finance required in managing the projects.
	PO12	2	Moderately mapped as students will keep on enhancing the knowledge of various sources of finance throughout their life.
CO5	PO9		Slightly mapped as students will understand the importance of team work in successful running of Small Scale Industries.
	PO11		Moderately mapped as students will analyse various government policies for successful management of projects.
	PO12		Moderately mapped as students will keep on enhancing the knowledge of government policies for Small Scale Industries throughout their life.

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Course Name: PEC-I-OS - C305-i (V Sem)

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

CO	Statement
C305.1	Explain basic concepts of operating system
C305.2	Understand the process management policies and scheduling algorithms
C305.3	Design various memory management techniques
C305.4	Analyze process synchronization techniques.
C305.5	Evaluate deadlock detection and prevention mechanism

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C305.1	1	-	-	-	-	-	-	-	-	-	-	2	-	2
C305.2	1	1	-	-	-	-	-	-	-	-	-	2	-	2
C305.3	1	1	-	-	-	-	-	-	-	-	-	2	-	2
C305.4	1	1	-	-	-	-	-	-	-	-	-	2	-	2
C305.5	1	1	-	-	-	-	-	-	-	-	-	2	-	2
Average	**1.0**	**1.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.0**	**-**	**2.0**

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Course Name: PEC-I-ITEC - C305-ii (V Sem)

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

CO	Statement
C305.1	Interpret and summarize the role of information theory and linear algebra in source coding.
C305.2	Illustrate and summarize the super Information, Channel Models and channel coding.
C305.3	Analyze the performance of error detection and correction codes.
C305.4	Implement various error control techniques.
C305.5	Apply various error control encoding and decoding techniques.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C305.1	3	3	3	-	-	-	-	-	-	-	-	-	3	1
C305.2	2	1	2	-	-	-	-	-	-	-	-	-	1	1
C305.3	2	2	2	-	-	-	-	-	-	-	-	-	1	1
C305.4	2	2	1	-	-	-	-	-	-	-	-	-	1	1
C305.5	2	2	2	-	-	-	-	-	-	-	-	-	1	1
Average	**2.2**	**2**	**2**	-	-	-	-	-	-	-	-	-	**1.4**	**1**

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels-ITEC

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	3	Applies basic mathematics and science knowledge for solution to engineering problem Demonstrate knowledge of information and entropy, and their use in information theory
	PO2	3	Ability to analyze a problem critically using scientific approach, relevant tools and techniques
	PO3	3	Identify, formulate and review engineering problems.Students will be able to use tools and technologies in the field of information security by encoading with solutions
	PSO1	3	Strongly mapped as student will able to possess technical knowledge in the area of Digital Coading
	PSO2	1	Slightly mapped as student will able to understand knowledge in the Digital Communication
CO2	PO1	2	Applies basic mathematics and science knowledge for solution to engineering problems Ability to analyze a problem critically using scientific approach, relevant tools and techniques
	PO2	1	Identify, formulate and review complex engineering problems Students will be able to gain the knowledge of channal capacity with Applications
	PO3	2	Students will be able to gain the knowledge of Design digital system concepts
	PSO1	1	Slightly mapped as student will able to understand knowledge in the Digital Communication
	PSO2	1	Slightly mapped as student will able to understand knowledge inDigital Communication
CO3	PO1	2	Applies basic mathematics and science knowledge for solution to engineering problem students will be able to understand the engineering principles to apply coading logics
	PO2	2	students could apply the knowledge of digital mathematics and engineering fundamentals for coadding and decoding as well.
	PO3	2	students will be able to understand the engineering principles to apply coading logics
	PSO1	1	Students will be able to gain the knowledge of Design digital system concepts
	PSO2	1	student will able to understand knowledge in the Digital Communication
CO4	PO1	2	students could apply the knowledge of digital mathematics and engineering fundamentals for coadding and decoding as well.
	PO2	2	students could apply the knowledge of digital mathematics and engineering fundamentals for coadding and decoding as well.
	PO3	1	Identify, formulate and review complex engineering problems students will learn various error control encoding and decoding techniques with design analysis
	PSO1	1	Students will be able to gain the knowledge of Design digital system concepts
	PSO2	1	student will able to understand knowledge in the Digital Communication
CO5	PO1	2	Applies basic mathematics and science knowledge for solution to Digital encoding engineering problem
	PO2	2	Students will learn various error control encoding and decoding techniques with their comparative study
	PO3	2	Students will be able to understand the engineering principles to apply coding logics

	PSO1	1	Students will be able to gain the knowledge of Design digital system concepts
	PSO2	1	student will able to understand knowledge in the Digital Communication

Name and Sign of Subject Teacher

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Course Name: PEC-I-EDT with VHDL - C305-iii (V Sem)

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

CO	Statement
C305.1	Explain the digital circuits and design.
C305.2	Analyze the digital system design process and various level of abstraction.
C305.3	Design digital functional systems through HDL language.
C305.4	Simulate, synthesize, and implement description into appropriate digital blocks.
C305.5	Explain the concepts of Finite State machines, FPGA and CPLD.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C305.1	3	2	2	-	-	-	-	-	-	2	-	2	2	2
C305.2	3	2	2	-	-	-	-	-	-	2	-	2	2	2
C305.3	3	2	2	-	-	-	-	-	-	2	-	2	2	2
C305.4	3	2	2	-	-	-	-	-	-	2	-	2	2	2
C305.5	3	2	2	-	-	-	-	-	-	2	-	2	2	2
Average	3	2	2	-	-	-	-	-	-	2	-	2	2	2

Name and Sign of Subject Teacher

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Course Name: PEC-I-S&S - C305-iv (V Sem)

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

CO	Statement
C305.1	Explain fundamental physical and technical base of sensors and actuators.
C305.2	Explain basic laws and phenomena that define behavior of sensors and actuators.
C305.3	Analyze various approaches, procedures and results related to sensors and actuators.
C305.4	Analyze design and development solutions for sensors and actuators.
C305.5	Interpret the acquired data and measured results.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C305.1	2	1	2	1	-	-	-	-	-	1	-	3	3	1
C305.2	2	2	2	1	-	-	-	-	-	1	-	3	3	1
C305.3	2	2	2	1	-	-	-	-	-	1	-	3	3	1
C305.4	2	2	2	1	-	-	-	-	-	1	-	3	3	1
C305.5	1	1	1	1	-	-	-	-	-	1	-	3	3	1
Average	**1.8**	**1.6**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**3**	**3**	**1**

Name and Sign of Subject Teacher

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels S & S

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	2	Moderately mapped as the students will be able to describe basics of Sensor for the solution of engineering problems.
	PO2	1	Slightly mapped as students will be able to gain the knowledge of enabling technologies for sensors.
	PO3	2	Slightly mapped as students will be able to finds professional engineering solutions for environmental safety
	PO4	1	Slightly mapped as students will be able to apply knowledge of Sensors fundamentals for different environmental considerations.
	PO10	1	Slight mapped as the students will be able to explain and write about Sensors and Systems.
	PO12	3	Strongly mapped as student will able to gain the knowledge pertaining to fundamentals of Sensors and its application to critical real time scenarios, facilitate lifelong learning
	PSO1	3	Strongly mapped as student will able to apply the concepts of enabling technologies of Sensors.
	PSO2	1	Slightly mapped as the students will be able to posses knowlede of Sensors and its enabling technologies
CO2	PO1	2	Moderately mapped as the students will be able tounderstand the basics of automobile sensors.
	PO2	2	Moderately mapped as the students will be able to apply the knowledge to identify appropriate automobile sensors to identify, formulate and analyze the complex sensors and systems problems
	PO3	2	Moderately mapped as students will be to interpret solution of complex engineering problems for real time applications
	PO4	1	Slightly mapped as the students will be able to interpret and provide valid conclusions regarding use of automobile sensors.
	PO10	1	Slightly mapped as the students will be able to explain and write about different sensors used in automobile.
	PO12	3	Strongly mapped as student will able to use required sensors for specific application
	PSO1	3	Strongly mapped as student will able to understand the design principles of automobile sensors for providing solutions in the field of automobiles.
	PSO2	1	Slightly mapped as the students will be able to implement the software solution of sensors used with embedded systems
CO3	PO1	2	Moderately mapped as the students will be able to understand the contact and non-contact sensors.
	PO2	2	Moderately mapped as the students will be able to identify and compare contact and non-contact sensors.

