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NBN SINHGAD TECHNICAL INSTITUTES CAMPUS
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S. No. 10/1, Ambegaon (Budruk), Off Sinhgad Road, Pune 411041
Sinhgad Institutes
•Tel. : +91-20-24355042 / 46, +91-20-24610880/881 • Tele Fax : +91-20-24355042 • Website : www.sinhgad.edu
• Email : nbnssoe@sinhgad.edu / nbnssoms@sinhgad.edu / nbnssocs@sinhgad.edu

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

VISION

उत्तमपुरुषान् उत्तमाभियंतॄन् निर्मातुं कटीबध्दा: वयम् ।

We are committed to produce not only good engineers but good human beings, also.

MISSION

"Holistic development of students and teachers is what we believe in and work for. We strive to achieve this by imbibing a unique value system, transparent work culture, excellent academic and physical environment conducive to learning, creativity and technology transfer. Our mandate is to generate, preserve and share knowledge for developing a vibrant society".

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

PROGRAMME OUTCOMES

The graduates of Electronics and Telecommunication Engineering will be able to:

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

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

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

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

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

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

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

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

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

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

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

: 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.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

PROGRAMME SPECIFIC OUTCOMES

PSO1: Analyze, Design and Development of systems based on Cognitive Technology from concept to completion.

PSO2: Graduate make their mark globally and will apply their knowledge to enrich the entrepreneurship.

PSO3: Graduate will demonstrate professional and personal growth in Electronics & Telecommunication for solving real life problems.

Savitribai Phule Pune University

Faculty of Science and Technology

Syllabus for

S.E (Electronics / Electronics & Telecommunication Engineering)

(Course 2019)

(w.e.f. June 2020)

Savitribai Phule Pune University, Pune
S.E. (Electronics / E&TC Engineering) 2019 Course
(With effect from Academic Year 2020-21)

Semester-III

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit			
		Theory	Practical	Tutorial	In-Sem	End-Sem	TW	PR	OR	Total	TH	PR	TUT	Total
207005	Engineering Mathematics III	04	-	01	30	70	25	-	-	125	04	-	01	05
204181	Electronic Circuits	03	-	-	30	70	-	-	-	100	03	-	-	03
204182	Digital Circuits	03	-	-	30	70	-	-	-	100	03	-	-	03
204183	Electrical Circuits	03	-	-	30	70	-	-	-	100	03	-	-	03
204184	Data structures	03	-	-	30	70	-	-	-	100	03	-	-	03
204185	Electronic Circuit Lab	-	02	-	-	-	-	50	-	50	-	01	-	01
204186	Digital circuits Lab		02					50		50		01		01
204187	Electrical Circuit Lab	-	02	-	-	-	25	-	-	25	-	01	-	01
204188	Data Structures Lab	-	02	-	-	-	-	-	25	25	-	01	-	01
204189	Electronic Skill Development	-	02	-	-	-	25	-	-	25	-	01	-	01
204190	Mandatory Audit Course 3 [&]	-	-	-					-	-	-	-	-	-
Total		**16**	**10**	**01**	**150**	**350**	**75**	**100**	**25**	**700**	**16**	**05**	**01**	**22**

Savitribai Phule Pune University, Pune
S.E. (Electronics / E&TC Engineering) 2019 Course
(With effect from Academic Year 2020-21)

Semester-IV

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit			
		Theory	Practical	Tutorial	In-Sem	End-Sem	TW	PR	OR	Total	TH	PR	TUT	Total
204191	Signals & Systems	03	-	01	30	70	25	-	-	125	03	-	01	04
204192	Control Systems	03	-		30	70		-	-	100	03	-	-	03
204193	Principles of Communication Systems	03	-	-	30	70	-	-	-	100	03	-	-	03
204194	Object Oriented Programming	03	-	-	30	70	-	-	-	100	03	-	-	03
204195	Signals & Control System Lab		02				50			50		01		01
204196	Principle of Communication Systems Lab	-	02	-	-	-	-	50	-	50	-	01	-	01
204197	Object Oriented Programming Lab	-	02	-	-	-	-	-	50	50	-	01	-	01
204198	Data Analytics Lab		02				-		25	25		01		01
204199	Employability Skill Development	02	02	-	-	-	50	-	-	50	02	01	-	03
204200	Project Based Learning [¶]	-	04				50		-	50		02		02
204201	Mandatory Audit Course 4 [&]	-	-	-	-	-	-	-	-	-	-	-	-	-
Total		**14**	**14**	**01**	**120**	**280**	**175**	**50**	**75**	**700**	**14**	**07**	**01**	**22**

Abbreviations:
In-Sem: In semester End-sem: End semester TH : Theory TW : Term Work
PR : Practical OR : Oral TUT : Tutorial

Note: Interested students of S.E. (Electronics/E&TC) can opt any one of the audit course from the list of audit courses prescribed by BoS (Electronics & Telecommunications Engineering)

Savitribai Phule Pune University

Second Year of Electronics / E & Tc Engineering (2019 Course)

207005: Engineering Mathematics - III

Teaching Scheme:	Credit	Examination Scheme:
Theory: 04 hrs. / week	04 + 01 = 05	In-Sem (Theory): 30 Marks
Tutorial: 01 hr. / week		End Sem (Theory): 70 Marks
		Term Work: 25 Marks

Prerequisite Courses, if any: 107001 - Engineering Mathematics - I
107008 - Engineering Mathematics - II

Companion Course, if any: --

Course Objectives:

- To make the students familiarize with concepts and techniques in Ordinary differential equations, Fourier Transform, Z-Transform, Numerical methods, Vector calculus and functions of a Complex variable.
- The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines.

Course Outcomes: On completion of the course, learner will be able to –

CO1: Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control systems.

CO2: Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems.

CO3: Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.

CO4: Perform vector differentiation & integration, analyze the vector fields and apply to electro-magnetic fields & wave theory.

CO5: Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

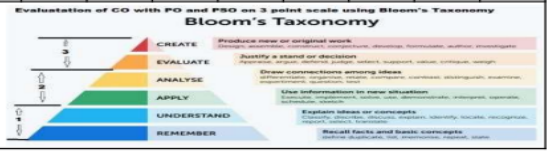
Course Title: Emgineering Mathematics III **SPPU Course Code:** 207005
Designation of Course: Engineering Science
Class: SE E&TC **Semester:** SE E&TC **AY:** 2021-22
Teaching Scheme: Theory 3 Lectures/ week

Assessment Tool	Internal Assessment Tool			External Assessment Tool		
Theory/ Practical	Unit Test	Prelim Exam	Term Work	Insem	Oral	Endsem
Marks	30	70	25	30	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
207005 CO1	2	1	1	1	-	1	-	-	-	-	-	-	-	-	1
207005 CO2	2	1	1	-	1	2	-	-	-	-	-	-	-	-	1
207005 CO3	1	1	1	-	1	2	-	-	-	-	-	-	1	-	-
207005 CO4	1	1	-	1	1	1	-	-	-	-	-	-	-	-	-
207005 CO5	1	2	-	2		2	-	-	-	-	-	-	1	-	1
207005 CO6	-	-	-	-	-	3	-	-	-	-	-	1	-	-	-
207005	**1.40**	**1.20**	**1.00**	**1.33**	**1.00**	**1.83**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**	**0.00**	**1.00**

CO- PO mapping is done with corelation level 1, 2, 3 and —
1 : Slightly (low)
2 : Moderately (Medium)
3 : Substantionally (High)
— : No corelation between CO and PO



Course Co-ordinator

Program Co-ordinator

Director / Principal

Savitribai Phule Pune University Second Year of Electronics / E & Tc Engineering (2019 Course) 204181: Electronic Circuits		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Theory: 03 hrs. / week	**03**	**In-Sem (Theory): 30 Marks** **End Sem (Theory): 70 Marks**

Prerequisite Courses, if any: 104010 - Basic Electronics Engineering

Companion Course, if any: 204185 - Electronic Circuits Laboratory

Course Objectives: To make the students understand

- Semiconductor device MOSFET, its characteristics, parameters & applications.
- Concepts of feedbacks in amplifiers & oscillators.
- Operational amplifier, concept, parameters & applications.
- ADC, DAC as an interface between analog & digital domains.
- Voltage to current and current to voltage converters.
- Concepts, characteristics & applications of PLL.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier.

CO2: Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications.

CO3: Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies.

CO4: Explain internal schematic of Op-Amp and define its performance parameters.

CO5: Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications.

CO6: Understand and compare the principles of various data conversion techniques and PLL with their applications.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Electronic Circuits **SPPU Course Code:** 204181
Designation of Course: Core Subjects
Class: SE E&TC **Semester:** III **AY:** 2021-22
Teaching Scheme-Theory 3 Lectures/ week

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	0	30	50	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
204181 CO1	2	-	1	-	2	1	-	-	-	1	-	-	-	-	1
204181 CO2	2	1	1	-	2	2	-	-	-	1	-	-	-	1	1
204181 CO3	1	-	2	-	-	1	-	-	-	1	-	-	-	-	2
204181 CO4	1	-	1	1	-	-	-	-	-	1	-	-	-	-	-
204181 CO5	2	1	1	1	-	2	-	-	-	1	-	-	-	-	2
204181 CO6	1	-	-	1	-	1	-	-	-	2	-	-	-	-	-
204181	**1.50**	**1.00**	**1.20**	**1.00**	**2.00**	**1.40**	**0.00**	**0.00**	**0.00**	**1.17**	**0.00**	**0.00**	**0.00**	**1.00**	**1.50**

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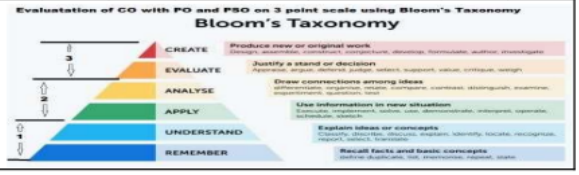

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University Second Year of Electronics / E & Tc Engineering (2019 Course) 204182: Digital Circuits		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Theory: 03 hrs. / week	**03**	**In-Sem (Theory): 30 Marks** **End Sem (Theory): 70 Marks**

Prerequisite Courses, if any: --

Companion Course, if any: 204186 - Digital Circuits Laboratory

Course Objectives: To make the students understand

- The fundamental principles of two-valued logic and various devices used to implement logical operations on variables.
- Boolean algebra, Karnaugh maps and its application to the design and characterization of digital circuits.
- To analyze logic processes and implement logical operations using combinational logic circuits.
- The principles of logic design and use of simple memory devices, flip-flops, and sequential circuits.
- Concepts of sequential circuits and to analyze sequential systems in terms of state machines.
- System design approach using programmable logic devices.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Identify and prevent various hazards and timing problems in a digital design.

CO2: Use the basic logic gates and various reduction techniques of digital logic circuit.

CO3: Analyze, design and implement combinational logic circuits.

CO4: Analyze, design and implement sequential circuits.

CO5: Differentiate between Mealy and Moore machines.

CO6: Analyze digital system design using PLD.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Digital Circuits **SPPU Course Code:** 204182
Designation of Course: Core Subjects
Class: SE E&TC **Semester:** III **AY:** 2021-22
Teaching Scheme-Theory 3 Lectures/ week

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	0	30	50	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
204182 CO1	1	1		-	-	-	-	-	1	1	-	-	-	-	-
204182 CO2	1	1	2	-	-	-	-	-	1	1	-	-	-	-	1
204182 CO3	1	1	2	-	-	-	-	-	1	1	-	-	-	-	1
204182 CO4	1	1	1	-	-	-	-	-	1	1	-	-	-	-	1
204182 CO5	1	2		-	-	-	-	-	1	1	-	-	-	-	-
204182 CO6	1	1	2	1	-	-	-	-	1	1	-	2	-	-	-
204182	**1.00**	**1.17**	**1.75**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**	**0.00**	**2.00**	**0.00**	**0.00**	**1.00**

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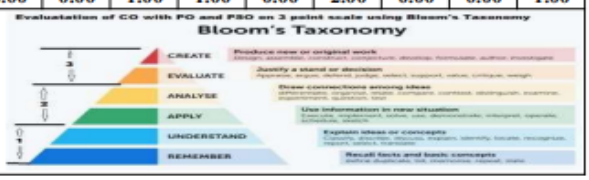

Course Co-ordinator

Program Co-ordinator

Director / Principal

Savitribai Phule Pune University Second Year of Electronics / E & Tc Engineering (2019 Course) 204183: Electrical Circuits		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Theory: 03 hrs. / week	**03**	**In-Sem (Theory): 30 Marks** **End Sem (Theory): 70 Marks**

Prerequisite Courses, if any: 103004 - Basic Electrical Engineering

Companion Course, if any: 204187 - Electrical Circuits Laboratory

Course Objectives:

- To analyze simple DC and AC circuits with circuit simplification techniques.
- To formulate and analyze driven and source free RL and RC circuits.
- To formulate & determine network parameters for given network.
- To understand the constructional details, characteristics, features and application areas of various types of electric motors.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Analyze the simple DC and AC circuit with circuit simplification techniques.

CO2: Formulate and analyze driven and source free RL and RC circuits.

CO3: Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.

CO4: Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors.

CO5: Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.