	PO3	2	Moderately mapped as the students will be able to apply the concepts contact and non-contact sensors for automation
	PO4	1	Slightly mapped as the students will be able to interpret and provide valid conclusions regarding use of automation sensors.
	PO10	1	Slightly mapped as the students will be able to explain and write about automation sensors.
	PO12	3	Strongly mapped as student will able to use automation sensors. .
	PSO1	3	Strongly mapped as student will able to apply the knowledge of contact and non-contact sensors.
	PSO2	1	Slightly mapped as the students will be able to implement the software solution of sensors used with embedded systems
CO4	PO1	2	Moderately mapped as the students will be able to understand the sensors network in IOT.
	PO2	2	Moderately mapped as the students will be able to review about microsensors.
	PO3	2	Moderately mapped as the students will be able to s understand the basics of IOT sensors.
	PO4	1	Slightly mapped as the students will be able to interpret design issues of IOT sensors.
	PO10	1	Slightly mapped as the students will be able to explain and write about design issues of IOT sensors.
	PO12	3	Strongly mapped as student will able to learn about the IOT sensors in terms of design constraints and challenges of network management.
	PSO1	3	Strongly mapped as student will be able to use technical context of IOT network management
	PSO2	1	Slightly mapped as the students will be able to implement the software solution of IOT sensors used with embedded systems
CO5	PO1	1	Slight mapped as students will be able to understand basics of Actuation systems.
	PO2	1	Slight mapped as students will be able to identify Sensor used for robotics.
	PO3	1	Slight mapped as students will be to analyze sensor used in actuation systems.
	PO4	1	Slight mapped as students will be able to get knowledge of rotary actuators
	PO10	1	Moderately mapped as the students will be able to explain and write about different sensor node hardware and softwares
	PO12	3	Strongly mapped as student will able to engage in life -long learning.
	PSO1	3	Strongly mapped as student will able to apply khowledge of sensors used for robotics and actuation systems.
	PSO2	1	Slightly mapped as the students will be able to implement the software solution of sensors used with embedded systems

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Course Name: Electronics Workshop -II- C306P (V Sem)

After the completion of practical, the students will be able to:

CO	Statement
C306.1	Use the simulation software to design electronic circuits and PCB design
C306.2	Organize Arduino & Raspberry Pi to implement various electronic projects.
C306.3	Build a mini-project based on Arduino and Raspberry-Pi.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C306.1	3	3	3	3	2	1	-	-	3	1	1	2	2	2
C306.2	3	3	3	3	2	1	-	-	3	1	1	2	2	2
C306.3	3	3	3	3	2	1	-	-	3	1	1	2	2	2
Average	**3**	**3**	**3**	**3**	**2**	**1**	**-**	**-**	**3**	**1**	**1**	**2**	**2**	**2**

Name and Sign of Subject Teacher

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(SEMESTER – VI)
List of VI Semester Subjects with Subject Code

Course Code as per RTMNU	Course Code	Subject
BEETC-601T	C307	Computer Communication Network
BEETC-601P	C307P	Computer Communication Network Lab
BEETC-602T	C308	Internet of Things (IOT)
BEETC-602P	C308P	IOT Lab
BEETC-603T	C309	Wireless Sensor Network
BEETC-603P	C309P	Wireless Sensor Network Lab
BEETC-604PE	C310	PEC-II
BEETC-605OE	C311	OE-I
BEETC-606T	C312	HSC: Effective Technical Communication
BEETC-607I	C313P	Mini Project (Internship)

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Course Name: Computer Communication Network - C307 (VI Sem)

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

CO	Statement
C307.1	Describe the basics of Computer Network, Data Communication, Network topologies, transmission media and switching techniques.
C307.2	Explain the services and features of various protocols of Data Link Layer and MAC sub-layer.
C307.3	Use the concept of IP Addressing techniques and its various protocols of Network Layer.
C307.4	Describe the transport layer, Application Layer services and its protocol Headers and analyze the congestion control protocols.
C307.5	Explain the function of Application Layer and Presentation layer paradigm and protocols.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C307.1	2	2	1	-	-	-	-	-	-	1	-	2	2	2
C307.2	2	2	1	-	-	-	-	-	-	1	-	2	2	2
C307.3	2	2	1	-	-	-	-	-	-	1	-	2	2	2
C307.4	2	2	1	-	-	-	-	-	-	1	-	2	2	2
C307.5	2	2	1	-	-	-	-	-	-	1	-	2	2	2
Average	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**	**2**	**2**

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels-CCN

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	2	Moderately mapped. Students will able to apply fundamental as well as Computer Communication Network concepts to solve Network based engineering problems.
	PO2	2	Moderately mapped. Students will able to analyse complex engineering problem of networks with gain knowledge
	PO3	1	Slightly mapped as Students will able to apply knowledge of physical layer protocols to design solutions of complex engineering problems
	PO10	**1**	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	**2**	Moderately mapped. Students will able to apply to use gain knowledge in technical change.
	PSO1	**2**	Moderately mapped as students will possess technical knowledge in area of Computer Networks
	PSO2	2	Moderately mapped as students will apply the knowledge of software in the area of Computer Networks
CO2	PO1	2	Moderately mapped. Students will able to apply various data link layer protocols to solve Network based engineering problems
	PO2	2	Moderately mapped. Students will able to analyse complex engineering problem of networks with gain knowledge
	PO3	1	Slightly mapped as Students will able to apply knowledge of data link layer protocols to design solutions of complex engineering problems
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12		Moderately mapped. Students will able to apply to use gain knowledge in technical change.
	PSO1		Moderately mapped as students will possess technical knowledge in area of Computer Networks
	PSO2		Moderately mapped as students will apply the knowledge of software in the area of Computer Networks
CO3	PO1	2	Moderately mapped. Students will able to apply various network layer protocols to solve Network based engineering problems
	PO2	2	Moderately mapped. Students will able to analyse complex engineering problem of networks with gain knowledge
	PO3	1	Slightly mapped as Students will able to apply knowledge of network layer protocols to design solutions of complex engineering problems
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	2	Moderately mapped. Students will able to apply to use gain knowledge in technical change.
	PSO1	2	Moderately mapped as students will possess technical knowledge in area

			of Computer Networks
	PSO2	2	Moderately mapped as students will apply the knowledge of software in the area of Computer Networtks
CO4	PO1	2	Moderately mapped. Students will able to apply various transport layer protocols to solve Network based engineering problems
	PO2	2	Moderately mapped. Students will able to analyse complex engineering problem of networks with gain knowledge
	PO3	1	Slightly mapped as Students will able to apply knowledge of transport layer protocols to design solutions of complex engineering problems
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	2	Moderately mapped. Students will able to apply to use gain knowledge in technical change.
	PSO1	2	Moderately mapped as students will possess technical knowledge in area of Computer Networks
	PSO2	2	Moderately mapped as students will apply the knowledge of software in the area of Computer Networtks
CO5	PO1	2	Moderately mapped. Students will able to apply various data application layer protocols to solve Network based engineering problems
	PO2	2	Moderately mapped. Students will able to analyse complex engineering problem of networks with gain knowledge
	PO3	1	Slightly mapped as Students will able to apply knowledge of application layer protocols to design solutions of complex engineering problems
	PO10	1	Slightly mapped as Students will able to read understand and interpret technical information
	PO12	2	Moderately mapped. Students will able to apply to use gain knowledge in technical change.
	PSO1	2	Moderately mapped as students will possess technical knowledge in area of Computer Networks
	PSO2	2	Moderately mapped as students will apply the knowledge of software in the area of Computer Networks

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Course Name: Computer Communication Network - C307P (VI Sem)

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

CO	Statement
C307.1	Explain different hardware components in computer communication network
C307.2	Demonstrate different communication protocols for computer networks
C307.3	Design different networks using NS-2

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C307.1	2	2	2	1	1	2	-	-	-	2	1	2	2	2
C307.2	2	2	2	1	1	2	-	-	-	2	1	2	2	2
C307.3	2	2	2	1	1	2	-	-	-	2	1	2	2	2
Average	**2**	**2**	**2**	**1**	**1**	**2**	**-**	**-**	**-**	**2**	**1**	**2**	**2**	**2**

Name and Sign of Subject Teacher

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Course Name: Internet of Things - C308 (VI Sem)

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

CO	Statement
C308.1	Aarticulate ddifferent design levels of IoT.
C308.2	Abstract and compare different IOT Architectures.
C308.3	Explain network and communication aspects of IoT.
C308.4	Design a portable IoT using Raspberry Pi and Arduino.
C308.5	Analyze applications of IoT in real time scenario.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C308.1	-	-	-	-	-	-	-	-	-	2	-	1	2	-
C308.2	-	-	-	-	-	-	-	-	-	2	-	1	2	-
C308.3	-	-	-	-	-	2	-	-	-	2	-	2	2	-
C308.4	2	2	2	-	2	-	-	-	-	2	1	2	2	3
C308.5	2	2	2	2	-	-	-	-	-	2	1	2	2	2
Average	**0.8**	**0.8**	**0.8**	**0.4**	**0.4**	**0.4**	**-**	-	**-**	**2**	**0.4**	**1.6**	**2**	**1**

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels- IOT

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO10	2	Moderately mapped. Students read , understand and interpret technical and non technical information also produce well constructed engineering documents like answer paper, assignments etc.
	PO12	1	Slightly mapped. Students know the need for keeping current in the IoT technologies also comprehend technical literature and other sources of information.
	PSO1	2	Moderately mapped. Students possess the knowledge in this latest technology.
CO2	PO10	2	Moderately mapped. Students read , understand and interprete technical and non technical information also produce well constructed engineering documents like answer paper, assignments etc.
	PO12	1	Slightly mapped. Students know the need for keeping current in the IoT technologies also comprehend technical literature and other sources of information.
	PSO1	2	Moderately mapped. Students possess the knowledege in this latest technology.
CO3	PO6	2	Moderately mapped. Students are able to interprete various IEEE standards like IEEE 802.11WiFi, 802.16 WiMax and 802.15 LRWPAN standard protocols.
	PO10	2	Moderately mapped. Students read , understand and interprete technical and non technical information also produce well constructed engineering documents like answer paper, assignments etc.
	PO12	1	Slightly mapped. Students know the need for keeping current in the IoT technologies also comprehend technical literature and other sources of information.
	PSO1	2	Moderately mapped. Students possess the knowledge in this latest technology.
CO4	PO1	2	Moderately mapped. Students apply fundamental as well as Electronics and Communication Engineering concepts to solve engineering problems/design an IoT based application.
	PO2	2	Moderately mapped. Students identify hardware and software requirements/parameters to solve given problem/design IoT application.
	PO3	2	Moderately mapped. Students can synthesize requirements and also determine design objectives for the development of IoT based applications.
	PO5	2	Moderately mapped. Students learn to use various tools (hardware/Software) required for the design and development of applications.
	PO10	2	Moderately mapped. Students read , understand and interprete technical and non technical information also produce well constructed engineering documents like answer paper, assignments etc.

	PO11	1	Slightly mapped. Students identify the tasks, tools and other requirement for formulation of IoT based project.
	PO12	1	Slightly mapped. Students know the need for keeping current in the IoT technologies also comprehend technical literature and other sources of information.
	PSO1	2	Moderately mapped. Students possess the knowledege in this latest technology.
	PSO2	3	Highly mapped. Students write arduino, raspberry pi program for the given application
CO5	PO1	2	Moderately mapped. Students apply fundamental as well as Electronics and Communication Engineering concepts to solve engineering problems/design an IoT based application.
	PO2	2	Moderately mapped. Students identify hardware and software requirements/parameters to solve given problem/design IoT application.
	PO3	2	Moderately mapped. Students can synthesize requirements and also determine design objectives for the development of IoT based applications.
	PO10	2	Moderately mapped. Students read , understand and interprete technical and non technical information also produce well constructed engineering documents like answer paper, assignments etc.
	PO11	1	Slightly mapped. Students identify the tasks, tools and other requirement for formulation of IoT based project.
	PO12	1	Slightly mapped. Students know the need for keeping current in the IoT technologies also comprehend technical literature and other sources of information.
	PSO1	2	Moderately mapped. Students possess the knowledge in this latest technology.
	PSO2	2	Highly mapped. Students write arduino, raspberry pi program for the given application and case study involved.

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Course Name: Internet of Things - C308P (VI Sem)

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

Course Code	Statement
C308.1	Configure and install IDEs of various boards/modules used in IOT.
C308.2	Design and implementation of IoT based applications using various IoT tools.
C308.3	Apply the concept of Internet of Things in designing the real-world application.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C308.1	1	1	1	1	3	-	-	-	3	3	1	3	3	3
C308.2	2	3	3	3	3	2	1	-	3	3	1	3	3	3
C308.3	3	3	3	3	3	3	1	-	3	3	2	3	3	3
Average	**2.3**	**2.3**	**2.3**	**2.3**	**3**	**2.1**	**0.6**	**0.3**	**3**	**3**	**1.3**	**3**	**3**	**3**

Name and Sign of Subject Teacher

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Course Name: Wireless Sensor Network - C309 (VI Sem)

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

	Statement
C309.1	Describe the overview of wireless sensor networks and enabling technologies for wireless sensor networks.
C309.2	Apply the knowledge to identify appropriate MAC layer protocols.
C309.3	Explain the transport layer mechanisms and analyze Routing Challenges and design issues in wireless sensor network
C309.4	Discuss Network Management for Wireless Sensor Networks, its requirements, design issues, with examples and WSN middleware principles
C309.5	Explain the Sensor node hardware and node-level software platforms.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C309.1	2	1	1	1	-	-	-	-	-	2	-	3	3	2
C309.2	2	2	1	1	-	-	-	-	-	2	-	3	3	1
C309.3	2	2	2	1	-	-	-	-	-	2	-	3	3	2
C309.4	2	2	1	1	-	-	-	-	-	2	-	3	3	2
C309.5	1	1	1	1	-	-	-	-	-	2	-	3	3	3
Average	**1.8**	**1.6**	**1.2**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**3**	**3**	**2**

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Department of Electronics & Communication Engineering

Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels- WSN

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	2	Moderately mapped as the students will be able to describe basics of Wireless Sensor Networks in engineering problems
	PO2	1	Slight mapped as students will be able to gain the knowledge of enabling technologies for wireless sensor networks.
	PO3	1	Slight mapped as students will be able to finds professional engineering solutions for environmental safety
	PO4	1	Slight mapped as students will be able to apply knowledge of WSN fundamentals for different environmental considerations.
	PO10	2	Moderately mapped as the students will be able to explain and write about WSN
	PO12	3	Strongly mapped as student will able to gain the knowledge pertaining to fundamentals of WSNs and its application to critical real time scenarios, facilitate lifelong learning
	PSO1	3	Strongly mapped as student will able to apply the concepts of enabling technologies of WSN
	PSO2	2	Moderately mapped as the students will be able to posses knowlede of WSN and its enabling technologies
CO2	PO1	2	Moderately mapped as the students will be able tounderstand the basics of MAC protocol
	PO2	2	Moderately mapped as the students will be able to apply the knowledge to identify appropriate MAC layer protocols to identify, formulate and analyze the complex WSN problems
	PO3	1	Slight mapped as students will be to interpret solution of complex engineering problems for real time applications
	PO4	1	Slightly mapped as the students will be able to interpret and provide valid conclusions regarding use of MAC protocols.
	PO10	2	Moderately mapped as the students will be able to explain and write about different MAC protocols used in WSN
	PO12	3	Strongly mapped as student will able to use required MAC protocol for specific application
	PSO1	3	Strongly mapped as student will able to understand the design principles for MAC layer protocols Is for providing WSN solutions in the field of engineering
	PSO2	2	Moderately mapped as the students will be able to apply khowledge how to use MAC protocols in WSN
CO3	PO1	2	Moderately mapped as the students will be able to understand the routing algorithms
	PO2	2	Moderately mapped as the students will be able to identify and compare different routing algorithms

	PO3	2	Moderately mapped as the students will be able to apply the concepts routing algorithms in networking applications
	PO4	1	Slightly mapped as the students will be able to use appropriate software tools used for sensor network
	PO10	2	Moderately mapped as the students will be able to explain and write about
	PO12	3	Strongly mapped as student will able to use the routing algorithms in networking protocols.
	PSO1	3	Strongly mapped as student will able to apply the knowledge of routing techniques
	PSO2	2	Moderately mapped as the students will be able to implement the software solution (routing algorithm) pertaining to the problem designed.
CO4	PO1	2	Moderately mapped as the students will be able to understand the network management for Wireless Sensor Networks.
	PO2	2	Moderately mapped as the students will be able to review about middleware principle.
	PO3	1	Slightly mapped as the students will be able to s understand the basics of middleware architecture
	PO4	1	Slightly mapped as the students will be able to interprete design issues of network management
	PO10	2	Moderately mapped as the students will be able to explain and write about design issues of network management and moddleware architecture
	PO12	3	Strongly mapped as student will able to learn about the WSN vision in terms of design constraints and challenges of network management
	PSO1	3	Strongly mapped as student will able to use technical contex of network management
	PSO2	2	Moderately mapped as the students will be able to implement the hardware and software solution for network management
CO5	PO1	1	Slight mapped as students will be able to understand basics of hardware and software requirement of WSN
	PO2	1	Slight mapped as students will be able to identify Sensor node hardware node level software platform
	PO3	1	Slight mapped as students will be to analyze sensor node hardware
	PO4	1	Slight mapped as students will be able to analyze data sensed by sensor node
	PO10	2	Moderately mapped as the students will be able to explain and write about different sensor node hardware and softwares
	PO12	3	Strongly mapped as student will able to engage in life -long learning
	PSO1	3	Strongly mapped as student will able to apply khowledge of sensor hardware and software
	PSO2	3	Strongly mapped as student will able to apply knowledge of node level software for sensor node hardware

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Course Name: Wireless Sensor Network - C309P (VI Sem)

After the completion of practical, the students will be able to:

CO	Statement
C309.1	Demonstrate the simulation software and discuss different applications of Wireless Sensor Networks
C309.2	Implement steps for installation of Network simulator.
C309.3	Implement TCL script for different protocols of WSN.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C309.1	3	3	3	3	3	1	1	-	-	1	-	2	2	2
C309.2	3	3	3	3	3	1	1	-	-	1	-	2	2	2
C309.3	3	3	3	3	3	2	1	-	-	1	-	2	2	2
Average	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**-**	**-**	**1**	**-**	**2**	**2**	**2**

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Course Name: PEC-II-CA - C310-i (VI Sem)

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

CO	Statement
C310.1	Explain computer architecture concepts related to design of modern processors, memories and I/Os.
C310.2	Develop logic for assembly language programming using arithmetic and logical operations.
C310.3	Distinguish the organization of various parts of a system memory hierarchy
C310.4	Describe fundamentals concepts of pipeline and vector processing.
C310.5	Analyze the performance of commercially available computers.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C310.1	3	2	-	1	-	-	-	-	-	1	-	2	1	1
C310.2	3	3	-	1	-	-	-	-	-	1	-	2	1	2
C310.3	3	3	-	1	-	-	-	-	-	1	-	2	1	1
C310.4	3	3	-	1	-	-	-	-	-	1	-	2	1	1
C310.5	3	3	-	3	-	-	-	-	-	1	-	2	1	1
Average	3	**2.8**	-	1.4		-	-	-	-	1	-	2	1	1.2

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Course Name: PEC-II-DBMS - C310-ii (VI Sem)

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

CO	Statement
C310.1	Explain basic database concepts and data modeling techniques used in data base design.
C310.2	Apply the concept of functional dependency and perform the calculus with design database by using different normalization techniques.
C310.3	Apply query processing and perform optimization on query processing
C310.4	Explain the concept of transaction processing and different recovery techniques used in RDBMS
C310.5	Explain and implement advanced database which are used in real time system.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C310.1	3	2	1	-	-	-	-	-	-	-	-	2	2	-
C310.2	2	1	2	1	3	-	-	-	-	-	-	1	3	-
C310.3	2	1	2	1	2	-	-	-	-	-	-	1	2	-
C310.4	2	3	-	-	1	-	-	-	-	-	-	2	3	-
C310.5	1	1	2	1	-	-	-	-	-	-	-	1	2	-
Average	**2.0**	**1.6**	**1.8**	**1.0**	**2.0**	**-**	**-**	**-**	**-**	**-**	**-**	**1.4**	**2.4**	**-**

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Course Name: PEC-II-AWP - C310-iii (VI Sem)