CO6: Analyze and select a suitable motor for different applications.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Electrical Circuits **SPPU Course Code:** 204183
Designation of Course: Core Subjects
Class: SE E&TC **Semester:** III **AY:** 2021-22
Teaching Scheme-Theory 3 Lectures/ week

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	25	30	0	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
204183 CO1	2	2	2	1	1	2	-	-	1	-	-	-	-	-	-
204183 CO2	2	2	2	1	1	2	-	-	1	-	-	-	-	-	-
204183 CO3	2	2	2	1	1	2	-	-	1	-	-	-	-	-	-
204183 CO4	-	-	-	-	1	-	-	-	1	-	-	-	-	1	1
204183 CO5	-	-	-	-	1	-	-	-	1	-	-	-	-	1	1
204183 CO6	-	1	-	-	1	-	-	-	1	-	-	-	-	1	1
204183	**2.00**	**1.75**	**2.00**	**1.00**	**1.00**	**2.00**	**0.00**	**0.00**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**

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Course Co-ordinator

Program Co-ordinator

Director / Principal

Savitribai Phule Pune University

Second Year of Electronics / E & Tc Engineering (2019 Course)

204184: Data Structures

Teaching Scheme:	Credit	Examination Scheme:
Theory: 03 hrs. / week	03	In-Sem (Theory): 30 Marks End Sem (Theory): 70 Marks

Prerequisite Courses, if any: 110005 - Programming and Problem Solving

Companion Course, if any: 204188 - Data Structures Laboratory

Course Objectives:

To learn basic concepts of C Programming language.

- To learn different sorting and searching algorithms and their analysis.
- To learn linear data structures: Stack and Queue, Linked List and their applications.
- To learn nonlinear data structures: Tree, Graph and their applications.
- To study the systematic ways of solving problem, various methods of organizing large amount of data.
- To solve problems using data structures such as binary tree, binary search tree, and graph and writing programs.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Solve mathematical problems using C programming language.

CO2: Implement sorting and searching algorithms and calculate their complexity.

CO3: Develop applications of stack and queue using array.

CO4: Demonstrate applicability of Linked List.

CO5: Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity.

CO6: Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Data Sturctures **SPPU Course Code: 204184**

Designation of Course: Core Subjects

Class: SE E&TC **Semester: III** **AY: 2021-22**

Teaching Scheme-Theory 3 Lectures/ week

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	0	30	0	25	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
204184 CO1	-	2	-	-	-	-	-	-	-	2	-	2	1	-	-
204184 CO2	2	2	-	-	-	-	-	-	-	-	-	-	1	-	-
204184 CO3	-		2	-	-	-	-	-	-	-	-	-	1	-	-
204184 CO4	-	2	-	-	-	-	-	-	-	-	-	-	1	-	-
204184 CO5	2	-	2	-	-	-	-	-	-	-	-	-	1	-	-
204184 CO6	-	-	2	-	1	1	-	-	-	-	-	-	1	-	-
204184	**2.00**	**2.00**	**2.00**	**0.00**	**1.00**	**1.00**	**0.00**	**0.00**	**0.00**	**2.00**	**0.00**	**2.00**	**1.00**	**0.00**	**0.00**

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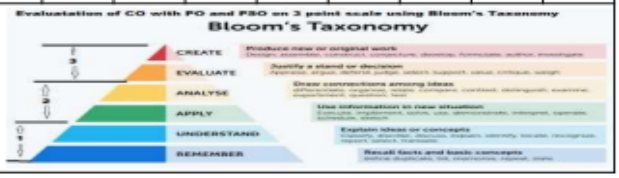
1 : Slightly (low)

2 : Moderately (Medium)

3 : Substantionally (High)

— : No corelation between CO and PO



Course Co-ordinator

Program Co-ordinator

Director / Principal

Savitribai Phule Pune University

Second Year of Electronics / E & Tc Engineering (2019 Course)

204191: Signals & Systems

Teaching Scheme:	Credit	Examination Scheme:
Theory: 03 hrs. / week	03 + 01 = 04	In-Sem (Theory): 30 Marks
Tutorial: 01 hr. / week		End Sem (Theory): 70 Marks
		Term Work: 25 Marks

Prerequisite Courses, if any: --

Companion Course, if any: 204195 - Signal & Control Systems Lab

Course Objectives:

- To understand the mathematical representation of continuous and discrete time signals and systems.
- To classify signals and systems into different categories.
- To analyze Linear Time Invariant (LTI) systems in time and transform domains.
- To build basics for understanding of courses such as signal processing, control system and communication.
- To develop basis of probability and random variables.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Identify, classify basic signals and perform operations on signals.

CO2: Identify, Classify the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between to signals.

CO3: Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform.

CO4: Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms.

CO5: Define and Describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF.

CO6: Compute the mean, mean square, variance and standard deviation for given random variables using PDF.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Signal and Systems **SPPU Course Code:** 204191

Designation of Course: Core Subjects

Class: SE E&TC **Semester:** IV **AY:** 2021-22

Teaching Scheme-Theory 3 Lectures/ week

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	25	30	0	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
204191 CO1	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-
204191 CO2	2	2		1	-	-	-	-	-	-	-	-	1	-	-
204191 CO3	2	1	1	-	1	-	-	-	-	-	-	-	1	-	1
204191 CO4	2	1	1	-	-	-	-	-	-	1	-	1	1	-	-
204191 CO5	1	1	1	1	-	-	-	-	-	1	-	1	-	-	-
204191 CO6	1	1	1	-	-	-	-	-	-	1	-	2	1	-	-
204191	**1.67**	**1.17**	**1.00**	**1.00**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**0.00**	**1.33**	**1.00**	**0.00**	**1.00**

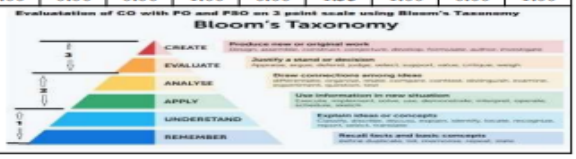
CO- PO mapping is done with corelation level 1, 2, 3 and —

1 : Slightly (low)

2 : Moderately (Medium)

3 : Substantionally (High)

— : No corelation between CO and PO



Course Co-ordinator

Program Co-ordinator

Director / Principal

Savitribai Phule Pune University Second Year of Electronics / E & Tc Engineering (2019 Course) 204192: Control Systems		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Theory: 03 hrs. / week	**03**	**In-Sem (Theory): 30 Marks** **End Sem (Theory): 70 Marks**

Prerequisite Courses, if any: —

Companion Course, if any: 204195 - Signal & Control Systems Lab

Course Objectives:

- To Introduce elements of control system and their modeling using various Techniques.
- To get acquainted with the methods for analyzing the time response and Stability of System
- To Introduce and analyze the frequency response and Stability of System
- To Introduce concept of root locus, Bode plots, Nyquist plots.
- To Introduce State Variable Analysis method.
- To get acquainted with Concepts of PID controllers and IoT based Industrial Automation.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.

CO2: Determine the (absolute) stability of a closed-loop control system.

CO3: Perform time domain analysis of control systems required for stability analysis.

CO4: Perform frequency domain analysis of control systems required for stability analysis.

CO5: Apply root-locus, Frequency Plots technique to analyze control systems.

CO6: Express and solve system equations in state variable form.

CO7: Differentiate between various digital controllers and understand the role of the controllers in Industrial automation.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Control Systems **SPPU Course Code:** 204192
Designation of Course: Core Subjects
Class: SE E&TC **Semester:** IV **AY:** 2021-22
Teaching Scheme-Theory 3 Lectures/ week

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	50	30	0	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
204192 CO1	2	1	1	-	-	-	-	-	-	-	-	-	-	-	-
204192 CO2	2	1	2	1	1	-	-	-	-	-	-	-	-	-	1
204192 CO3	2	1	-	1	1	-	-	-	-	2	-	-	-	-	-
204192 CO4	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-
204192 CO5	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-
204192 CO6	1	2	2	1	-	-	1	-	-	1	-	2	-	-	2
204192	**1.67**	**1.17**	**1.40**	**1.00**	**1.00**	**0.00**	**1.00**	**0.00**	**0.00**	**1.50**	**0.00**	**2.00**	**0.00**	**0.00**	**1.50**

CO- PO mapping is done with corelation level 1, 2, 3 and —
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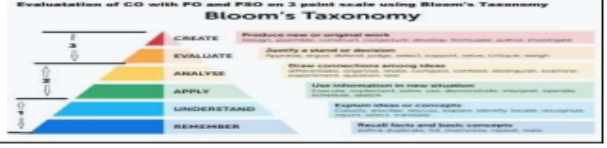
— : No corelation between CO and PO



Course Co-ordinator

Program Co-ordinator

Director / Principal

Savitribai Phule Pune University

Second Year of Electronics / E & Tc Engineering (2019 Course)

204193: Principles of Communication Systems

Teaching Scheme:	Credit	Examination Scheme:
Theory: 03 hrs. / week	03	In-Sem (Theory): 30 Marks End Sem (Theory): 70 Marks

Prerequisite Courses, if any: --

Companion Course, if any: 204191 - Signals & Systems
204196 - Principles of Communication Systems Lab

Course Objectives:

- To equip/ familiarize students with basic mathematical tools for time and frequency domain analysis of communication signal and systems.
- To acquaint the students with the fundamental principles of modulation process and different amplitude and angle modulation systems.
- To introduce the students with the concept of Sampling theorem and pulse modulation techniques PAM, PWM, PPM.
- To impart pre-requisites of digital communication systems and explore digital representation techniques like PCM, DPCM, DM and ADM.
- To highlight the issues in baseband digital transmission such as data representation, synchronization, multiplexing and ISI.

Course Outcomes: On completion of the course, learner will be able to -

CO1: To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study.

CO2: Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.

CO3: Explain generation and detection of FM systems and compare with AM systems.

CO4: Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).

CO5: Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).

CO6: Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Principles of Communication Systems **SPPU Course Code:** 204193
Designation of Course: Core Subjects
Class: SE E&TC **Semester:** IV **AY:** 2021-22
Teaching Scheme-Theory 3 Lectures/ week

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	0	30	50	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
204193 CO1	2	1	1	-	-	-	-	-	-	2	-	1	-	-	-
204193 CO2	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
204193 CO3	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-
204193 CO4	1	1	2	-	-	-	-	-	-	-	-	-	1	-	1
204193 CO5	-	1	1	1	-	-	-	-	-	-	-	-	-	-	-
204193 CO6	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
204193	**1.20**	**1.17**	**1.17**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.00**	**0.00**	**1.00**	**1.00**	**0.00**	**1.00**

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— : No corelation between CO and PO

Course Co-ordinator

Program Co-ordinator

Director / Principal

Savitribai Phule Pune University Second Year of Electronics / E & Tc Engineering (2019 Course) 204194: Object Oriented Programming		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Theory: 03 hrs. / week	**03**	**In-Sem (Theory): 30 Marks** **End Sem (Theory): 70 Marks**
Prerequisite Courses, if any: --		
Companion Course, if any: 204197 - Object Oriented Programming Lab		

Course Objectives:

- Make the students familiar with basic concepts and techniques of object oriented programming in C++ To acquaint the students with the fundamental principles of modulation process and different amplitude and angle modulation systems.
- Develop an ability to write programs in C++ for problem solving.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Describe the principles of object oriented programming.

CO2: Apply the concepts of data encapsulation, inheritance in C++.

CO3: Understand Operator overloading and friend functions in C++.

CO4: Apply the concepts of classes, methods inheritance and polymorphism to write programs C++.

CO5: Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.

CO6: Describe and use of File handling in C++.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Object Oriented Programming **SPPU Course Code:** 204194
Designation of Course: Core Subjects
Class: SE E&TC **Semester:** IV **AY:** 2021-22
Teaching Scheme-Theory 3 Lectures/ week

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	0	30	0	50	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
204194 CO1	2	1	1	-	1	-	-	-	-	2	-	2	1	-	-
204194 CO2	1	1	1	-	-	-	-	-	-	-	-	-	1	-	-
204194 CO3	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-
204194 CO4	-	1	1	1	1	-	-	-	-	-	-	-	2	-	-
204194 CO5	1	1	1	1	1	-	-	-	-	2	-	2	1	-	-
204194 CO6	-	1	1	1	2	-	-	-	-	1	-	-	1	-	-
204194	**1.25**	**1.00**	**1.00**	**1.00**	**1.20**	**0.00**	**0.00**	**0.00**	**0.00**	**1.67**	**0.00**	**2.00**	**1.20**	**0.00**	**0.00**

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3 : Substantionally (High)
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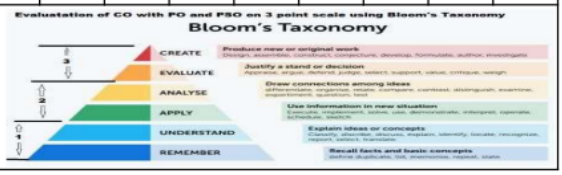

Course Co-ordinator Program Co-ordinator Director / Principal

Savitribai Phule Pune University Second Year of Electronics / E & Tc Engineering (2019 Course) 204199: Employbility Skills Development		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Theory: 02 hrs. / week **Practical: 02 hrs. / week**	**02 + 01 = 03**	**Term work: 50 Marks**
Prerequisite Courses, if any: --		
Companion Course, if any: --		

Course Objectives:

- Develop good communication skills – both oral as well as written.
- Encourage creative and critical thinking among students.
- Nurture collaborative behavior to work efficiently in groups.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Define personal and career goals using introspective skills and SWOC assessment. Outline and evaluate short-term and long-term goals.

CO2: Develop effective communication skills (listening, reading, writing, and speaking), self- management attributes, problem solving abilities and team working & building capabilities in order to fetch employment opportunities and further succeed in the workplace.

CO3: Be a part of a multi-cultural professional environment and work effectively by enhancing inter-personal relationships, conflict management and leadership skills.

CO4: Comprehend the importance of professional ethics, etiquettes & morals and demonstrate sensitivity towards it throughout certified career.