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

CO	Statement
C310.1	Describe transmission line characteristics.
C310.2	Calculate antenna parameters (radiation pattern, beam width, lobes, directivity, gain, impedance efficiency, polarization)
C310.3	Analyze wire antennas (monopoles, dipoles, and loops).
C310.4	Analyze and design antenna arrays.
C310.5	Describe the operation of broadband and traveling wave antennas.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C310.1	3	3	3	2	1	-	-	-	1	2	-	2	2	1
C310.2	3	3	3	2	1	-	-	-	1	2	-	2	2	1
C310.3	3	3	3	2	1	-	-	-	1	2	-	2	2	1
C310.4	3	3	3	2	1	-	-	-	1	2	-	2	2	1
C310.5	3	3	3	2	1	-	-	-	1	2	-	2	2	1
Average	3	3	3	2	1	-	-	-	1	2		2	2	1

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Course Name: PEC-II-CSE - C310-iv (VI Sem)

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

CO	Statement
C310.1	Analyze various control systems.
C310.2	Develop the mathematical model of a system.
C310.3	Determine the response of different order systems for various step inputs
C310.4	Analyze the stability of the system using Root locus. Bode plot, Nyquist plot.
C310.5	Illustrate transfer function of systems using signal flow graph.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C310.1	3	3	3	3	1	1	1	-	1	2	-	2	1	-
C310.2	3	3	3	3	1	1	1	-	1	2	-	2	1	-
C310.3	3	3	3	3	1	1	1	-	1	2	-	2	1	-
C310.4	3	3	3	3	1	1	1	-	1	2	-	2	1	-
C310.5	3	3	3	3	1	1	1	-	1	2	-	2	1	-
Average	**3**	**3**	**3**	**3**	**1**	**1**	**1**	**-**	**1**	**2**	**-**	**2**	**1**	**-**

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Course Name: Effective Technical Communication - C312 (VI Sem)

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

CO	Statement
C312.1	Acquire knowledge of structure of language.
C312.2	Be able to face competitive exams and the interview process and can become employable
C312.3	Develop business writing skills.
C312.4	Become familiar with technology enabled communication and can develop technical and scientific writing skills.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C312.1	-	-	-	-	-	-	-	-	-	3	-	2	-	-
C312.2	-	-	-	-	-	-	-	-	-	3	-	2	-	-
C312.3	-	-	-	-	-	-	-	-	-	3	-	2	-	-
C312.4	-	-	-	-	-	-	-	1	-	3	-	2	-	-
Average	-	-	-	-	-	-	-	**0.2**	-	**3**	-	**2**	-	-

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Department of Electronics & Communication Engineering

(SEMESTER – VII)-CBCS
List of VII Semester Subjects with Subject Code

Course Code as per RTMNU	Course Code	Subject
BEETC-701PE	C401	PEC–III
BEETC-702PE	C402	PEC-IV
BEETC-703PE	C404	PEC–V
BEETC-704OE	C405	OE-II

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Course Name: PEC-III-AVE - C401-i (VII Sem)

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

CO	Statement
C401.1	Analysis & Synthesis of color composite video signals in Colour television system
C401.2	Analyze and understand different Television Technologies with the help of Signal generation
C401.3	Explain Digital Television system and analysis Video Compression Techniques
C401.4	Explain High-definition Television system and distinguish with different Television technologies.
C401.5	Analysis of Audio Video recording, Display and relevant consumer applications in Television area.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C401.1	3	2	1	-	-	-	-	-	-	1	-	2	2	-
C401.2	3	2	1	-	-	-	-	-	-	1	-	2	2	-
C401.3	3	2	1	-	-	-	-	-	-	1	-	2	2	-
C401.4	3	2	1	-	-	-	-	-	-	1	-	2	2	-
C401.5	3	2	1	-	-	-	-	-	-	1	-	2	2	-
Average	**3**	**2**	**1**	-	-	-	-	-	-	**1**		**2**	**2**	-

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Course Name: PEC-III-AVE - C401-i(P) (VII Sem)

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

CO	Statement
C401.1	Classify different Television system.
C401.2	Categories VIF SIF section, video/ chroma section and RGB section
C401.3	Explain power supply section.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C401.1	3	3	3	3	3	1	1	-	-	1	-	2	2	2
C401.2	3	3	3	3	3	1	1	-	-	1	-	2	2	2
C401.3	3	3	3	3	3	1	1	-	-	1	-	2	2	2
Average	**3**	**3**	**3**	**3**	**3**	**1**	**1**	-	-	**1**	-	**2**	**2**	**2**

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Course Name: PEC-III-Web Tech - C401-ii (VII Sem)

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

CO	Statement
C401.1	Explain the concept of WWW, HTML, CSS and Java Script.
C401.2	Identify the engineering structural design of XML and parse tree, Analyze the difference between and PHP and XML
C401.3	Explain the JSP and servlet concepts.
C401.4	Analyze the difference between JSP and servlet.
C401.5	Design web application using MVC Architecture.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C401.1	2	2	1	-	-	-	-	-	1	1	-	2	2	2
C401.2	2	2	1	-	-	-	-	-	1	1	-	2	2	2
C401.3	2	2	1	-	-	-	-	-	1	1	-	2	2	2
C401.4	2	2	1	-	-	-	-	-	1	1	-	2	2	2
C401.5	2	2	1	-	-	-	-	-	1	1	-	2	2	2
Average	**2**	**2**	**1**	-	-	-	-	-	**1**	**1**	-	**2**	**2**	**2**

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels- Web Tech

CO	PO/PSO	CL	Justification
CO1	**PO1**	**2**	Moderately mapped as students Understand and apply the concepts of HTML5, CSS, JavaScript.
	PO2	**2**	Moderately mapped Analyzing web development problems and providing solutions using HTML, CSS, and JavaScript.
	PO3	**1**	slightly mapped as students explore and analyse the javascript programs for safety risks and cultural and societal issues
	PO9	**1**	Slightly mapped as Working individually and in teams to develop web projects.
	PO10	**1**	Slightly mapped as Communicating effectively about web development concepts.
	PO12	**2**	Moderately mapped as students Keeping up with the rapidly evolving web technologies.
	PSO1	**2**	Moderately mapped as students analyze, design, implement and test web applications.
	PSO2	**2**	Moderately mapped as students demonstrate the technical skills and apply the knowledge of software tools
CO2	**PO1**	**2**	Moderately mapped as students understand the concepts of XML, and develop programs and apply the same to write the javascript programs.
	PO2	**2**	Moderately mapped as students Analyzing XML structures and parse trees, comparing PHP and XML.
	PO3	**1**	Slightly mapped as students demonstrate the XML.
	PO9	**1**	Working individually and in teams on XML and PHP projects.
	PO10	**1**	Communicating effectively about XML and PHP concepts.
	PO12	**2**	Slightly mapped Keeping up with the rapidly evolving web technologies.
	PSO1	**2**	Moderately mapped as students analyze, design, implement and test web applications.
	PSO2	**2**	Moderately mapped as students demonstrate the technical skills and apply the knowledge of software tools
CO3	**PO1**	**2**	Moderately mapped as students Understanding the concepts of JSP and servlets.
	PO2	**2**	Moderately mapped as students Analyzing web application problems and employing JSP and servlets as solutions.
	PO3	**1**	Slightly mapped as students Designing and developing solutions using JSP and servlets.
	PO9	**1**	Slightly mapped as Working individually and in teams on projects involving JSP and servlets.
	PO10	**1**	Slightly mapped as students Communicating effectively about JSP and servlet concepts.
	PO12	**2**	Moderately mapped as students Keeping up with evolving web technologies like JSP and servlets.

	PSO1	**2**	Moderately mapped as students analyze, design, implement and test web applications.
	PSO2	**2**	Moderately mapped as students Keeping up with the rapidly evolving web technologies
CO4	**PO1**	**2**	Moderately mapped as students Understand the differences between JSP and Servlets requires fundamental engineering knowledge
	PO2	**2**	Moderately mapped as students Analyzing the differences helps in identifying suitable technologies for solving specific problems.
	PO3	**1**	Slightly mapped as students Choosing between JSP and Servlets is crucial in designing and developing web solutions.
	PO9	**1**	Slightly mapped as students Working individually and in teams to analyze and decide on using JSP or Servlets.
	PO10	**1**	Slightly mapped as students Communicating the differences and appropriate usage of JSP and Servlets.
	PO12	**2**	Moderately mapped as students Keeping up with advancements and changes in JSP and Servlet technologies..
	PSO1	**2**	Moderately mapped as students analyze, design, implement and test web applications.
	PSO2	**2**	Moderately mapped as students Demonstrating competency in understanding and using JSP and Servlets.
CO5	**PO1**	**2**	Moderately mapped as students having Knowledge of MVC architecture is fundamental for designing modern web applications.
	PO2	**2**	Moderately mapped as students Analyzing web application requirements and applying the MVC architecture for optimal solutions.
	PO3	**1**	Slightly mapped as students Choosing MVC-based applications in designing and developing web solutions.
	PO9	**1**	Slightly mapped as students Collaborating in teams to design and develop web applications using MVC.
	PO10	**1**	Slightly mapped as students Effectively communicating the design and development processes of MVC-based applications.
	PO12	**2**	Moderately mapped as students Continuously learning about new developments and best practices in MVC architecture.
	PSO1	**2**	Moderately mapped as students analyze, design, implement and test web applications.
	PSO2	**2**	Moderately mapped as students Demonstrating advanced competency in designing web applications using MVC architecture.

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Course Name: PEC-III-Web Tech - C401-ii(P) (VII Sem)

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

CO	Statement
C401.1	Design and developed static and dynamic web pages.
C401.2	Design and validate XML documents.
C401.3	Understand, analyze and apply the role of languages like HTML, CSS, XML, JavaScript, PHP, SERVLETS, JSP and protocols in the workings of the web and web applications

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C401.1	2	2	1	-	1	-	-	-	1	-	-	2	1	1
C401.2	2	2	1	-	1	-	-	-	1	-	-	2	1	1
C401.3	2	2	1	-	1	-	-	-	1	-	-	2	1	1
Average	**2**	**2**	**1**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	**1**	**1**

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Course Name: PEC-III-WMcom - C401-iii (VII Sem)

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

CO	Statement
C401.1	Design a model of cellular Communication system and analyse their operation and performance.
C401.2	Quantify the causes and effects of path loss and signal fading on received signal characteristics.
C401.3	Apply and analyse the fundamental techniques of Diversity and Channel Coding
C401.4	Construct and analyse the GSM system, use the IRS technology to increase the range and quality of GSM signal.
C401.5	Describe the different types of Latest Wireless Technologies and Cognitive radio communication technology.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C401.1	3	3	2	2	-	1	-	-	-	1	-	2	3	1
C401.2	3	3	3	2	-	1	-	-	-	1	-	2	3	1
C401.3	3	3	3	2	-	1	-	-	-	1	-	2	3	1
C401.4	3	3	3	3	-	1	-	-	-	1	-	2	3	1
C401.5	3	3	3	3	-	1	-	-	-	1	-	2	3	1
Average	**3**	**3**	**3**	**2.4**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**2**	**3**	**1**

Name and Sign of Subject Teacher

Dr. Mrs. A. P. Rathkanthiwar
Head (ECE)

PRIYADARSHINI COLLEGE OF ENGINEERING

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Phone : 07104 – 236381, 237307, Fax : 07104 – 237681,
Department of Electronics & Communication Engineering

Course Name: PEC-III-WMcom - C401-iii(P) (VII Sem)

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

CO	Statement
C401.1	Demonstrate and design the model of cellular communication system and analyze the operation and performance.
C401.2	onstrate and analyze concept of path loss, signal fading, equalization on received signal.
C401.3	rmine and analyze the framework of GSM system.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C401.1	3	3	3	3	2	1	-	-	2	2	1	2	2	2
C401.2	3	3	3	3	2	1	-	-	2	2	1	2	2	2
C401.3	3	3	3	3	2	1	-	-	2	2	1	2	2	2
Average	**3**	**3**	**3**	**3**	**2**	**1**	**-**	**-**	**2**	**2**	**1**	**2**	**2**	**2**

Name and Sign of Subject Teacher

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Department of Electronics & Communication Engineering

Course Name: PEC-III-R&A - C401-iv (VII Sem)

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

CO	Statement
C401.1	Explain the concepts of industrial robots in terms of classification, specification and coordinate systems, along with the need and application of robots and automation.
C401.2	Examine different types of electric motors and actuators and their applications.
C401.3	Explain robot and end-effector and their different types and application
C401.4	Examine different types of sensors and robot input output interfaces and safety measures in robot.
C401.5	Describe the impact and progress in AI and Other research trends in the field of robotics

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C401.1	2	1	-	-	-	-	-	-	-	1	-	2	2	2
C401.2	2	1	-	-	-	-	-	-	-	1	-	2	2	2
C401.3	2	1	-	-	-	-	-	-	-	1	-	2	2	2
C401.4	2	1	-	-	-	-	-	-	-	1	-	2	2	2
C401.5	2	1	-	-	-	-	-	-	-	1	-	2	2	2
Average	2	1	-	-	-		-	-	-	1	-	2	2	2

Name and Sign of Subject Teacher

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels- R&A

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	2	Students will apply the knowledge of fundamental concepts of engineering.
	PO2	1	Used the principles of robot specification and automation.
	PO10	1	Students will be able to communicate effectively and explanation on the industrial robot.
	PO12	2	Students need to listen effectively to pursue life long learning
	PSO1	2	Students will be able to gain knowledge of emerging technologies.
	PSO2	2	Students demonstrate the technical skill in the field of Electronics.
CO2	PO1	2	Students will apply the knowledge of fundamental concepts of engineering.
	PO2	1	Used the principles of robotic motors and actuators
	PO10	1	Students will be able to communicate effectively and explanation on the electrics motors and actuators
	PO12	2	Students need to listen effectively to pursue life long learning
	PSO1	2	Students will be able to gain knowledge of emerging technologies.
	PSO2	2	Students demonstrate the technical skill in the field of Electronics.
CO3	PO1	2	Students will apply the knowledge of fundamental concepts of engineering.
	PO2	1	Used the principles of end-effector.
	PO10	1	Students will be able to communicate effectively and explanation on the end-effector and their different types and application
	PO12	2	Students need to listen effectively to pursue life long learning
	PSO1	2	Students will be able to gain knowledge of emerging technologies.
	PSO2	2	Students demonstrate the technical skill in the field of Electronics.
CO4	PO1	2	Students will apply the knowledge of fundamental concepts of engineering.
	PO2	1	Used the principles of robotic sensors.
	PO10	1	Students will be able to communicate effectively and explanation on the sensors used in robotics, input output interfaces and safety measures in robot.
	PO12	2	Students need to listen effectively to pursue life long learning
	PSO1	2	Students will be able to gain knowledge of emerging technologies.
	PSO2	2	Students demonstrate the technical skill in the field of Electronics.
CO5	PO1	2	Students will apply the knowledge of fundamental concepts of engineering.
	PO2	1	Used the principles of AI in robotics

	PO10	1	Students will be able to communicate effectively and explanation on the AI and Other research trends in the field of robotics
	PO12	2	Students need to listen effectively to pursue life long learning
	PSO1	2	Students will be able to gain knowledge of emerging technologies.
	PSO2	2	Students demonstrate the technical skill in the field of Electronics.

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Department of Electronics & Communication Engineering

Course Name: PEC-III-R&A - C401-iv(P) (VII Sem)

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

CO	Statement
C401.1	Explain the concept of industrial robots in terms of classification, specification and coordinate system along with the need of robots and automation
C401.2	Examine different types of electric motor and actuator, sensors and their application
C401.3	Explain robot and end-effectors and their different types and their application.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C401.1	3	3	3	3	3	1	1	-	1	1	2	2	2	2
C401.2	3	3	3	3	3	1	1	-	1	1	2	2	2	2
C401.3	3	3	3	3	3	1	1	-	1	1	2	2	2	2
Average	3	3	3	3	3	1	1	-	1	1	2	2	2	2

Name and Sign of Subject Teacher

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Department of Electronics & Communication Engineering

Course Name: PEC-IV-MSD - C402-i (VII Sem)

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

CO	Statement
C402.1	Design and analysis of Switched Capacitor circuits
C402.2	Apply the concepts of Phase Lock Loop
C402.3	Design and analysis of Nyquist rate D/A Converter.
C402.4	Design and analysis of Nyquist Rate of A/D Converter
C402.5	Apply the concepts of Oversampling Convertors and Continuous -Time Filters.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C402.1	3	2	1	1	-	-	-	-	-	1	-	2	2	2
C402.2	2	2	1	1	-	-	-	-	-	1	-	2	2	2
C402.3	2	2	1	1	-	-	-	-	-	1	-	2	2	2
C402.4	2	2	1	1	-	-	-	-	-	1	-	2	2	2
C402.5	2	2	1	1	-	-	-	-	-	1	-	2	2	2
Average	2.2	2	1	1	-		-	-	-	1	-	2	2	2

Name and Sign of Subject Teacher

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels-MSD

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	3	Students will apply the knowledge of fundamental concepts of engineering problem
	PO2	2	Students will be able analyzing engineering problems.
	PO3	1	Students will be able to develop and design solution to complex problems
	PO4	1	Students apply knowledge for design of experiment
	PO10	1	Students will be able to communicate effectively and explanation on the circuit design
	PO12	1	Students need to listen effectively to pursue life long learning
	PSO1	2	Students will be able to gain knowledge on basic problems and to work in the field of Electronics engineering.
	PSO2	2	Students demonstrate the technical skill in the field of Electronics.
CO2	PO1	2	Students will apply the knowledge of fundamental concepts of engineering problem
	PO2	2	Students will be able analyzing engineering problems.
	PO3	1	Students will be able to develop and design solution to complex problems
	PO4	1	Students apply knowledge for design of experiment
	PO10	1	Students will be able to communicate effectively and explanation on the circuit design
	PO12	1	Students need to listen effectively to pursue life long learning
	PSO1	2	Students will be able to gain knowledge on basic problems and to work in the field of Electronics engineering.
	PSO2	2	Students demonstrate the technical skill in the field of Electronics.
CO3	PO1	2	Students will apply the knowledge of fundamental concepts of engineering problem
	PO2	2	Students will be able analyzing engineering problems.
	PO3	1	Students will be able to develop and design solution to complex problems
	PO4	1	Students apply knowledge for design of experiment
	PO10	1	Students will be able to communicate effectively and explanation on the circuit design
	PO12	1	Students need to listen effectively to pursue life long learning
	PSO1	2	Students will be able to gain knowledge on basic problems and to work in the field of Electronics engineering.
	PSO2	2	Students demonstrate the technical skill in the field of Electronics.
CO4	PO1	2	Students will apply the knowledge of fundamental concepts of engineering problem
	PO2	2	Students will be able analyzing engineering problems.
	PO3	1	Students will be able to develop and design solution to complex problems
	PO4	1	Students apply knowledge for design of experiment

	PO10	1	Students will be able to communicate effectively and explanation on the circuit design
	PO12	1	Students need to listen effectively to pursue life long learning
	PSO1	2	Students will be able to gain knowledge on basic problems and to work in the field of Electronics engineering.
	PSO2	2	Students demonstrate the technical skill in the field of Electronics.
CO5	PO1	2	Students will apply the knowledge of fundamental concepts of engineering problem
	PO2	2	Students will be able analyzing engineering problems.
	PO3	1	Students will be able to develop and design solution to complex problems
	PO4	1	Students apply knowledge for design of experiment
	PO10	1	Students will be able to communicate effectively and explanation on the circuit design
	PO12	1	Students need to listen effectively to pursue life long learning
	PSO1	2	Students will be able to gain knowledge on basic problems and to work in the field of Electronics engineering.
	PSO2	2	Students demonstrate the technical skill in the field of Electronics.