CO5: Develop practically deployable skill set involving critical thinking, effective presentations and leadership qualities to hone the opportunities of employability and excel in the professional environment.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Employbility Skills Development **SPPU Course Code:** 204199
Designation of Course: Humanities and Social Science
Class: SE E&TC **Semester:** IV **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	0	0	50	0	0	0	0

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
204199 CO1	-	-	-	-	-	1	-	-	1	1	-	1	-	1	1
204199 CO2	-	-	-	-	-	1	-	-	2	2	1	1	-	-	1
204199 CO3	-	-	-	-	-	-	-	2	2	-	2	1	-	1	-
204199 CO4	-	-	-	-	-	-	-	-	2	1	-	-	-	1	-
204199 CO5	-	-	-	-	-	-	-	-	2	1	1	1	-	-	-
204199 CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
204199	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**0.00**	**2.00**	**1.80**	**1.25**	**1.33**	**1.00**	**0.00**	**1.00**	**1.00**

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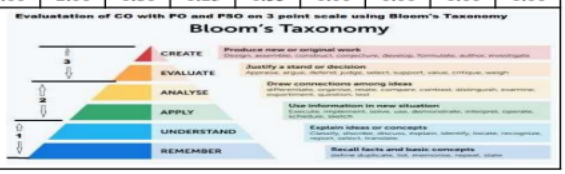

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University

Faculty of Science and Technology

Syllabus for

T.E (Electronics & Telecommunication Engineering)

(Course 2019)

(w.e.f. June 2021)

Savitribai Phule Pune University, Pune
T.E. (Electronics& Telecommunication Engineering) 2019 Course
(With effect from Academic Year 2021-22)

Semester-V

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit			
		Theory	Practical	Tutorial	In-Sem	End-Sem	TW	PR	OR	Total	TH	PR	TUT	Total
304181	Digital Communication	03	-	-	30	70	-	-	-	100	03	-	-	03
304182	Electromagnetic Field Theory	03	-	01	30	70	25	-	-	125	03	-	01	04
304183	Database Management	03	-	-	30	70	-	-	-	100	03	-	-	03
304184	Microcontrollers	03	-	-	30	70	-	-	-	100	03	-	-	03
304185	Elective - I	03	-	-	30	70	-	-	-	100	03	-	-	03
304186	Digital Communication Lab	-	02	-	-	-	-	50	-	50	-	01	-	01
304187	Database Management Lab	-	02	-	-	-	-	-	25	25	-	01	-	01
304188	Microcontroller Lab	-	02	-	-	-	-	50	-	50	-	01	-	01
304189	Elective I Lab	-	02	-	-	-	-	25	-	25	-	01	-	01
304190	Skill Development	-	02	-	-	-	25	-	-	25	-	01	-	01
304191A	Mandatory Audit Course 5 &	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	**15**	**10**	**01**	**150**	**350**	**50**	**125**	**25**	**700**	**-**		-	-
										Total Credit	**15**	**05**	**01**	**21**

Elective -I

1) Digital Signal Processing
2) Electronic Measurements
3) Fundamentals of JAVA Programming
4) Computer Networks

Savitribai Phule Pune University, Pune
T.E. (Electronics& Telecommunication Engineering) 2019 Course
(With effect from Academic Year 2021-22)

Semester-VI

Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks						Credit			
		Theory	Practical	Tutorial	In-Sem	End-Sem	TW	PR	OR	Total	TH	PR	TUT	Total
304192	Cellular Networks	03	-	-	30	70	-	-	-	100	03	-	-	03
304193	Project Management	03	-	-	30	70	-	-	-	100	03	-	-	03
304194	Power Devices & Circuits	03	-	-	30	70	-	-	-	100	03	-	-	03
304195	Elective-II	03	-	-	30	70	-	-	-	100	03	-	-	03
304196	Cellular Networks Lab	-	02	-	-	-	-	-	50	50	-	01	-	01
304197	Power Devices & Circuits Lab	-	02	-	-	-	-	50	-	50		01		01
304198	Elective-II Lab	-	02	-	-	-	-	25	-	25	-	01	-	01
304199	Internship**	-	-	-	-	-	100	-	-	100	-	-	04	04
304200	Mini Project	-	04	-	-	-	25	-	50	75	-	02	-	02
304191 B	Mandatory Audit Course 6 &	-	-	-	-	-	-	-	-	-	-	-	-	-
	Total	**12**	**10**	**00**	**120**	**280**	**125**	**75**	**100**	**700**				
										Total Credit	**12**	**05**	**04**	**21**

Abbreviations:

In-Sem: In semester — End-Sem: End semester — TH: Theory — TW : Term Work

PR: Practical — OR: Oral — TUT: Tutorial

Note: Students of T.E. (Electronics & Telecommunications) have to opt any one of the audit course from the list of audit courses prescribed by BoS (Electronics & Telecommunications Engineering)

Elective -II

1) Digital Image Processing
2) Sensors in Automation
3) Advanced JAVA Programming
4) Embedded Processors
5) Network Security

Savitribai Phule Pune University
Third Year of E & Tc Engineering (2019 Course)
304181: Digital Communication

Teaching Scheme:	Credit	Examination Scheme:
Theory: 03 hrs. / week	03	In-Sem (Theory): 30 Marks End Sem (Theory): 70 Marks

Prerequisite Courses, if any:
1. Principles of Communication Systems
2. Signals & Systems
3. Control Systems
4. Digital Circuits
5. Electronic Circuits.

Companion Course, if any: Digital Communication Lab

Course Objectives: To make the students understand
- To familiarize students with various digital modulation techniques used in digital communication systems.
- To equip students the students with tools required for performance analysis of digital communication systems.
- To introduce the students with the concept of information theory & coding techniques.

Course Outcomes: On completion of the course, learner will be able to –

CO1: Apply the statistical theory for describing various signals in a communication system.

CO2: Understand and explain various digital modulation techniques used in digital communication systems and analyze their performance in presence of AWGN noise.

CO3: Describe and analyze the digital communication system with spread spectrum modulation.

CO4: Analyze a communication system using information theoretic approach.

CO5: Use error control coding techniques to improve performance of a digital communication system.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Digital Communication **SPPU Course Code:** 304181
Designation of Course: Core Subjects
Class: TE E&TC **Semester:** V **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory	Unit Test	Assignment / Tuto	Prelim Exam	Online / Insem		Endsem	
Practical / Tutorial	TW			TW	OR	PR	

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
304181 CO1	3	2	1	-	1	1	-	1	2	1	-	1	1	-	-
304181 CO2	3	2	-	-	1	1	-	1	2	1	1	1	1	-	1
304181 CO3	3	1	-	-	1	-	-	1	2	1	1	1	1	-	-
304181 CO4	3	2	-	-	1	1	-	1	2	1	1	1	1	-	1
304181 CO5	3	1	-	-	-	-	-	1	-	-	-	1	-	-	-
304181 CO6	3	-	-	-	1	-	-	1	2	1	-	1	-	-	-
304181	**3.00**	**1.60**	**1.00**	**0.00**	**1.00**	**1.00**	**0.00**	**1.00**	**2.00**	**1.00**	**1.00**	**1.00**	**1.00**	**0.00**	**1.00**

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3 : Substantionally (High)
— : No corelation between CO and PO

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University

Third Year of E & Tc Engineering (2019 Course)

304182: Electromagnetic Field Theory

Teaching Scheme:	Credit	Examination Scheme:
Theory: 03 hrs. / week Tutorial: 01 hr. / week	03 + 01 = 04	In-Sem (Theory): 30 Marks End Sem (Theory): 70 Marks Term Work: 25 Marks

Prerequisite Courses, if any:

1. Vectors, Vector Calculus
2. Coordinate Geometry, Cartesian, Cylindrical, Spherical
3. Engineering Mathematics III

Companion Course, if any: Electromagnetic Field Theory Tutorials

Course Objectives:

- Provide the foundation and rudiments of Electromagnetic theory essential to subsequent courses of radiation, microwave and wireless communications.
- Expose the students to basic laws of electro statics, magneto statics leading to the Maxwell Equations for static and dynamic fields.
- Extend these laws to Uniform Plane waves, transmission line theory and some of the case studies of applications of engineering electromagnetic field theory.
- The main focus will be on the physical interpretation of all the mathematical formulations and extend these concepts to real time applications in the field Electronics and Telecommunication Engineering.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Apply the basic electromagnetic principles and determine the fields (E & H) due to the given source.

CO2: Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either sides.

CO3: State, Identify and Apply Maxwell's equations (integral and differential forms) in both the forms (Static, time-varying or Time-harmonic field) for various sources, Calculate the time average power density using Poynting Theorem, Retarded magnetic vector potential.

CO4: Formulate, Interpret and solve simple uniform plane wave (Helmholtz Equations) equations, and analyze the incident/reflected/transmitted waves at normal incidence.

CO5: Interpret and Apply the transmission line equation to transmission line problems with load impedance to determine input and output voltage/current at any point on the Transmission line, Find input/load impedance, input/load admittance, reflection coefficient, SWR, Vmax/Vmin, length of transmission line using Smith Chart.

CO6: Carry out a detailed study, interpret the relevance and applications of Electromagnetics.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Electromagnetic Field Theory **SPPU Course Code:** 304182

Designation of Course: Core Subjects

Class: TE E&TC **Semester:** V **AY:** 2021-22

Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	25	30	0	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
304182 CO1	3	1	-	1	-	-	-	-	-	-	-	2	-	-	-
304182 CO2	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
304182 CO3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
304182 CO4	2	2	2	-	-	-	-	-	-	-	-	2	-	-	-
304182 CO5	2	-	1	-	-	-	-	-	-	-	-	2	-	-	-
304182 CO6	2	-	2	-	1	-	-	-	-	-	-	2	-	-	2
304182	**2.17**	**1.50**	**1.80**	**1.00**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**2.00**	**0.00**	**0.00**	**2.00**

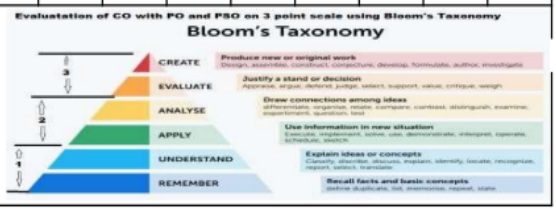
CO- PO mapping is done with corelation level 1, 2, 3 and —

1 : Slightly (low)

2 : Moderately (Medium)

3 : Substantionally (High)

— : No corelation between CO and PO



Course Co-ordinator

Program Co-ordinator

Director / Principal

Savitribai Phule Pune University Third Year of E & Tc Engineering (2019 Course) 304183: Database Management		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Theory: 03 hrs. / week	**03**	**In-Sem (Theory): 30 Marks** **End Sem (Theory): 70 Marks**

Prerequisite Courses, if any:
1. Data Structures

Companion Course, if any: Database Management Lab

Course Objectives:
- To understand fundamental concepts of database from its design to its implementation.
- To analyze database requirements and determine the entities involved in the system and with one another.
- To manipulate database using SQL Query to create, update and manage Database.
- Be familiar with the basic issues of transaction processing and concurrency control.
- To learn and understand Parallel Databases and its Architectures.
- To learn and understand Distributed Databases and its applications.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Ability to implement the underlying concepts of a database system.
CO2: Design and implement a database schema for a given problem-domain using data model.
CO3: Formulate, using SQL/DML/DDL commands, solutions to a wide range of query and update problems.
CO4: Implement transactions, concurrency control, and be able to do Database recovery.
CO5: Able to understand various Parallel Database Architectures and its applications.
CO6: Able to understand various Distributed Databases and its applications.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Database Management **SPPU Course Code:** 304183
Designation of Course: Core Subjects
Class: TE E&TC **Semester:** V **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	0	30	0	25	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
304183 CO1	1	2	-	-	1	-	-	-	-	-	2	1	-	-	-
304183 CO2	2	-	2	1	-	-	-	-	-	1	-	-	2	-	-
304183 CO3	2	2	2	-	1	1	-	-	-	-	-	-	-	-	-
304183 CO4	1	2	-	-	1	-	-	-	-	-	-	-	1	-	-
304183 CO5	2	-	-	-	-	-	1	-	-	-	2	-	-	-	-
304183 CO6	-	1	-	-	1	-	-	-	-	-	2	-	-	-	-
304183	**1.60**	**1.75**	**2.00**	**1.00**	**1.00**	**1.00**	**1.00**	**0.00**	**0.00**	**1.00**	**2.00**	**1.00**	**1.50**	**0.00**	**0.00**

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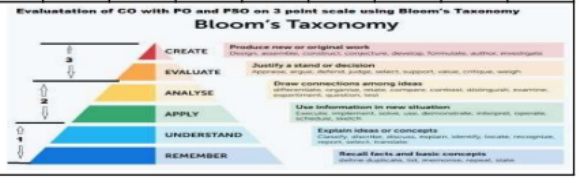

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University Third Year of E & Tc Engineering (2019 Course) 304184: Microcontroller		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Theory: 03 hrs. / week	**03**	**In-Sem (Theory): 30 Marks** **End Sem (Theory): 70 Marks**

Prerequisite Courses, if any:

1. Digital Logic Design
2. Electronic Components and Hardware
3. Basics of C Language.

Companion Course, if any: Microcontroller Lab

Course Objectives: During the course study students will be able to

- Understand architecture and features of 8051 and PIC18FXX Microcontroller.
- Learn interfacing of real-world peripheral devices with microcontroller.
- Explore different features of PIC 18F Microcontroller with Architecture.
- Use concepts of timers and interrupts of PIC 18 in programming.
- Design and develop microcontroller based embedded application.
- Demonstrate real life applications using PIC 18.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Understand the fundamentals of microcontroller and programming.
CO2: Interface various electronic components with microcontrollers.
CO3: Analyze the features of PIC 18F XXXX.
CO4: Describe the programming details in peripheral support.
CO5: Develop interfacing models according to applications.
CO6: Evaluate the serial communication details and interfaces.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Microcontrollers **SPPU Course Code: 304184**
Designation of Course: Core Subjects
Class: TE E&TC **Semester: V** **AY: 2021-22**
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	0	30	50	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
304184 CO1	2	-	-	-	-	-	-	-	-	2	-	1	-	-	1
304184 CO2	2	-	2	-	2	1	1	1	2	2	2	1	-	1	-
304184 CO3	2	-	-	-	-	-	-	-	-	2	-	1	-	-	-
304184 CO4	2	-	-	-	2	-	1	1	2	2	-	1	-	-	-
304184 CO5	2	-	2	-	2	2	1	1	2	2	2	1	-	-	-
304184 CO6	2	-	1	-	2	2	1	1	2	2	2	1	1	-	-
304184	**2.00**	**0.00**	**1.67**	**0.00**	**2.00**	**1.67**	**1.00**	**1.00**	**2.00**	**2.00**	**2.00**	**1.00**	**1.00**	**1.00**	**1.00**

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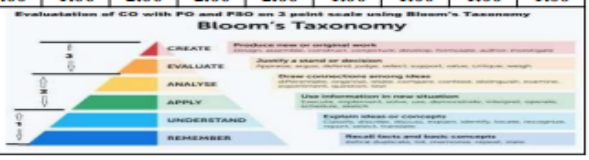

Course Co-ordinator

Program Co-ordinator

Director / Principal

Savitribai Phule Pune University Third Year of E & Tc Engineering (2019 Course) 304185 (C): Fundamentals of JAVA Programming (Elective - I)		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Theory: 03 hrs. / week	**03**	**In-Sem (Theory): 30 Marks** **End Sem (Theory): 70 Marks**

Prerequisite Courses, if any:

1. Data Structures
2. Object Oriented Programming concept

Companion Course, if any: Fundamentals of JAVA Programming Lab

Course Objectives:

- Make the students familiar with basic concepts and techniques of object oriented programming in Java.
- Develop an ability to write various programs in Java for problem solving.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Understand the basic principles of Java programming language

CO2: Apply the concepts of classes and objects to write programs in Java

CO3: Demonstrate the concepts of methods & Inheritance

CO4: Use the concepts of interfaces & packages for program implementation

CO5: Understand multithreading and Exception handling in Java to develop robust programs

CO6: Use Graphics class, AWT packages and manage input and output files in Java

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Course Articulation Matrix

Course Title: Elective - I - Fundamentals of JAVA Programming **SPPU Course Code: 304185 C**

Designation of Course: Elective Subjects

Class: TE E&TC **Semester: V** **AY: 2021-22**

Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	0	30	25	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
304185 C CO1	2	-	1	1	2	-	-	1	1	1	-	2	-	1	1
304185 C CO2	2	-	1	1	2	-	-	2	1	1	-	2	-	2	1
304185 C CO3	1	-	2	2	1	-	-	1	1	1	-	1	-	1	2
304185 C CO4	1	-	2	1	1	-	-	1	2	1	-	1	-	1	2
304185 C CO5	1	-	1	1	2	-	-	1	1	1	-	1	-	1	2
304185 C CO6	1	-	1	2	2	-	-	2	1	1	-	2	-	2	2
304185 C	**1.33**	**0.00**	**1.33**	**1.33**	**1.67**	**0.00**	**0.00**	**1.33**	**1.17**	**1.00**	**0.00**	**1.50**	**0.00**	**1.33**	**1.67**

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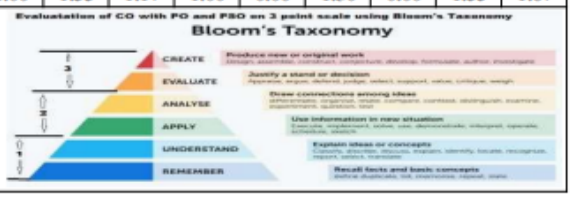

Course Co-ordinator

Program Co-ordinator

Director / Principal

Savitribai Phule Pune University Third Year of E & Tc Engineering (2019 Course) 304190: Skill Development		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Practical: 02 hrs. / week	**01**	**Term work: 25 Marks**

Prerequisite Courses, if any:

1. Basics of Electronics Components
2. Working of Operational amplifier
3. Basics of Electronics measurement instruments and Tools

Companion Course, if any: --

Course Objectives:

- To build and upgrade practical knowledge ofan individual.
- To make students Employable with required skill set.
- To promote youth work to assist "Make in India" initiative.
- To grow and build confidence among students on specific skill sets.
- To cultivate Entrepreneur mindset after getting required experience.
- To improve professional skills such as moral/ethics/team work/communication skill/lifelong learning etc.

Course Outcome: After Successfully completing the course,

CO1: Student should recognize the need to engage in independent and life-long learning in required skill sets
CO2: Student needs to experience the impact of industries on society by visiting different industries and understand the importance of industrial products for analog and digital circuits and systems.
CO3: Student has to make use of the modern electronic and IT Engineering Tools and Technologies for solving electronic engineering problems.
CO4: Student would be able to communicate effectively at different technical and administrative levels.
CO5: Student will exhibit leadership skills both as an individual and as a member in a team in multidisciplinary environment.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Skill Development **SPPU Course Code:** 304190
Designation of Course: Core Subjects
Class: TE E&TC **Semester:** V **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	0	0	25	0	0	0	0

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
304190 CO1	-	-	-	-	-	1	-	-	1	1	-	1	-	1	1
304190 CO2	-	-	-	-	-	1	-	2	2	2	1	1	-	-	1
304190 CO3	-	-	-	-	-	-	-	-	2	-	2	1	-	1	-
304190 CO4	-	-	-	-	-	-	-	-	2	1	-	-	-	1	-
304190 CO5	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
304190 CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
304190	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**0.00**	**2.00**	**1.75**	**1.33**	**1.33**	**1.00**	**0.00**	**1.00**	**1.00**

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Course Co-ordinator

Program Co-ordinator

Director / Principal

Savitribai Phule Pune University Third Year of E & Tc Engineering (2019 Course) 304192: Cellular Networks		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Theory: 03 hrs. / week	**03**	**In-Sem (Theory): 30 Marks** **End Sem (Theory): 70 Marks**

Prerequisite Courses, if any:
1. Basic knowledge of - Probability, Random variables and Modulation.

Companion Course, if any: Cellular Networks Lab

Course Objectives: To make the students understand

- Various propagation Model and Estimation techniques of wireless communication system.
- OFDM and MIMO technologies to explain modern wireless systems.
- Various aspects of mobile communication system.
- Various aspects of wireless-system planning.
- Different Generation of Mobile Networks.
- Diversified issues that can enhance Network Performance.

Course Outcomes: On completion of the course, learner will be able to -

CO1: Understand fundamentals of wireless communications.
CO2: Discuss and study OFDM and MIMO concepts.
CO3: Elaborate fundamentals mobile communication.
CO4: Describes aspects of wireless system planning.
CO5: Understand of modern and futuristic wireless networks architecture.
CO6: Summarize different issues in performance analysis.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Cellular Networks **SPPU Course Code:** 304192
Designation of Course: Core Subjects
Class: TE E&TC **Semester:** VI **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	0	30	0	50	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
304192 CO1	2	-	-	-	2	2	1	1	1	1	2	2	2	2	1
304192 CO2	2	-	-	-	2	2	2	1	1	1		2	1		1
304192 CO3	2	-	-	-	2	2	2	1	1	1	2	3	2	1	1
304192 CO4	2	-	-	-	1	2	2	-	1	1	-	1	1	-	-
304192 CO5	2	-	-	-	2	2	2	2	1	1	2	2	2	1	1
304192 CO6	1	-	-	-	2	1	2	2	1	2	1	2	1	-	2
304192	**1.83**	**0.00**	**0.00**	**0.00**	**1.83**	**1.83**	**1.83**	**1.40**	**1.00**	**1.17**	**1.75**	**2.00**	**1.50**	**1.33**	**1.20**

CO- PO mapping is done with corelation level 1, 2, 3 and —
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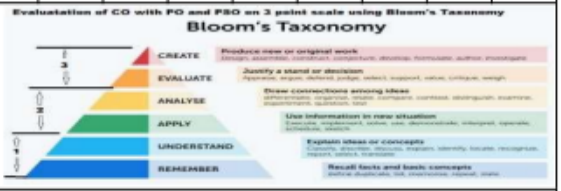

Course Co-ordinator Program Co-ordinator Director / Principal

Savitribai Phule Pune University Third Year of E & Tc Engineering (2019 Course) 304193: Project Management		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Theory: 03 Hrs. / week	**03**	**In-Sem (Theory): 30 Marks** **End Sem (Theory): 70 Marks**

Prerequisite Courses, if any: NIL

Companion Course, if any: NIL

Course Objectives: To make the students understand

- The basics of project management and its life cycle
- The process of project identification, selection criteria of the project and how the project planning is undertaken.
- The organizational structure within a project and issues related to project management
- The techniques for effective project scheduling and resource considerations in project.
- The basics of effective handling the risks as well as managing finances within the project
- The complete product development process and requirements for entrepreneurship along with related legal issues.

Course Outcomes: On completion of the course, learner will be able to –

CO1: Apply the fundamental knowledge of project management for effectively handling the projects.

CO2: Identify and select the appropriate project based on feasibility study and undertake its effective planning.

CO3: Assimilate effectively within the organizational structure of project and handle project management related issues in an efficient manner.

CO4: Apply the project scheduling techniques to create a Project Schedule Plan and accordingly utilize the resources to meet the project deadline.

CO5: Identify and assess the project risks and manage finances in line with Project Financial Management Process.

CO6: Develop new products assessing their commercial viability and develop skillsets for becoming successful entrepreneurs while being fully aware of the legal issues related to Product development and Entrepreneurship.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Project Management **SPPU Course Code:** 304193
Designation of Course: Core Subjects
Class: TE E&TC **Semester:** VI **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	0	30	0	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
304193 CO1	-	-	-	-	-	2	2	2	2	2	-	2	-	2	2
304193 CO2	-	-	-	-	-	2	2	2	1	-	2	2	-	2	2
304193 CO3	-	-	-	1	-	2	2	2	2	1	2	3	-	2	2
304193 CO4	-	-	-	-	-	2	-	2	2	1	-	2	-	2	2
304193 CO5	-	-	-	1	-	2	-	2	2	1	-	2	-	2	2
304193 CO6	-	-	-	-	2	2	-	2	2	2	-	2	-	2	2
304193	**0.00**	**0.00**	**0.00**	**1.00**	**2.00**	**2.00**	**2.00**	**2.00**	**1.83**	**1.40**	**2.00**	**2.17**	**0.00**	**2.00**	**2.00**

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3 : Substantionally (High)
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Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University
Third Year of E & Tc Engineering (2019 Course)
304194: Power Devices & Circuits

Teaching Scheme:	Credit	Examination Scheme:
Theory: 03 hrs. / week	03	In-Sem (Theory): 30 Marks End Sem (Theory): 70 Marks

Prerequisite Courses, if any:
1. Basic Electrical Engineering
2. Basic Electronics Engineering
3. Electronic Circuits
4. Electrical Circuits

Companion Course, if any: Power Devices & Circuits Lab

Course Objectives:

- To introduce different power devices viz. SCR, GTO, MOSFET and IGBT with construction, characteristics, repetitive and non repetitive ratings and typical triggering/driver circuits.
- To understand working, design and performance analysis and applications of various power converter circuits such as ac to dc converters, inverter and chopper
- To know various protection circuit requirements of power electronic devices.

Course Outcomes: On completion of the course, learner will be able -

CO1: To differentiate based on the characteristic parameters among SCR, GTO, MOSFET & IGBT and identify suitability of the power device for certain applications and understand the significance of device ratings.

CO2: To design triggering / driver circuits for various power devices.

CO3: To evaluate and analyze various performance parameters of the different converters and its topologies.

CO4: To understand significance and design of various protections circuits for power devices.

CO5: To evaluate the performance of uninterruptible power supplies, switch mode power supplies and battery.

CO6: To understand case studies of power electronics in applications like electric vehicles, solar systems etc.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Power Devices & Circuits **SPPU Course Code:** 304194
Designation of Course: Core Subjects
Class: TE E&TC **Semester:** VI **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	0	30	50	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
304194 CO1	2	1	1	-	-	2	-	2	2	2	2	1	1	1	1
304194 CO2	2	1	1	-	-	2	-	2	2	2	2	2	1	1	1
304194 CO3	2	1	1	-	-	2	-	2	2	2	2	2	1	1	1
304194 CO4	2	1	1	-	-	2	-	2	2	2	2	2	1	1	1
304194 CO5	2	1	1	-	-	1	-	-	-	-	2	2	1	1	1
304194 CO6	1	1	-	-	-	2	-	2	2	2	2	2	2	1	1
304194	**1.83**	**1.00**	**1.00**	**0.00**	**0.00**	**1.83**	**0.00**	**2.00**	**2.00**	**2.00**	**2.00**	**1.83**	**1.17**	**1.00**	**1.00**

CO- PO mapping is done with corelation level 1, 2, 3 and —
1 : Slightly (low)
2 : Moderately (Medium)
3 : Substantionally (High)
— : No corelation between CO and PO

Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University Third Year of E & TC Engineering (2019 Course) 304195 (C): Advanced JAVA Programming (Elective - II)		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Theory: 03 hrs. / week	**03**	**In-Sem (Theory): 30 Marks** **End Sem (Theory): 70 Marks**

Prerequisite Courses, if any:

1. Fundamentals of Java Programming

Companion Course, if any: Advanced JAVA Programming Lab

Course Objectives: Make the learner to:

- Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
- Design and develop Web applications
- Designing Enterprise based applications by encapsulating an application's business logic.
- Designing applications using pre-built frameworks.