Name and Sign of Subject Teacher

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Department of Electronics & Communication Engineering

Course Name: PEC-IV-MSD - C402-i(P) (VII Sem)

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

CO	Statement
C402.1	Design Concepts of switched capacitor Circuits
C402.2	Apply Mixed signal Design to different Applications
C402.3	Apply the concepts of Oversampling Convertors and Continuous Time-Filters
C402.4	Design and Analysis of Nyquist Rate A/D converters

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C402.1	3	3	3	3	3	1	1	-	1	1	2	2	2	2
C402.2	3	3	3	3	3	1	1	-	1	1	2	2	2	2
C402.3	3	3	3	3	3	1	1	-	1	1	2	2	2	2
C402.4	3	3	3	3	3	1	1	-	1	1	2	2	2	2
Average	**3**	**3**	**3**	**3**	**3**	**1**	**1**	**-**	**1**	**1**	**2**	**2**	**2**	**2**

Name and Sign of Subject Teacher

Dr. Mrs. A. P. Rathkanthiwar
Head (ECE)

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Department of Electronics & Communication Engineering

Course Name: PEC-IV-DSCC - C402-ii (VII Sem)

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

CO	Statement
C402.1	Explain the basic concepts and technologies involved in dealing with Data science process.
C402.2	Apply data management for exploring and fixing data using SPSS software.
C402.3	Demonstrate different types of statistical data analysis using R Programming.
C402.4	Interpret different types of statistical data analysis using Data Visualization.
C402.5	Apply data science techniques to real world problems using Python

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C402.1	2	-	-	-	-	-	-	-	-	-	-	2	3	-
C402.2	-	2	-	-	2	-	-	-	-	-	2	-	-	2
C402.3	2	-	-	2	2	-	-	-	-	-	-	-	-	2
C402.4	2	-	-	-	-	-	-	-	-	2	-	2	-	2
C402.5	2	3	3	-	3	-	-	-	2	-	-	-	-	3
Average	**1.6**	**1**	**0.6**	**0.4**	**1.4**	**-**	**-**	**-**	**0.4**	**0.4**	**0.4**	**0.8**	**0.6**	**1.8**

Name and Sign of Subject Teacher

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Department of Electronics & Communication Engineering

Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels-DSCC

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	2	Moderately mapped as students will apply fundamental knowledge of mathematics, science, and engineering to understand basic concepts and technologies involved in the data science process.
	PO12	2	Moderately mapped as understanding data science concepts supports lifelong learning in the rapidly evolving field of data science.
	PSO1	3	Strongly mapped as students will gain technical knowledge in data science, an emerging technology.
CO2	PO2	2	Moderately mapped as students will analyze and fix data using data management techniques and SPSS software.
	PO5	2	Moderately mapped as students will use modern engineering and IT tools, such as SPSS, to manage and explore data.
	PO11	2	Moderately mapped as data management with SPSS involves understanding engineering and management principles.
	PSO2	2	Moderately mapped as students will apply knowledge of software tools in data management.
CO3	PO1	2	Moderately mapped as students will apply knowledge of engineering and statistical principles to demonstrate different types of data analysis using R programming.
	PO4	2	Moderately mapped as students will conduct investigations of complex problems through statistical data analysis using R.
	PO5	2	Moderately mapped as students will utilize modern engineering tools, specifically R programming, for statistical data analysis.
	PSO2	2	Moderately mapped as students will apply technical skills in software tools for data analysis.
CO4	PO1	2	Moderately mapped as students will apply basic engineering and statistical knowledge to interpret data analysis results through data visualization.
	PO10	2	Moderately mapped as students will communicate effectively by interpreting and presenting statistical data analysis using data visualization techniques.
	PO12	2	Moderately mapped as interpreting data analysis supports lifelong learning in data science.
	PSO2	2	Moderately mapped as students will use software tools for data visualization.

CO5	PO1	2	Moderately mapped as students will apply engineering knowledge to solve real-world problems using data science techniques in Python.
	PO2	3	Strongly mapped as students will identify and analyze complex problems and apply data science techniques to solve them.
	PO3	3	Strongly mapped as students will design and develop solutions for real-world problems using data science techniques.
	PO5	3	Strongly mapped as students will use modern engineering tools, specifically Python, for data science applications.
	PO9	2	Moderately mapped as students will work effectively in teams to apply data science techniques to real-world problems.
	PSO2	3	Strongly mapped as students will demonstrate technical skills and apply knowledge of software tools, specifically Python, in data science applications.

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Department of Electronics & Communication Engineering

Course Name: PEC-IV-DSCC - C402-ii(P) (VII Sem)

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

CO	Statement
C402.1	Implementation of Regression, Sampling and visual representation using Python.
C402.2	Implement K-Means and K- NN algorithm using R Programming.
C402.3	Demonstrate proficiency in statistical parameters and data handling using SPSS.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C402.1	3	3	3	3	2	1	-	-	2	2	1	2	2	2
C402.2	3	3	3	3	2	1	-	-	2	2	1	2	2	2
C402.3	3	3	3	3	2	1	-	-	2	2	1	2	2	2
Average	3	3	3	3	2	1	-	-	2	2	1	2	2	2

Name and Sign of Subject Teacher

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Course Name: PEC-IV-MRE - C402-iii (VII Sem)

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

CO	Statement
C402.1	Identify the different types of active and passive microwave components & devices used in Microwave Test Bench
C402.2	Compare Different Microwave generators and explain it with the help of scattering parameter
C402.3	Explain the use of Different Microwave solid state device and estimate the performance parameters
C402.4	Demonstration of Microwave Power measurement in microwave Test Bench and Analysis of different power measurement techniques
C402.5	Explain and identify different types of radar system and find radar engineering solutions based on a system approach

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C402.1	3	3	2	1	-	-	-	-	-	-	-	1	2	-
C402.2	1	3	1	1	-	-	-	-	-	-	-	1	2	-
C402.3	2	1	1	1	-	-	-	-	-	-	-	1	2	-
C402.4	1	1	1	1	-	-	-	-	-	-	-	1	2	-
C402.5	3	3	1	1	-	-	-	-	-	-	-	1	2	-
Average	**1.8**	**1.6**	**1**	**2**						**-**		**1**	**2**	

Name and Sign of Subject Teacher

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels-MRE

CO	PO/PSO	CL	Explanation /Justification
CO1	PO1	3	Strongly mapped as students will be able to gain the knowledge of Microwave Engineering concept
	PO2	3	Strongly mapped as Analysis and implementation of different Microwave generator in microwave engineering
	PO3	2	Moderately mapped as students able to learn modern IDE in microwave engineering application
	PO4	1	Slightly mapped as implementation of different Microwave generator in microwave engineering for complex problems
	PO12	1	Slightly mapped as students can apply their knowledge to Microwave engineering application .
	PSO1	2	Moderately mapped as students understand fundamental concepts of Microwave Engineering applications in todays emerging technology
CO2	PO1	1	Slightly mapped as students will be able to Microwave generators in microwave engineering
	PO2	3	Strongly mapped as students will be able to analyze different Microwave generator in microwave applications
	PO3	1	Slightly mapped as students learn modern tools to in microwave Engineering
	PO4	1	Slightly mapped as Analysis and implementation of different Microwave generator in microwave engineering for complex problems
	PO12	1	Slightly mapped as students can apply their knowledge to build Microwave applications
	PSO1	2	Moderately mapped as students understand fundamental concepts RADAR system in Microwave area
CO3	PO1	2	Moderately mapped as students gain the knowledge Solid state devices
	PO2	1	Slightly mapped as students will be able to analyze different Solid stare devices in microwave Engineering
	PO3	1	Slightly mapped as students will be able Understand differnt Solid stare devices in microwave Engineering
	PO4	1	Slightly mapped as Analysis of different Solid state devices in microwave engineering for complex problems
	PO5	2	Moderately mapped as students learn modern ools to develop Solid stare devices in microwave Engineering
	PO12	1	Slightly mapped as students can apply their knowledge to build application using Solid stare devices in microwave Engineering

	PSO1	2	Moderately mapped as students understand fundamental concepts MTI RADAR system
CO4	PO1	1	Slightly mapped as students gain the knowledge of Power measurement in Microwave application
	PO2	1	Strongly mapped as students will be able to Power measurement in Microwave application
	PO3	1	Moderately mapped as students learn modern tools to Power measurement in Microwave application
	PO4	1	Slightly mapped as Analysis Power measurement techniques in microwave engineering for complex problems
	PO12	1	Slightly mapped as students can apply their knowledge to Power measurement in Microwave application
	PSO1	2	Moderately mapped as students understand Power measurement in RADAR application
CO5	PO1	3	Strongly mapped as students gain the knowledge Different types of RADAR system in Microwave Engineering
	PO3	3	Strongly mapped as students will be able to undetsand Different types of RADAR system in Microwave Engineering
	PO4	1	Slightly mapped as students learn modern tools to develop Different RADAR system in Microwave Engineering
	PO5	1	Slightly mapped as Analysis RADAR System in microwave engineering for complex problems
	PO12	1	Slightly mapped as students can apply their knowledge to build Different types of RADAR system in Microwave Engineering
	PSO1	2	Moderately mapped as students understand fundamental concepts of Different types of RADAR system in Microwave Engineering.