Course Outcomes: On completion of the course, learner will be able to –

CO1: Design and develop GUI applications using Applets.
CO2: Apply relevant AWT/ swing components to handle the given event.
CO3: Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
CO4: Learn to access database through Java programs, using Java Database Connectivity (JDBC)
CO5: Invoke the remote methods in an application using Remote Method Invocation (RMI)
CO6: Develop program for client /server communication using Java Networking classes.

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Course Articulation Matrix

Course Title: Elective-II -Advanced JAVA Programming **SPPU Course Code:** 304195 C
Designation of Course: Elective Subjects
Class: TE E&TC **Semester:** VI **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	30	70	0	30	25	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
304195 C CO1	1	1	3	1	-	1	-	1	1	1	-	2	1	2	1
304195 C CO2	2	1	1	2	-	2	-	1	1	1	-	1	2	1	1
304195 C CO3	2	1	1	2	-	2	-	1	1	1	-	1	2	2	1
304195 C CO4	1	2	1	2	-	1	-	2	2	1	-	1	1	1	2
304195 C CO5	2	1	1	2	-	2	-	1	1	1	-	2	2	2	2
304195 C CO6	2	1	2	1	-	2	-	1	1	1	-	1	1	1	1
304195 C	**1.67**	**1.17**	**1.50**	**1.67**	**0.00**	**1.67**	**0.00**	**1.17**	**1.17**	**1.00**	**0.00**	**1.33**	**1.50**	**1.50**	**1.33**

CO- PO mapping is done with corelation level 1, 2, 3 and —
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3 : Substantionally (High)
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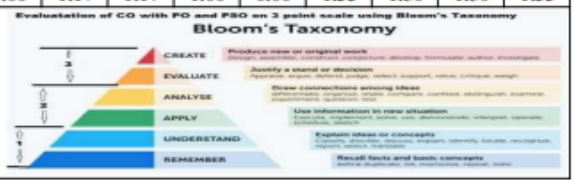

Course Co-ordinator

Program Co-ordinator

Director / Principal

Savitribai Phule Pune University Third Year of E & Tc Engineering (2019 Course) 304199: Internship		
Teaching Scheme:	**Credit**	**Examination Scheme:**
**	04	Term Work: 100 Marks

Course Objective:

- Will expose technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
- Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
- Exposure to the current technological developments relevant to the subject area of training.
- Experience gained from the **'Internship'** will be used in classroom discussions.
- Create conditions conducive to quest for knowledge and its applicability on the job.
- Learn to apply the Technical knowledge in real industrial situations.
- Gain experience in writing Technical reports/projects.
- Expose students to the engineer's responsibilities and ethics.
- Familiarize with various materials, processes, products and their applications along with relevant aspects of quality control.
- Promote academic, professional and/or personal development.
- Expose the students to future employers.
- Understand the social, economic and administrative considerations that influence the working environment of industrial organizations.
- Understand the psychology of the workers and their habits, attitudes and approach to problem solving.

Course Outcomes: On completion of the internship, learner will be able to –

CO1: To develop professional competence through internship.

CO2: To apply academic knowledge in a personal and professional environment.

CO3: To build the professional network and expose students to future employees.

CO4: Apply professional and societal ethics in their day to day life.

CO5: To become a responsible professional having social, economic and administrative considerations.

CO6: To make own career goals and personal aspirations.

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Course Articulation Matrix

Course Title: Internship **SPPU Course Code:** 304199
Designation of Course: Internship
Class: TE E&TC **Semester:** VI **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	0	0	100	0	0	0	0

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
304199 CO1	-	-	-	1	2	1	1	2	2	2	1	1	-	2	1
304199 CO2	1	1	-	-	1	1	1	2	2	2	1	1	1	2	2
304199 CO3	-	-	1	-	-	1	-	2	2	2	1	1	-	1	1
304199 CO4	-	-	-	-	-	2	2	2	2	2	-	-	-	-	-
304199 CO5	-	-	-	-	-	-	-	2	2	-	2	-	-	-	-
304199 CO6	-	-	-	-	-	-	-	2	2	-	-	-	-	2	2
304199	**3.00**	**2.00**	**3.00**	**3.00**	**3.00**	**2.00**	**2.00**	**3.00**	**3.00**	**3.00**	**2.00**	**2.00**	2.00	3.00	1.00

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Course Co-ordinator | Program Co-ordinator | Director / Principal

Savitribai Phule Pune University Third Year of E & Tc Engineering (2019 Course) 304200: Mini Project		
Teaching Scheme:	**Credit**	**Examination Scheme:**
Practical: 04 hrs. / week	**02**	**Term Work: 25 Marks** **Oral: 50 Marks**

Course Objectives:

- To understand the —Product Development Process" including budgeting through Mini Project.
- To plan for various activities of the project and distribute the work amongst team members.
- To inculcate electronic hardware implementation skills by -
- Learning PCB artwork design using an appropriate EDA tool.
- Imbibing good soldering and effective trouble-shooting practices.
- Following correct grounding and shielding practices.
- To develop student's abilities to transmit technical information clearly and test the same by delivery of Seminar based on the Mini Project.
- To understand the importance of document design by compiling Technical Report on the Mini Project work carried out.

Course Outcome:

On completion of the course, student will be able to

CO1: Understand, plan and execute a Mini Project with team.

CO2: Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshooting etc.

CO3: Prepare a technical report based on the Mini project.

CO 4: Deliver technical seminar based on the Mini Project work carried out.

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Course Articulation Matrix

Course Title: Mini Project — **SPPU Course Code:** 304200
Designation of Course: Project work
Class: TE E&TC — **Semester:** VI — **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam	Term Work	Insem	Practical	Oral	Endsem
Marks	0	0	25	0	0	50	0

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
304200 CO1	2	-	2	2	2	1	-	3	3	3	2	1	2	1	2
304200 CO2	2	-	2	2	2	1	-	3	3	3	2	1	2	1	2
304200 CO3	2	-	2	2	2	1	-	3	3	3	2	1	2	1	2
304200 CO4	2	-	2	2	2	1	-	-	3	3	2	1	2	1	2
304200 CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
304200 CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
304200	**2.00**	**0.00**	**2.00**	**2.00**	**2.00**	**1.00**	**0.00**	**3.00**	**3.00**	**3.00**	**2.00**	**1.00**	**2.00**	**1.00**	**2.00**

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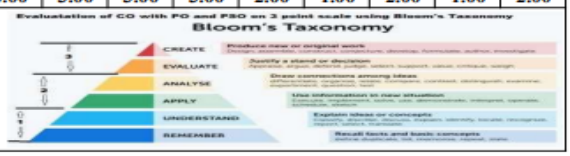

Course Co-ordinator — Program Co-ordinator — Director / Principal

Savitribai Phule Pune University

Faculty of Science &Technology

B.E. (Electronics & Telecommunication)
(2015 Pattern) Syllabus
(With effect from Academic Year 2018-19)

Savitribai PhulePune University
Final Year E&TC Engineering (2015 Course)
(With effect from Academic Year 2018-19)

Semester I

Course Code	Course	Teaching Scheme Hours / Week			Semester Examination Scheme of Marks						Credits	
		Theory	Tut	Pract	In-Sem	End-Sem	TW	PR	OR	Total	TH/TW	PR+OR
404181	VLSI Design& Technology	3	--	--	30	70	--	--	--	100	3	--
404182	Computer Networks & Security	4	--	--	30	70	--	--	--	100	4	--
404183	Radiation & Microwave Techniques	3	--	--	30	70	--	--	--	100	3	--
404184	Elective I	3	--	--	30	70	--	--	--	100	3	--
404185	Elective II	3			30	70	--	--	--	100	3	--
404186	Lab Practice -I (CNS+ RMT)	--	--	4	--	--	50	--	50	100	--	2
404187	Lab Practice -II (VLSI + Elective I)	--	--	4	--	--	50	50		100	--	2
404188	Project Stage I	-	2	--	--	--	-	--	50	50	--	2
	Audit Course 5	--	--	--	--	--	--	--	--	--	----	
	Total	16	2	8	150	350	100	50	100	750	16	6
Total Credits											**22**	

Elective I

1 Digital Image and Video Processing
2. Industrial Drives and Control
3. Embedded Systems & RTOS
4. Internet of Things

Elective II

1. Wavelets
2. Electronics Product Design
3. Optimization Techniques
4. Artificial Intelligence
5. Electronics in agriculture

Audit Course 5

1. Green Energy
2. Human Behaviour

Final Year E&TC Engineering (2015 Course)

(With effect from Academic Year 2018-19)

Semester II

Course Code	Course	Teaching Scheme Hours / Week			Semester Examination Scheme of Marks						Credit	
		Theory	Tut	Pract	In-Sem	End-Sem	TW	PR	OR	Total	TH/TW	PR+OR
404189	Mobile Communication	3	--	--	30	70	--	--	--	100	3	--
404190	Broadband Communication Systems	4	--	--	30	70	--	--	--	100	4	--
404191	Elective III	3	--	--	30	70	--	--	--	100	3	--
404192	Elective IV	3	--	--	30	70	--	--	--	100	3	--
404193	Lab Practice –III (MC+BCS)	--	--	4	--	--	50	50	--	100	--	2
404194	Lab Practice –IV (Elective III)	--	--	2	--	--	--	--	50	50	--	1
404195	Project Stage II	--	6	-	--	--	150	--	50	200	--	6
	Audit Course 6	--	--	--	--	--	--	--	--	--		
Total		13	6	6	120	280	200	50	100	750	13	9
										Total Credits	**22**	

Elective III	**Elective-IV**	**Audit Course 6**
1. Machine Learning 2. PLC s and Automation 3. Audio and Speech Processing 4. Software Defined Radio 5. Audio Video Engineering	1. Robotics 2. Biomedical Electronics 3. Wireless Sensor Networks 4. Renewable Energy Systems 5. Open Elective*	1. Team Building, Leadership and Fitness 2. Environmental issues and Disaster Management

404181 VLSI Design & Technology

Credits: 03

Teaching Scheme:			Examination Scheme:	
Lecture : 03 Hr/Week				In-Sem : 30 Marks End-Sem: 70 Marks

Course Objectives:

- To explore HDL and related design approach.
- To nurture students with CMOS circuit designs.
- To realize importance of testability in logic circuit design.
- To overview ASIC issues and understand PLD architectures with advanced features.

Course Outcomes:

On completion of the course, student will be able to

1. Write effective HDL coding for digital design.
2. Apply knowledge of real time issues in digital design.
3. Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
4. Design CMOS circuits for specified applications.
5. Analyze various issues and constraints in design of an ASIC
6. Apply knowledge of testability in design and build self test circuit.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: VLSI Design& Technology **SPPU Course Code:** 404181
Designation of Course: Core Subjects
Class: BE E&TC **Semester:** VII **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam		Insem	PR	Term Work	Endsem
Marks	30	70		30	50	50	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
404181 CO1	1	1	2	-	2	2	-	1	-	-	1	-	-	1	1
404181 CO2	1	1	2	-	2	1	-	1	-	1	-	-	2	-	2
404181 CO3	-	-	1	1	-	-	-	-	-	-	2	-	-	1	-
404181 CO4	1	1	1	-	-	1	-	-	-	1	-	1	-	2	-
404181 CO5	1	-	-	1	-	-	-	2	-	2	-	1	-	-	2
404181 CO6	1	-	2	-	2	-	-	1	-	-	-	-	-	-	-
404181	**1.00**	**1.00**	**1.60**	**1.00**	**2.00**	**1.33**	**0.00**	**1.25**	**0.00**	**1.33**	**1.50**	**1.00**	**2.00**	**1.33**	**1.67**

CO- PO mapping is done with corelation level 1, 2, 3 and —
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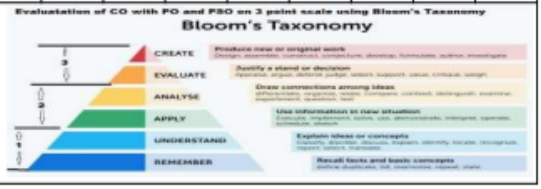

Course Co-ordinator

Program Co-ordinator

Director / Principal

404182Computer Networks & Security

Credits: 04

Teaching Scheme:			Examination Scheme:	
Lecture : 04 Hrs/Week				In-Sem: 30 Marks End-Sem: 70 Marks

Course Objectives:

- To understand state-of-the-art in network protocols, architectures, and applications
- To provide students with a theoretical and practical base in computer networks issues
- To outline the basic network configurations
- To understand the transmission methods underlying LAN and WAN technologies.
- To understand security issues involved in LAN and Internet.

Course Outcomes:

On completion of the course, student will be able to

1. Understand fundamental underlying principles of computer networking
2. Describe and analyze the hardware, software, components of a network and their interrelations.
3. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
4. Have a basic knowledge of installing and configuring networking applications.
5. Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols.
6. Have a basic knowledge of the use of cryptography and network security.
7.