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Department of Electronics & Communication Engineering

Course Name: PEC-IV-MRE - C402-iii(P) (VII Sem)

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

CO	Statement
C402.1	Identify the different types of active and passive microwave components & devices used in Microwave Test Bench
C402.2	Estimate the performance parameters different Microwave generators and solid-state device
C402.3	Demonstration of Microwave Power measurement in microwave Test Bench and estimate different power measurement parameters

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C402.1	3	3	3	3	1	-	-	-	-	2	1	2	3	1
C402.2	3	3	3	3	1	-	-	-	-	2	1	2	3	1
C402.3	3	3	3	3	1	-	-	-	-	2	1	2	3	1
Average	**3**	**3**	**3**	**3**	**1**	**-**	**-**	**-**	**-**	**2**	**1**	**2**	**3**	**1**

Name and Sign of Subject Teacher

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Department of Electronics & Communication Engineering

Course Name: PEC-IV-PLC & Scada - C402-iv (VII Sem)

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

CO	Statement
C402.1	Illustrate with the concept of programmable logic controllers, PLC architecture, I/O modules of PLC
C402.2	Develop proficiency in programming PLC systems using various programming languages and techniques, and the ability to troubleshoot and debug PLC program effectively.
C402.3	Define SCADA systems, including the development of human machine interface (HMIs)/dashboard for visualization, effective operations and data presentation.
C402.4	Explain the different communication protocols, network architecture, remote monitoring and control.
C402.5	Apply SCADA systems for data acquisition, storage, retrieval, and analysis to optimize process performance and decision making in industrial settings.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C402.1	2	2	1	-	-	-	-	-	-	1	1	2	2	2
C402.2	2	2	1	-	-	-	-	-	-	1	1	2	2	2
C402.3	2	2	1	-	-	-	-	-	-	1	1	2	2	2
C402.4	2	2	1	-	-	-	-	-	-	1	-	2	2	2
C402.5	2	2	1	-	-	-	-	-	-	1	1	2	2	2
Average	**2**	**2**	**1**	-	-	-	-	-	-	**1**	**1**	**2**	**2**	**2**

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels-PLC & SCADA

CO	PO/PSO	CL	Justification
CO1	**PO1**	**2**	Moderately mapped as students Understand the fundamentals of PLCs requires a good grasp of engineering knowledge.
	PO2	**2**	Moderately mapped as students Identifying and explaining PLC architecture involves problem analysis
	PO3	**1**	Slightly as Designing system components with PLCs involves basic design principles
	PO10	**1**	Slightly as Basic communication of PLC concepts. .
	PO11	**1**	Slightly as Basic understanding of project management in context of PLCs.
	PO12	**2**	Moderately mapped as students Lifelong learning in understanding new PLC technologies.
	PSO1	**2**	Moderately mapped as students Proficiency in specific technical skills.
	PSO2	**2**	Moderately mapped as students Application of technical skills in specific contexts.
CO2	**PO1**	**2**	Moderately mapped as students Involves applying engineering knowledge to programming PLCs.
	PO2	**2**	Moderately mapped as students Problem analysis through debugging and troubleshooting.
	PO3	**2**	Moderately mapped as students Basic design of PLC programs.
	PO10	**1**	Slightly as Basic communication skills needed for programming.
	PO11	**1**	Slightly as Project management in the context of PLC programming.
	PO12	**2**	Moderately mapped as students Lifelong learning for improving programming skills.
	PSO1	**2**	Moderately mapped as students Proficiency in programming.
	PSO2	**2**	Moderately mapped as students Application of programming skills in specific projects.
CO3	**PO1**	**2**	Moderately mapped as students Involves understanding SCADA systems which is part of engineering knowledge.
	PO2	**2**	Moderately mapped as students Analyzing SCADA systems involves problem analysis.
	PO3	**1**	Slightly as Basic design of HMIs and dashboards
	PO10	**1**	Slightly as Communication of SCADA system concepts.
	PO11		Slightly as Project management in SCADA system development
	PO12	**2**	Lifelong learning in SCADA technologies.
	PSO1	**2**	Moderately mapped as students Proficiency in SCADA system

			development.
	PSO2	**2**	Moderately mapped as students Application of SCADA systems in specific contexts
CO4	**PO1**	**2**	Moderately mapped as students Engineering knowledge applied to communication protocols.
	PO2	**2**	Moderately mapped as students Problem analysis of network architecture.
	PO3	**2**	Moderately mapped as students Basic design principles of communication protocols.
	PO10	**1**	Slightly as Basic communication skills for explaining protocols.
	PO12	**2**	Moderately mapped as students Project management in communication systems.
	PSO1	**2**	Moderately mapped as students Proficiency in network and communication protocols.
	PSO2	**2**	Moderately mapped as students Application of network skills in specific projects.
CO5	**PO1**	**2**	Moderately mapped as students Involves applying engineering knowledge to SCADA systems.
	PO2	**2**	Moderately mapped as students Problem analysis through data acquisition and analysis.
	PO3	**2**	Moderately mapped as students Basic design of SCADA systems for optimization.
	PO10	**1**	Slightly as Communication skills for data analysis results.
	PO11	**1**	Slightly as Project management in industrial SCADA applications.
	PO12	**2**	Moderately mapped as students Lifelong learning in SCADA and data analysis.
	PSO1	**2**	Moderately mapped as students Proficiency in SCADA system application
	PSO2	**2**	Moderately mapped as students Application of SCADA systems in industrial contexts.

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Course Name: PEC-IV-PLC & Scada - C402-iv (P) (VII Sem)

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

CO	Statement
C402.1	Analyze and interpret industrial automation requirements and select appropriate PLC and SCADA systems for efficient process control and monitoring.
C402.2	Develop proficiency in programming PLC systems using various programming languages and techniques, and the ability to troubleshoot and debug PLC program effectively.
C402.3	Define SCADA systems, including the development of human machine interface (HMIs)/dashboard for visualization, effective operations and data presentation.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C402.1	2	2	1	-	1	-	-	-	1	-	-	2	1	1
C402.2	2	2	1	-	1	-	-	-	1	-	-	2	1	1
C402.3	2	2	1	-	1	-	-	-	1	-	-	2	1	1
Average	2	2	1	-	1	-	-	-	1	-	-	2	1	1

Name and Sign of Subject Teacher

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Course Name: PEC-V-SC - C403-i (VII Sem)

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

CO	Statement
C403.1	Explain the basic concepts of soft-computing methodology and apply the same in particular problem-solving process.
C403.2	Explain Fuzzy logic and reasoning and applying it to handle uncertainty as well as to solve engineering problems.
C403.3	Demonstrate different types of Genetic Algorithms and apply it to combinatorial optimization problems.
C403.4	Explain Adaptive Neural networks and apply it to pattern classification and regression problems.
C403.5	Analyse Neuro-fuzzy inference systems, models and spectrum.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C403.1	1	3	3	3	-	-	-	-	-	-	2	2	2	3
C403.2	2	2	1	2	-	-	-	-	-	-	2	3	2	3
C403.3	1	3	2	3	-	-	-	-	-	-	2	3	1	3
C403.4	1	1	1	2	-	-	-	-	-	-	2	2	2	3
C403.5	2	2	2	1	-	-	-	-	-	-	2	3	2	3
Average	1.4	2.2	1.8	2.2	-	-	-	-	-	-	2	2.6	1.8	3

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Course Name: PEC-V-FML - C403-ii (VII Sem)

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

CO	Statement
C403.1	Describe Machine learning and its types.
C403.2	Discuss Bayesian Decision Theory and Parametric Methods.
C403.3	Illustrate Multivariate and Dimensionality Reduction methods.
C403.4	Categorize non-parametric methods.
C403.5	Justify discrimination techniques used in Machine learning.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C403.1	2	2	1	1	-	-	-	-	-	1	-	2	2	1
C403.2	3	3	2	2	-	-	-	-	-	1	-	2	2	1
C403.3	3	3	2	2	-	-	-	-	-	1	-	2	2	1
C403.4	3	3	2	1	-	-	-	-	-	1	-	2	2	1
C403.5	3	3	2	1	-	-	-	-		1	-	2	2	1
Average	**2.8**	**2.8**	**1.8**	**1.4**	-	-	-	-	-	**1**	-	**2**	**2**	**1**

Name and Sign of Subject Teacher

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Course Name: PEC-V-OC - C403-iii (VII Sem)

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

CO	Statement
C403.1	Define fundamental blocks of optical fiber.
C403.2	Analyze various types of losses and signal degradation factors, explain splices and connectors.
C403.3	Identify various optical source materials and classify optical detectors.
C403.4	Compare performance parameters for Analog and Digital optical Links.
C403.5	Use of WDM, Optical Amplifiers and Networks for real time applications

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C403.1	3	3	2	2	-	1	-	-	-	1	-	2	3	2
C403.2	3	3	3	2	-	1	-	-	-	1	-	2	3	3
C403.3	3	3	3	3	-	1	-	-	-	1	-	2	3	3
C403.4	3	3	3	3	-	1	-	-	-	1	-	2	3	3
C403.5	3	3	2	2	-	1	-	-	-	1	-	2	3	2
Average	**3**	**3**	**2**	**2**	**-**	**1**	**-**	**-**	**-**	**1**	**-**	**2**	**3**	**2.6**

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Course Name: PEC-V-Biomedical Engineering - C403-iv (VII Sem)

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

CO	Statement
C403.1	Analyse the Biomedical Signals.
C403.2	Describe and analyse x-ray, MRI, CT, VR technologies and infra-red imaging.
C403.3	Explain Biomedical sensors & understand the measurements.
C403.4	Describe different medical instruments & their applications.
C403.5	Illustrate hospital information system & relevant training & simulation technologies.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C403.1	2	3	-	1	-	1	-	-	-	1	-	2	1	-
C403.2	3	3	3	3	-	1	-	-	-	1	-	2	1	-
C403.3	2	2	2	2	-	1	-	-	-	1	-	2	1	-
C403.4	3	2	3	3	-	1	-	-	-	1	-	2	1	-
C403.5	2	2	2	2	-	1	-	-	-	1	-	2	1	-
Average	2.4	2.4	2	2.2	-	1	-	-	-	1	-	2	1	-