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Course Articulation Matrix

Course Title: Computer Networks & Security **SPPU Course Code:** 404182
Designation of Course: Core Subjects
Class: BE E&TC **Semester:** VII **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam		Insem	OR	Term Work	Endsem
Marks	30	70		30	50	50	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
404182 CO1	1	-	1	-	1	-	-	1	-	1	-	1	1	2	1
404182 CO2	-	1	1	-	2	1	1	-	-	1	-	-	1	1	-
404182 CO3	-	1	1	-	1	1	-	1	-	-	-	1	1	-	2
404182 CO4	-	2	1	1	-	-	-	-	-	-	-	2	-	2	-
404182 CO5	1	-	1	1	-	1	2	-	-	2	-	2	-	-	1
404182 CO6	2	-	1	1	1	-	-	2	-	-	-	1	-	-	1
404182	**1.33**	**1.33**	**1.00**	**1.00**	**1.25**	**1.00**	**1.50**	**1.33**	**0.00**	**1.33**	**0.00**	**1.40**	**1.00**	**1.67**	**1.25**

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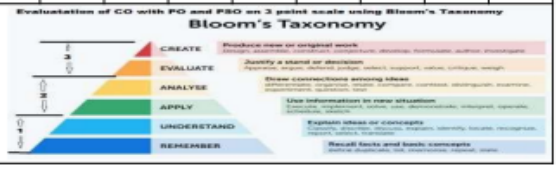

Course Co-ordinator | Program Co-ordinator | Director / Principal

404183 Radiation and Microwave Techniques

Credits: 03

Teaching Scheme:		Examination Scheme:	
Lecture : 03 Hr/Week			In-Sem : 30 Marks End-Sem : 70 Marks

Course Objectives:

- To introduce fundamental theory of radiation and microwaves.
- To understand design principles of various radiating elements.
- To understand theory of passive and active components of microwave systems.
- To learn microwave measurement techniques.

Course Outcomes:

On completion of the course, student will be able to

1. Differentiate various performance parameters of radiating elements.
2. Analyze various radiating elements and arrays.
3. Apply the knowledge of waveguide fundamentals in design of transmission lines.
4. Design and set up a system consisting of various passive microwave components.
5. Analyze tube based and solid state active devices along with their applications.
6. Measure various performance parameters of microwave components.

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Course Articulation Matrix

Course Title: Radiation & Microwave Techniques **SPPU Course Code:** 404183
Designation of Course: Core Subjects
Class: BE E&TC **Semester:** VII **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam		Insem	OR	Term Work	Endsem
Marks	30	70		30	50	50	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
404183 CO1	1	-	1	1	-	-	-	-	1	1	-	1	1	1	1
404183 CO2	1	1	1	-	-	1	-	1	-	-	-	-	1	-	1
404183 CO3	-	-	-	1	1	-	1	-	-	2	1	-	-	1	-
404183 CO4	1	1	2	-	-	1	-	2	-	1	-	2	2	2	2
404183 CO5	2	-	-	-	1	-	-	-	2	-	1	1	-	-	-
404183 CO6	-	1	-	-	-	-	1	-	-	1	-	-	-	-	2
404183	**1.25**	**1.00**	**1.33**	**1.00**	**1.00**	**1.00**	**1.00**	**1.50**	**1.50**	**1.25**	**1.00**	**1.33**	**1.33**	**1.33**	**1.50**

CO- PO mapping is done with corelation level 1, 2, 3 and —
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2 : Moderately (Medium)
3 : Substantionally (High)
— : No corelation between CO and PO

Course Co-ordinator | Program Co-ordinator | Director / Principal

404184 Digital Image and Video Processing (Elective-I)

Credits: 03

Teaching Scheme:			Examination Scheme:
Lecture : 03 Hr/Week			In-Sem: 30 Marks End-Sem: 70 Marks

Course Objectives:

- Understand the fundamental concepts of Digital Image Processing with basic relationship of pixels and mathematical operations on 2-D data.
- Learn design and integrate image enhancement and image restoration techniques
- Understand object segmentation and image analysis techniques
- Learn the need for effective use of resources such as storage and bandwidth and ways to provide effective use of them by data compression techniques
- Learn basic concepts of video processing

Course Outcomes:

On completion of the course, student will be able to

1. Develop and implement basic mathematical operations on digital images.
2. Analyze and solve image enhancement and image restoration problems.
3. Identify and design image processing techniques for object segmentation and recognition.
4. Represent objects and region of the image with appropriate method.
5. Apply 2-D data compression techniques for digital images.
6. Explore video signal representation and different algorithm for video processing.

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Course Articulation Matrix

Course Title: Elective I Digital Image and Video Processing — **SPPU Course Code:** 404184 A
Designation of Course: Elective Subjects
Class: BE E&TC — **Semester:** VII — **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam		Insem	PR	Term Work	Endsem
Marks	30	70		30	50	50	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
404184 A CO1	1	-	-	-	2	1	-	1	-	1	-	-	1	-	1
404184 A CO2	-	1	-	-	1	-	-	-	2	-	-	-	-	1	2
404184 A CO3	2	1	1	1	1	-	1	1	-	2	-	1	1	-	-
404184 A CO4	-	-	-	-	1	-	-	-	1	-	-	-	-	-	2
404184 A CO5	1	-	1	1	-	-	-	1	-	-	-	-	2	-	1
404184 A CO6	1	1	1	-	1	1	1	1	-	1	-	1	1	2	-
404184 A	**1.25**	**1.00**	**1.00**	**1.00**	**1.20**	**1.00**	**1.00**	**1.00**	**1.50**	**1.33**	**0.00**	**1.00**	**1.25**	**1.50**	**1.50**

CO- PO mapping is done with corelation level 1, 2, 3 and —
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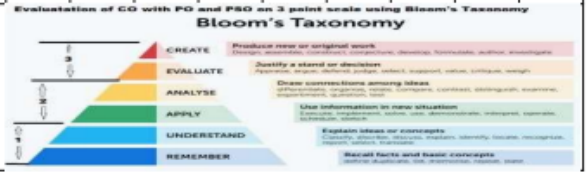

Course Co-ordinator — Program Co-ordinator — Director / Principal

404185 Artificial Intelligence (Elective II)				
Credits: 03				
Teaching Scheme:			**Examination Scheme:**	
Lecture : 03 hr/week				**In-Sem : 30 Marks** **End-Sem: 70 Marks**

Course Objectives:

- To learn various types of algorithms useful in Artificial Intelligence (AI).
- To convey the ideas in AI research and programming language related to emergingtechnology.
- To understand the concepts of machine learning, pattern recognition, and natural language processing.
- To understand the numerous applications and huge possibilities in the field of AI that gobeyond the normal human imagination.

Course Outcomes:

On completion of the course, student will be able to

1. Design and implement key components of intelligent agents and expert systems.
2. To apply knowledge representation techniques and problem solving strategies to common AI applications.
3. Applyand integrate various artificial intelligence techniques in intelligent system development as well as understand the importance of maintaining intelligent systems.
4. Build rule-based and other knowledge-intensive problem solvers.

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Course Articulation Matrix

Course Title: Elective II Artificial Intelligence **SPPU Course Code:** 404185 D
Designation of Course: Elective Subjects
Class: BE E&TC **Semester:** VII **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam		Insem	PR	Term Work	Endsem
Marks	30	70		30	0	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
404185 D CO1	1	1	-	-	-	-	-	1	1	-	-	-	-	-	1
404185 D CO2	-	1	1	1	-	-	-	-	1	-	-	1	-	1	1
404185 D CO3	1	1	1	-	-	1	1	2	-	-	-	1	-	1	1
404185 D CO4	-	-	2	1	2	-	-	1	-	-	-	1	-	1	1
404185 D CO5	1	2	1	1	1	-	-	-	2	1	-	1	1	1	2
404185 D CO6	1	1	1	2	1	-	-	-	-	-	1	-	1	2	-
404185 D	**1.00**	**1.20**	**1.20**	**1.25**	**1.33**	**1.00**	**1.00**	**1.33**	**1.33**	**1.00**	**1.00**	**1.00**	**1.00**	**1.20**	**1.20**

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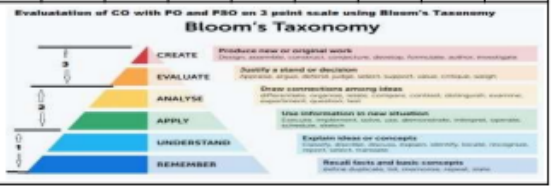

Course Co-ordinator Program Co-ordinator Director / Principal

Semester-II

404189 Mobile Communication		
Credits: 03		
Teaching Scheme:		**Examination Scheme:**
Lectures: 3Hrs/ Week		**In-Sem : 30 Marks** **End-Sem : 70 Marks**

Course Objectives

- To understand switching techniques for voice and data traffic.
- To nurture students with knowledge of traffic engineering to design networks.
- To realize importance of cellular concepts and its propagation mechanism.
- To understand architecture of GSM system.
- To overview 4G LTE and 5G technologies.

Course Outcomes

On completion of the course, student will be able to

1. Apply the concepts of switching technique and traffic engineering to design multistage networks.
2. Explore the architecture of GSM.
3. Differentiate thoroughly the generations of mobile technologies.

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Course Articulation Matrix

Course Title: Mobile Communication **SPPU Course Code:** 404189
Designation of Course: Core Subjects
Class: BE E&TC **Semester:** VIII **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam		Insem	PR	Term Work	Endsem
Marks	30	70		30	50	50	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
404189 CO1	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-
404189 CO2	2	1	1	1	-	-	-	-	-	-	-	-	-	-	-
404189 CO3	1	2	2	2	1	1	-	-	-	-	-	1	1	-	1
404189 CO4	1	1	2	2	1	1	-	-	-	-	-	-	1	-	1
404189 CO5	1	1	2	2	1	1	-	-	-	-	-	1	1	-	1
404189 CO6	1	1	2	-	2	-	1	-	-	-	-	1	1	-	1
404189	**1.33**	**1.17**	**1.67**	**1.60**	**1.25**	**1.00**	**1.00**	**0.00**	**0.00**	**0.00**	**0.00**	**1.00**	**1.00**	**0.00**	**1.00**

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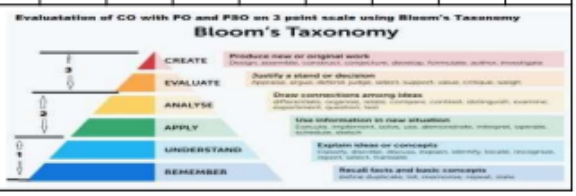

Course Co-ordinator

Program Co-ordinator

Director / Principal

404190 Broadband Communication Systems

Credits: 04

Teaching Scheme:			Examination Scheme:	
Lecture : 04 hr/week				In-Sem : 30 Marks End-Sem : 70 Marks

Course Objectives:

- To comprehend the three primary components of a fiber optic communication system.
- To understand the system design issues and the role of WDM components in advanced light wave systems.
- To understand the basics of orbital mechanics and the look angles from ground stations to the satellite.
- To apply subject understanding in Link Design.

Course Outcomes:

After successfully completing the course students will be able to:

1. Perform Link power budget and Rise Time Budget by proper selection of components and check its viability.
2. Perform Satellite Link design for Up Link and Down Link.

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Course Articulation Matrix

Course Title: Broadband Communication Systems **SPPU Course Code:** 404190
Designation of Course: Core Subjects
Class: BE E&TC **Semester:** VIII **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam		Insem	PR	Term Work	Endsem
Marks	30	70		30	50	50	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
404190 CO1	1	-	1	-	-	-	-	-	-	1	-	1	1	-	2
404190 CO2	-	1	1	-	-	1	1	2	-	-	1	-	-	-	-
404190 CO3	1	-	-	1	-	1	-	-	1	1	-	-	-	1	2
404190 CO4	-	1	-	-	-	-	-	1	-	-	-	1	1	1	-
404190 CO5	1	-	1	1	1	2	-	-	1	1	1	1	-	-	1
404190 CO6	1	-	1	1	1	-	-	1	-	-	-	-	1	1	-
404190	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.33**	**1.00**	**1.33**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.67**

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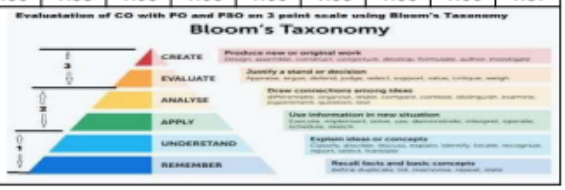

Course Co-ordinator Program Co-ordinator Director / Principal

404191 Machine Learning (Elective III)				
Credits: 03				
Teaching Scheme:			**Examination Scheme:**	
Lecture : 03 Hr/week				**In-Sem : 30 Marks** **End-Sem: 70 Marks**

Course Objectives:

- Explore supervised and unsupervised learning paradigms of machine learning used forregression and classification.
- To design and analyze various machine learning algorithms using neural networks
- To explore Deep learning technique and various feature extraction strategies.

Course Outcomes:

On completion of the course, student will be able to

1. To compare and contrast pros and cons of various machine learning techniques and to get an in sight of when to apply a particular machine learning approach.
2. To mathematically analyze various machine learning approaches and paradigms.
3. To implement convolution neural networks in recognition applications.

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Course Articulation Matrix

Course Title: Elective III Machine Learning **SPPU Course Code:** 404191 A
Designation of Course: Elective Subjects
Class: BE E&TC **Semester:** VIII **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam		Insem	OR	Term Work	Endsem
Marks	30	70		30	50	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
404191 A CO1	1	-	1	1	2	-	-	-	-	-	-	1	-	1	1
404191 A CO2	-	1	-	-	1	1	-	1	-	1	1	-	2	-	1
404191 A CO3	-	1	-	-	1	-	-	-	1	-	-	1	1	2	2
404191 A CO4	1	-	-	2	2	-	1	1	-	1	-	-	-	-	-
404191 A CO5	-	1	1	-	1	1	-	-	-	-	-	2	1	1	1
404191 A CO6	1	-	-	1	-	-	-	1	-	1	1	-	-	-	-
404191 A	**1.00**	**1.00**	**1.00**	**1.33**	**1.40**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.33**	**1.33**	**1.33**	**1.25**

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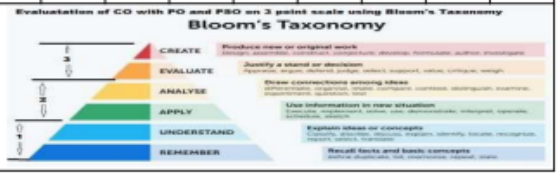

Course Co-ordinator | Program Co-ordinator | Director / Principal

404194 Wireless Sensor Networks (Elective-IV)

Credits: 03

Teaching Scheme:			Examination Scheme:	
Lecture : 03 hr/week				In-Sem : 30 Marks End-Sem: 70 Marks

Course Objectives:

- To learn basic concepts of Wireless sensor networks
- To be familiar with architecture and protocols used in Wireless sensor networks
- To provide knowledge of deployment and security issued of Wireless sensor networks

Course Outcomes:

On completion of the course, student will be able to

1. Explain various concepts and terminologies used in WSN
2. Describe importance and use of radio communication and link management in WSN
3. Explain various wireless standards and protocols associated with WSN
4. Recognize importance of localization and routing techniques used in WSN
5. Understand techniques of data aggregation and importance of security in WSN
6. Examine the issues involved in design and deployment of WSN

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Course Articulation Matrix

Course Title: Elective IV Wireless Sensor Networks **SPPU Course Code:** 404192 C
Designation of Course: Elective Subjects
Class: BE E&TC **Semester:** VIII **AY:** 2021-22
Teaching Scheme

Assessment Tool	Internal Assessment Tool			External Assessment Tool			
Theory /Practical	Unit Test	Prelim Exam		Insem	OR	Term Work	Endsem
Marks	30	70		30	0	0	70

CO - PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
404192 C CO1	1	-	2	-	-	1	-	-	-	1	1	1	2	-	1
404192 C CO2	-	1	1	1	2	-	1	2	1	-	-	2	1	-	2
404192 C CO3	1	1	-	-	1	-	1	-	-	1	1	-	-	2	2
404192 C CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
404192 C CO5	2	1	-	-	2	-	-	1	-	-	-	2	1	-	-
404192 C CO6	1	1	1	1	-	-	-	1	-	-	-	2	1	-	-
404192 C	**1.25**	**1.00**	**1.33**	**1.00**	**1.67**	**1.00**	**1.00**	**1.33**	**1.00**	**1.00**	**1.00**	**1.75**	**1.25**	**2.00**	**1.67**

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Course Co-ordinator

Program Co-ordinator

Director / Principal

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PROGRAM ARTICULATION MATRIX

Academic Year: 2021-22

Sr. No.	Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	207005	1.40	1.20	1.00	1.33	1.00	1.83	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00
2	204181	1.50	1.00	1.20	1.00	2.00	1.40	0.00	0.00	0.00	1.17	0.00	0.00	0.00	1.00	1.50
3	204182	1.00	1.17	1.75	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	2.00	0.00	0.00	1.00
4	204183	2.00	1.75	2.00	1.00	1.00	2.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
5	204184	2.00	2.00	2.00	0.00	1.00	1.00	0.00	0.00	0.00	2.00	0.00	2.00	1.00	0.00	0.00
6	204191	1.67	1.17	1.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	1.33	1.00	0.00	1.00
7	204192	1.67	1.17	1.40	1.00	1.00	0.00	1.00	0.00	0.00	1.50	0.00	2.00	0.00	0.00	1.50
8	204193	1.20	1.17	1.17	1.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	1.00	1.00	0.00	1.00
9	204194	1.25	1.00	1.00	1.00	1.20	0.00	0.00	0.00	0.00	1.67	0.00	2.00	1.20	0.00	0.00
10	204198	1.25	1.00	1.00	1.00	1.20	0.00	0.00	0.00	0.00	1.67	0.00	2.00	1.20	0.00	0.00
11	204199	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.00	1.80	1.25	1.33	1.00	0.00	1.00	1.00
12	204200	2.00	1.33	1.00	1.50	2.00	1.00	0.00	1.50	1.33	2.00	1.00	1.00	0.00	1.00	1.00
13	304181	3.00	1.60	1.00	0.00	1.00	1.00	0.00	1.00	2.00	1.00	1.00	1.00	1.00	0.00	1.00
14	304182	2.17	1.50	1.80	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
15	304183	1.60	1.75	2.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	2.00	1.00	1.50	0.00	0.00
16	304184	2.00	0.00	1.67	0.00	2.00	1.67	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00
17	304185 C	1.33	0.00	1.33	1.33	1.67	0.00	0.00	1.33	1.17	1.00	0.00	1.50	0.00	1.33	1.67
18	304190	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.00	1.75	1.33	1.33	1.00	0.00	1.00	1.00
19	304192	1.83	0.00	0.00	0.00	1.83	1.83	1.83	1.40	1.00	1.17	1.75	2.00	1.50	1.33	1.20
20	304193	0.00	0.00	0.00	1.00	2.00	2.00	2.00	2.00	1.83	1.40	2.00	2.17	0.00	2.00	2.00
21	304194	1.83	1.00	1.00	0.00	0.00	1.83	0.00	2.00	2.00	2.00	2.00	1.83	1.17	1.00	1.00
22	304195 C	1.67	1.17	1.50	1.67	0.00	1.67	0.00	1.17	1.17	1.00	0.00	1.33	1.50	1.50	1.33
23	304199	3.00	2.00	3.00	3.00	3.00	2.00	2.00	3.00	3.00	3.00	2.00	2.00	2.00	3.00	1.00
24	304200	2.00	0.00	2.00	2.00	2.00	1.00	0.00	3.00	3.00	3.00	2.00	1.00	2.00	1.00	2.00
25	404181	1.00	1.00	1.60	1.00	2.00	1.33	0.00	1.25	0.00	1.33	1.50	1.00	2.00	1.33	1.67
26	404182	1.33	1.33	1.00	1.00	1.25	1.00	1.50	1.33	0.00	1.33	0.00	1.40	1.00	1.67	1.25
27	404183	1.25	1.00	1.33	1.00	1.00	1.00	1.00	1.50	1.50	1.25	1.00	1.33	1.33	1.33	1.50
28	404184 A	1.25	1.00	1.00	1.00	1.20	1.00	1.00	1.00	1.50	1.33	0.00	1.00	1.25	1.50	1.50
29	404185 D	1.00	1.20	1.20	1.25	1.33	1.00	1.00	1.33	1.33	1.00	1.00	1.00	1.00	1.20	1.20
30	404188	1.50	2.33	2.00	1.00	1.00	1.00	1.33	1.00	2.00	2.00	1.00	1.33	1.33	1.33	2.50

Sr. No.	Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
31	404189	1.33	1.17	1.67	1.60	1.25	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00
32	404190	1.00	1.00	1.00	1.00	1.00	1.33	1.00	1.33	1.00	1.00	1.00	1.00	1.00	1.00	1.67
33	404191 A	1.00	1.00	1.00	1.33	1.40	1.00	1.00	1.00	1.00	1.00	1.00	1.33	1.33	1.33	1.25
34	404192 C	1.25	1.00	1.33	1.00	1.67	1.00	1.00	1.33	1.00	1.00	1.00	1.75	1.25	2.00	1.67
35	404195	2.00	2.00	2.33	1.33	1.33	2.00	2.00	1.00	2.50	1.50	2.00	1.50	1.33	1.50	2.00
Average PO		**1.60**	**1.32**	**1.46**	**1.23**	**1.43**	**1.33**	**1.29**	**1.52**	**1.63**	**1.48**	**1.47**	**1.42**	**1.28**	**1.36**	**1.37**
% Average		**53.42**	**44.05**	**48.69**	**40.89**	**47.51**	**44.32**	**43.06**	**50.73**	**54.37**	**49.35**	**48.98**	**47.29**	**42.53**	**45.46**	**45.59**

Course Co-ordinator

Program Co-ordinator

Director/Principal

SINHGAD TECHNICAL EDUCATION SOCIETY'S

NBN SINHGAD TECHNICAL INSTITUTES CAMPUS

Sinhgad Institutes

NBN Sinhgad School of Engineering, Ambegaon, Pune -41.

Department of Electronics and Telecommunication Engineering

Course: 204181 Electronic Circuits **Class:** SE

Academic Year	Semester	Course Outcomes	CO1												CO2											
		Type of Assessment	Internal						External						Internal						External					
2021-22		Assessment Tools	UT1		PRELIM	ASSI/TUT	% of all tools	Students Attained Y/N	IN SEM	PR	END SEM		% of all tools	Students Attained Y/N	UT1		PRELIM	ASSI/TUT	% of all tools	Students Attained Y/N	IN SEM	PR	END SEM		% of all tools	Students Attained Y/N
		Total Marks	30		70		100.00		30	50	70		150.00		30		70		100.00		30	50	70		150.00	
Sr. No	ROLL NO.	EXAM SEAT NO.	Name of the Students	Avg. Relevant Marks %					55	Avg. Relevant Marks %					55	Avg. Relevant Marks %					55	Avg. Relevant Marks %					55
1	1	S191053001	SHELAR ADITYA SATISH	26		43		69	Y	22	28	59		73	Y	26		43		69	Y	22	28	59		73	Y
2	2	S191053002	AMAN SINGH JARAUT	26		49		75	Y	25	23	50		65	Y	26		49		75	Y	25	23	50		65	Y
3	3	S191053003	ANIKET BHAMBARE	24		49		73	Y	24	41	36		67	Y	24		49		73	Y	24	41	36		67	Y
4	4	S191053004	ARBAJ	15		36		51	N	24	27	53		69	Y	15		36		51	N	24	27	53		69	Y
5	5	S191053005	AYUSH KUMAR	16		16		32	N	16	33	63		75	Y	16		16		32	N	16	33	63		75	Y
6	6	S191053006	BADAVE SAHIL SANTOSH	15		48		63	Y	24	46	52		81	Y	15		48		63	Y	24	46	52		81	Y
7	7	S191053007	BAJRANG R. BHOSALE	16		38		54	N	16	42	39		65	Y	16		38		54	N	16	42	39		65	Y
8	8	S191053008	BARHATE SAURBH VASUDEO	23		46		69	Y	21	34	59		76	Y	23		46		69	Y	21	34	59		76	Y
9	9	S191053009	BHOR AKANKSHA RAJU	15		37		52	N	12	43	66		81	Y	15		37		52	N	12	43	66		81	Y
10	10	S191053010	CHAUDHARI SHIVRAJE D.	24		46		70	Y	24	38	52		76	Y	24		46		70	Y	24	38	52		76	Y
11	11	S191053011	CHETAN BALIRAM PATIL	29		49		78	Y	25	42	67		89	Y	29		49		78	Y	25	42	67		89	Y
12	12	S191053012	CHOUDHARI SHIVANI SHANKAR	26		37		63	Y	25	39	57		81	Y	26		37		63	Y	25	39	57		81	Y
13	13	S191053013	DABHOLKAR SAHIL H.	14		42		56	Y	20	39	56		77	Y	14		42		56	Y	20	39	56		77	Y
14	14	S191053014	DAITHANKAR ASHISH ARUN	0		0		0	N	21	38	56		77	Y	0		0		0	N	21	38	56		77	Y
15	15	S191053015	DEEPALI RAMDAS SHINDE	12		39		51	N	14	27	56		65	Y	12		39		51	N	14	27	56		65	Y
16	16	S191053016	DESHMUKH PUSHKAR SANJAY	25		46		71	Y	25	28	67		80	Y	25		46		71	Y	25	28	67		80	Y
17	17	S191053017	DESHMUKH SHIVAM R.	20		39		59	Y	23	38	60		81	Y	20		39		59	Y	23	38	60		81	Y
18	18	S191053018	DHENGEKAR VIPUL RAVIKANT	19		32		51	N	23	23	63		73	Y	19		32		51	N	23	23	63		73	Y
19	19	S191053019	DHOLE HARSH KAILAS	14		33		47	N	15	35	49		66	Y	14		33		47	N	15	35	49		66	Y
20	20	S191053020	DIGHE PRAJWAL RAVSAHEB	17		38		55	Y	15	29	56		67	Y	17		38		55	Y	15	29	56		67	Y
21	21	S191053021	DUKSE DUSHANT JANARDHAN	20		40		60	Y	23	33	63		79	Y	20		40		60	Y	23	33	63		79	Y
22	22	S191053022	GORE ROHIT BALIRAM	18		32		50	N	24	41	53		79	Y	18		32		50	N	24	41	53		79	Y
23	23	S191053023	HAGARGI BADAL MUKIND	12		42		54	N	19	35	52		71	Y	12		42		54	N	19	35	52		71	Y
24	24	S191053024	HENDRE SAHIL PRAKASH	13		0		13	N	13	23	53		59	Y	13		0		13	N	13	23	53		59	Y
25	25	S191053025	JADHAV BHARAT TANAJI	25		0		25	N	23	39	45		71	Y	25		0		25	N	23	39	45		71	Y
26	26	S191053026	JADHAV PUSHKRAJ ARUN	20		43		63	Y	26	34	55		77	Y	20		43		63	Y	26	34	55		77	Y
27	27	S191053027	JAWALE TEJAS PRAMOD	24		44		68	Y	24	47	52		82	Y	24		44		68	Y	24	47	52		82	Y
28	28	S191053028	JAYESH KAKASAHEB SHELAKE	13		34		47	N	21	41	63		83	Y	13		34		47	N	21	41	63		83	Y
29	29	S191053029	KADAM AKSHAY LAXMAN	7		35		42	N	19	37	31		58	Y	7		35		42	N	19	37	31		58	Y
30	30	S191053030	KALPESH EKNATH BORLE	18		41		59	Y	22	28	63		75	Y	18		41		59	Y	22	28	63		75	Y
31	31	S191053031	KANHE AKASH PANDHARINATH	21		48		69	Y	22	42	50		76	Y	21		48		69	Y	22	42	50		76	Y
32	32	S191053032	KARANDE KEDAR RAJENDRA	16		37		53	N	13	36	48		65	Y	16		37		53	N	13	36	48		65	Y
33	33	S191053033	KHAIRE SUNEET SURESH	22		32		54	N	24	24	64		75	Y	22		32		54	N	24	24	64		75	Y
34	34	S191053034	KHANDAVE SANSKAR SURESH	0		39		39	N	24	38	52		76	Y	0		39		39	N	24	38	52		76	Y

Sinhgad Institutes

SINHGAD TECHNICAL EDUCATION SOCIETY'S

NBN SINHGAD TECHNICAL INSTITUTES CAMPUS

NBN Sinhgad School of Engineering, Ambegaon, Pune -41.