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Department of Electronics & Communication Engineering

(SEMESTER – VIII)-CBCS
List of VIII Semester Subjects with Subject Code

Course Code as per RTMNU	Course Code	Subject
BEECE-801PE	C406	PEC-VI
BEECE-802PE	C407	PEC-VII

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Course Name: PEC-VI-CMOS VLSI Design - C405-i (VIII Sem)

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

CO	Statement
C405.1	Explain the Fabrication Process of MOS Transistors and its theory.
C405.2	Describe the Logic Design with MOSFETs, Transmission Gate Circuits (TG) and Pass Transistor.
C405.3	Discribe electrical properties of MOS & BICMOS devices.
C405.4	Implement the combinational circuit design using static and dynamic logic.
C405.5	Implement sequential Circuit Design.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C405.1	2	2	2	1	-	-	-	-	-	2	-	3	3	1
C405.2	2	2	2	1	-	-	-	-	-	2	-	3	3	1
C405.3	2	2	2	1	-	-	-	-	-	2	-	3	3	1
C405.4	2	2	2	1	1	-	-	-	-	2	-	3	3	1
C405.5	2	2	2	1	1	-	-	-	-	2	-	3	3	1
Average	**2**	**2**	**2**	**1**	**0.4**	**-**	**-**	**-**	**-**	**2**	**-**	**3**	**3**	**1**

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Course Name: PEC-VI-AI - C405-ii (VIII Sem)

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

CO	Statement
C405.1	Explain the history, development and various applications of artificial intelligence
C405.2	Demonstrate the knowledge representation and reasoning techniques. Propositional Logic, First order Logic
C405.3	Illustrate the Machine Learning techniques, Supervised learning, unsupervised and reinforcement learning
C405.4	Demonstrate artificial Neural networks and deep learning techniques
C405.5	Illustrate various platforms, tools, language framework

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C405.1	3	3	-	-	1	-	1	-	-	-	-	1	1	1
C405.2	3	3	-	-	1	-	1	-	-	-	-	1	1	1
C405.3	3	3	-	1	1	-	1	-	-	-	-	1	1	1
C405.4	3	3	-	1	1	-	1	-	-	-	-	1	1	1
C405.5	3	3	-	1	3	-	1	-	-	-	-	1	1	2
Average	3	3	-	0.6	1	-	1	-	-	-	-	1	1	1.2

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Course Name: PEC-VI-MEMS - C405-iii (VIII Sem)

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

CO	Statement
C405.1	Apply the principles behind the opeartions of MEMS devices.
C405.2	Describe a Micromachine technique for a specific MEMS fabrication process.
C405.3	Explain various techniques of surface Micromachining for MEMS devices.
C405.4	Explain recent advancements in the field of RF MEMS devices.
C405.5	Classify and use of Physical micro sensors.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C405.1	3	3	3	3	-	-	-	-	-	3	-	2	2	3
C405.2	2	2	2	2	-	-	-	-	-	1	-	3	2	3
C405.3	3	3	2	3	-	-	-	-	-	2	-	3	2	3
C405.4	3	3	2	2	-	-	-	-	-	3	-	2	2	3
C405.5	2	2	2	2	-	-	-	-	-	2	-	3	2	3
Average	2.4	2.4	2.2	2.4	-	-	-	-	-	2.2	-	2.6	2	3

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Course Name: PEC-VII-VLSI Signal Processing - C406-i (VIII Sem)

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

CO	Statement
C406.1	Describe Pipelining and parallel processing techniques for high speed and low power.
C406.2	Apply retiming techniques for high speed.
C406.3	Implement unfolding technique for high speed and low power.
C406.4	Use folding transform for register minimization and multirate system
C406.5	Implement convolution using fast convolution algorithms

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C406.1	3	3	2	-	-	-	-	-	-	1	-	2	2	-
C406.2	3	3	2	-	-	-	-	-	-	1	-	2	2	-
C406.3	3	3	2	-	-	-	-	-	-	1	-	2	2	-
C406.4	3	3	2	-	-	-	-	-	-	1	-	2	2	-
C406.5	3	3	2	-	-	-	-	-	-	1	-	2	2	-
Average	**3**	**3**	**2**	-	-	-	-	-	-	**1**	-	**2**	**2**	-

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Curse Name: PEC-VII- Satellite Communication - C406-ii (VIII Sem)

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

CO	Statement
C406.1	Identify orbital aspects and components of a satellite communication system
C406.2	Examine research with capabilities in the analysis of satellite link budget systems
C406.3	Identify different multiple communication systems.
C406.4	Identify the atmospheric effect on satellite communication
C406.5	Analyze various error control codes for communication

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C406.1	2	2	-	-	-	-	1	-	-	-	-	1	3	-
C406.2	3	3	-	-	-	-	-	-	-	-	-	-	3	-
C406.3	2	2	-	-	-	-	-	-	-	-	-	-	3	-
C406.4	1	1	-	-	-	-	1	-	-	-	-	-	1	-
C406.5	3	3	-	-	-	-	-	-	-	-	-	-	3	-
Average	**2.2**	**2.2**	-	-	-	-	**1**	-	-	-	-	**1**	**2.6**	-

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Explanation/ Justification of CO PO PSO Mapping Matrix for Co-relation Levels- SATCOM

CO's	PO/PSO	CL	Explanation/Justification
CO1	PO1	2	Moderately mapped as students will be able to apply the knowledge of mathematics and science in orbital aspects of Satellite Communication.
	PO2	2	Moderately mapped as students can find solution of orbital equation analysis.
	PO7	1	Slightly mapped as student will able to apply the knowledge of basic concepts of orbital mechanism in societal & environmental context
	PO12	1	Slightly mapped as student will able to apply the knowledge of basic concepts in life long learning.
	PSO1	3	Strongly mapped as student will able to possess technical knowledge in the area of Satellite Communication
CO2	PO1	3	Strongly mapped as student will able to solve the satellite link design issues.
	PO2	3	Strongly mapped as student will able to analyze CNR & C/T ratio
	PSO1	3	Strongly mapped as student will able to investigate and solve the engineering problems using technical knowledge of satellite link budget calculations.
CO3	PO1	2	Moderately mapped as student will able to apply the knowledge of multiple access techniques to solve engineering problems.
	PO2	2	Moderately mapped as student will able to find synchronization methods
	PSO1	3	Strongly mapped as student will able to investigate and solve the engineering problems using technical knowledge of different multiple access techniques.
CO4	PO1	1	Slightly mapped as students get the knowledge on analyzing the propagation effect, scintillation effect.
	PO2	1	Slightly mapped as student will able to know the land & sea multipath effects on satellite communication.
	PO7	1	Slightly mapped as student will able to understand the rain & ice effects on satellite communication.
	PSO1	1	Slightly mapped as student will able to know the environmental effects on Satellite Communication.
CO5	PO1	3	Strongly mapped as students get the knowledge of error detection & correction coding in satellite communication.
	PO2	3	Strongly mapped as students calculate error detection, channel capacity for all types of error codes.
	PSO1	3	Strongly mapped as student will able to investigate and solve the error coding problems

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Phone : 07104 – 236381, 237307, Fax : 07104 – 237681,
Department of Electronics & Communication Engineering

Course Name: PEC-VII- Android Mobile Application Development - C406-iii (VIII Sem)

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

CO	Statement
C406.1	Explain Android Complier Android Studio, Eclipse.
C406.2	Apply Android Application Design Essentials
C406.3	Discuss and design Android User Interface Essentials
C406.4	Demonstrate Testing Android applications
C406.5	Design Android Application in various fields

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C406.1	3	-	3	-	2	-	-	-	-	-	-	1	-	2
C406.2	1	3	-	-	2	-	-	-	-	-	-	1	-	2
C406.3	1	3	1	-	2	-	-	-	-	-	-	1	-	2
C406.4	1	-	-	-	2	-	-	-	-	-	-	1	-	2
C406.5	1	-	3	-	2	-	-	-	-	-	-	1	-	2
Average	**1.5**	3	**2.3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2**

Name and Sign of Subject Teacher

Dr. Mrs. A. P. Rathkanthiwar
Head (ECE)

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Course Name: Project -C407-(VIII Sem)

CO	Statement
C407.1	Identify, analyze and design engineering solutions to complex problems utilizing a systems approach
C407.2	Demonstrate the knowledge, skills and attitudes of a professional engineer.
C407.3	Work in a team and communicate with peers.
C407.4	Show correct attitude towards achieving the goals and objectives
C407.5	Address societal issues related to environment, sustainability, ethics and safety.
C407.6	Use modern tools in the field of Electronics and Communication Engineering

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C407.1	3	3	3	3	3	-	2	-	-	1	-	2	3	2
C407.2	3	3	2	3	1	2	-	2	2	3	1	2	1	1
C407.3	-	-	-	-	-	2	2	2	3	1	2	2	3	3
C407.4	1	1	1	1	2	2	1	2	3	3	2	-	2	2
C407.5	1	1	1	1	-	3	3	3	-	1	-	2	3	3
C407.6	3	3	3	3	-	1	-	-	-	1	-	2	3	3
Average	**1.8**	**1.8**	**1.6**	**1.8**	**1**	**1.6**	**1.33**	**1.5**	**1.3**	**1.6**	**0.8**	**1.6**	**2.5**	**2.3**

Name and Sign of Subject Teacher

Dr. Mrs. A. P. Rathkanthiwar
Head (ECE)

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