Department of Electronics and Telecommunication Engineering

Course: 204181 Electronic Circuits **Class:** SE

Academic Year	Semester	Course Outcomes	CO1												CO2											
		Type of Assessment	Internal						External						Internal						External					
2021-22		Assessment Tools	UT1		PREL IM	ASSI/ TUT	% of all tools	Students Attained Y/N	IN SEM	PR	END SEM		% of all tools	Students Attained Y/N	UT1		PREL IM	ASSI/ TUT	% of all tools	Students Attained Y/N	IN SEM	PR	END SEM		% of all tools	Students Attained Y/N
		Total Marks	30		70		100.00		30	50	70		150.00		30		70		100.00		30	50	70		150.00	

Sr. No	ROLL NO.	EXAM SEAT NO.	Name of the Students	Avg. Relevant Marks %					55	Avg. Relevant Marks %					55	Avg. Relevant Marks %					55	Avg. Relevant Marks %					55
35	35	S191053035	KHEDKAR ANAND BABAN	27		29		56	Y	17	35	52		69	Y	27		29		56	Y	17	35	52		69	Y
36	36	S191053036	KISHORI BALASAHEB ADMANE	25		44		69	Y	21	43	59		82	Y	25		44		69	Y	21	43	59		82	Y
37	37	S191053037	KOKADWAR OMKAR PRAKASH	23		32		55	Y	21	29	50		67	Y	23		32		55	Y	21	29	50		67	Y
38	38	S191053038	KULKARNI SHRIRAM P.	18		35		53	N	24	41	62		85	Y	18		35		53	N	24	41	62		85	Y
39	39	S191053039	KUTTY GAURY SANJAY	18		26		44	N	17	39	66		81	Y	18		26		44	N	17	39	66		81	Y
40	40	S191053040	LOKARE VISHAL JAGANNATH	26		40		66	Y	23	38	57		79	Y	26		40		66	Y	23	38	57		79	Y
41	41	S191053041	MAHALLE KAUSTUBH SUNIL	27		41		68	Y	25	39	56		80	Y	27		41		68	Y	25	39	56		80	Y
42	42	S191053042	MANE PRATHAMESH P.	25		47		72	Y	24	42	62		85	Y	25		47		72	Y	24	42	62		85	Y
43	43	S191053043	MAYANK GAURAV	21		38		59	Y	16	29	69		76	Y	21		38		59	Y	16	29	69		76	Y
44	44	S191053044	MULANI TAYYAB SHABBIR	20		0		20	N	24	28	55		71	Y	20		0		20	N	24	28	55		71	Y
45	45	S191053045	NAIK SAHIL HANUMAN	15		35		50	N	24	33	48		70	Y	15		35		50	N	24	33	48		70	Y
46	46	S191053046	NARKHEDE SAGAR S.	26		46		72	Y	23	42	55		80	Y	26		46		72	Y	23	42	55		80	Y
47	47	S191053047	NEMADE ADITYA THOMAS	0		41		41	N	24	42	56		81	Y			41		41	N	24	42	56		81	Y
48	48	S191053048	PAGARE SHIVAM RAMESH	26		36		62	Y	22	38	57		78	Y	26		36		62	Y	22	38	57		78	Y
49	49	S191053049	PARDESHI PRERNA PRAKASH	24		40		64	Y	19	41	57		78	Y	24		40		64	Y	19	41	57		78	Y
50	50	S191053050	PARTH PRAKASH SANGITRAO	21		29		50	N	23	39	52		76	Y	21		29		50	N	23	39	52		76	Y
51	51	S191053051	PATHAK VAISHNAVI DEEPAK	12		36		48	N	12	38	35		57	Y	12		36		48	N	12	38	35		57	Y
52	52	S191053052	PATIL BHUSHAN RAVINDRA	26		46		72	Y	25	39	63		85	Y	26		46		72	Y	25	39	63		85	Y
53	53	S191053053	PATIL OM VIJAY	0		46		46	N	25	46	69		93	Y	0		46		46	N	25	46	69		93	Y
54	54	S191053054	PATIL RUSHIKESH M.	26		45		71	Y	24	41	53		79	Y	26		45		71	Y	24	41	53		79	Y
55	55	S191053055	PATIL TEJAS RAJENDRA	27		46		73	Y	25	38	62		83	Y	27		46		73	Y	25	38	62		83	Y
56	56	S191053056	PAWAR HARIOM ANANTRAO	16		45		61	Y	20	38	49		71	Y	16		45		61	Y	20	38	49		71	Y
57	57	S191053057	POTE VAISHNAVI UPENDRA	22		48		70		24	41	36		67	Y	22		48		70	Y	24	41	36		67	Y
58	58	S191053058	PRASAD PRAKASH SANGITRAO	22		30		52	N	23	38	60		81	Y	22		30		52	N	23	38	60		81	Y
59	59	S191053059	PRASAD VISHNU KHARCHE	0		40		40	N	20	29	62		74	Y	0		40		40	N	20	29	62		74	Y
60	60	S191053060	PRATHAMESH	27		35		62	Y	26	28	50		69	Y	27		35		62	Y	26	28	50		69	Y
61	61	S191053061	RANJEET ANANDRAO KADAM	19		41		60	Y	23	37	64		83	Y	19		41		60	Y	23	37	64		83	Y
62	62	S191053062	RIYA TIJARE	27		41		68	Y	25	41	56		81	Y	27		41		68	Y	25	41	56		81	Y
63	63	S191053063	RUIKAR SAEE SUJIT	19		35		54	N	21	38	39		65	Y	19		35		54	N	21	38	39		65	Y
64	64	S191053064	SAHIL SHAIKH	27		46		73	Y	24	32	50		71	Y	27		46		73	Y	24	32	50		71	Y
65	65	S191053065	SANGAR PRANAV RAJENDRA	18		39		57	Y	18	37	62		78	Y	18		39		57	Y	18	37	62		78	Y
66	66	S191053066	SAWANT ANUSHKA KIRAN	18		35		53	N	21	42	48		74	Y	18		35		53	N	21	42	48		74	Y
67	67	S191053067	SHINDE PULKESH KESHAV	26		49		75	Y	23	36	62		81	Y	26		49		75	Y	23	36	62		81	Y
68	68	S191053068	SHINDE SHIVAM SANJAY	26		46		72	Y	25	37	52		76	Y	26		46		72	Y	25	37	52		76	Y

SINHGAD TECHNICAL EDUCATION SOCIETY'S

NBN SINHGAD TECHNICAL INSTITUES CAMPUS

Sinhgad Institutes

NBN Sinhgad School of Engineering, Ambegaon, Pune -41.

Department of Electronics and Telecommunication Engineering

Course: 204181 Electronic Circuits **Class:** SE

Academic Year: 2021-22 **Semester:**

CO1

Sr. No	ROLL NO.	EXAM SEAT NO.	Name of the Students	Internal UT1		PRELIM	ASSI/TUT	% of all tools	Students Attained Y/N	External IN SEM	PR	END SEM		% of all tools	Students Attained Y/N
			Total Marks	30		70		100.00	Y/N	30	50	70		150.00	Y/N
				Avg. Relevant Marks %					55	Avg. Relevant Marks %					55
69	69	S191053069	SHREYAS KAILAS SALUNKHE	25		37		62	Y	21	28	49		65	Y
70	70	S191053070	SURYAWANSHI YASH D.	18		40		58	Y	16	39	52		71	Y
71	71	S191053071	TAKALKAR AKSHADA RAJESH	18		34		52	N	24	25	39		59	Y
72	72	S191053072	TAKATE MAMALESHWAR SUNIL	17		43		60	Y	26	45	60		87	Y
73	73	S191053073	VINIT JAIBIR SIWACH	25		33		58	Y	24	41	56		81	Y
			Total	1408.0	0.0	2725.0	0.0	4133.0	42.0	1573.0	2643.0	4001.0	0.0	5478.0	73.0
			Average	19.56	0.00	37.85	0.00	57.40		21.55	36.21	54.81	0.00	75.04	

CO2

Sr. No	Name of the Students	Internal UT1		PRELIM	ASSI/TUT	% of all tools	Students Attained Y/N	External IN SEM	PR	END SEM		% of all tools	Students Attained Y/N
	Total Marks	30		70		100.00	Y/N	30	50	70		150.00	Y/N
		Avg. Relevant Marks %					55	Avg. Relevant Marks %					55
69	SHREYAS KAILAS SALUNKHE	25		37		62	Y	21	28	49		65	Y
70	SURYAWANSHI YASH D.	18		40		58	Y	16	39	52		71	Y
71	TAKALKAR AKSHADA RAJESH	18		34		52	N	24	25	39		59	Y
72	TAKATE MAMALESHWAR SUNIL	17		43		60	Y	26	45	60		87	Y
73	VINIT JAIBIR SIWACH	25		33		58	Y	24	41	56		81	Y
	Total	1408.0	0.0	2725.0	0.0	4133.0	43.0	1573.0	2643.0	4001.0	0.0	5478.0	73.0
	Average	19.56	0.00	37.85	0.00	57.40		21.55	36.21	54.81	0.00	75.04	

Attainment Level		CO1 Internal	CO1 External		CO2 Internal	CO2 External
If % Attainment <=50, Level obtained = **1 (Low)**	Total No fo Students	72	73	Total No fo Students	72	73
If % Attainment >50 & <66, Level obtained = **2 (Medium)**	No of students achieved	42	73	No of students achieved	43	73
If % Attainment >=66, Level obtained = **3 (High)**	% Attainment	58.33	100.00	% Attainment	59.72	100.00
	Attainment level	2	3	**Attainment level**	2	3

	CO1		CO2
A. Internal Attainment Level (20%)	0.40	A. Internal Attainment Level (20%)	0.40
B. External Attainment Level (80%)	2.4	B. External Attainment Level (80%)	2.4
Total CO1 Attainment level (A+B)	2.80	Total CO2 Attainment level (A+B)	2.80
Final CO Attainment level	2.80		

A Y	% RESULT
2018-19	77.27
2019-20	77.14
2020-21	100.00
Target Value	85

To measure course outcomes **attained level** through University examination are obtained by using **precribed levels** defined by program.

Gap Analysis

204181 CO	CO1	CO2	CO3	CO4	CO5	CO6	CO
Target Level	1.50	1.50	1.50	1.50	1.50	1.50	1.50
Attained Level	2.80	2.80	2.80	2.80	2.80	2.80	2.80
Action Required (Y/N)	N	N	N	N	N	N	N

Note: 1. Enter **Zero** marks for absent student

Sinhgad Institutes

SINHGAD TECHNICAL EDUCATION SOCIETY'S
NBN SINHGAD TECHNICAL INSTITUES CAMPUS
NBN Sinhgad School of Engineering, Ambegaon, Pune -41.
DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING
CO-ATTAINMENT SUMMARY TABLE
Academic Year: 2021-22

Sr. No.	Course	CO1	CO2	CO3	CO4	CO5	CO6	CO
1	207005	3.00	3.00	3.00	3.00	3.00	3.00	**3.00**
2	204181	2.80	2.80	2.80	2.80	2.80	2.80	**2.80**
3	204182	3.00	3.00	3.00	3.00	3.00	3.00	**3.00**
4	204183	3.00	3.00	3.00	3.00	3.00	3.00	**3.00**
5	204184	3.00	3.00	3.00	3.00	3.00	3.00	**3.00**
6	204191	1.40	3.00	1.40	1.40	1.40	1.40	**1.67**
7	204192	3.00	3.00	1.40	1.40	1.40	1.40	**1.93**
8	204193	3.00	3.00	1.40	1.40	1.40	1.40	**1.93**
9	204194	2.20	2.20	1.40	1.40	1.40	1.40	**1.67**
10	204198	3.00	3.00	3.00	3.00	3.00	3.00	**3.00**
11	204199	3.00	3.00	3.00	3.00	3.00	3.00	**3.00**
12	204200	3.00	3.00	3.00	3.00	3.00	3.00	**3.00**
13	304181	3.00	3.00	3.00	3.00	3.00	3.00	**3.00**
14	304182	3.00	3.00	3.00	3.00	3.00	3.00	**3.00**
15	304183	3.00	3.00	3.00	3.00	2.60	3.00	**2.93**
16	304184	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**
17	304185 C	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**
18	304190	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**	**3.00**
19	304192	**3.00**	**3.00**	**2.20**	**2.20**	**2.20**	**2.20**	**2.47**
20	304193	**3.00**	**3.00**	**1.00**	**1.00**	**1.00**	**1.00**	**1.67**
21	304194	**2.00**	**2.00**	**3.00**	**3.00**	**3.00**	**3.00**	**2.67**
22	304195 C	**3.00**	**3.00**	**2.20**	**2.20**	**2.20**	**2.20**	**2.47**

Sr. No.	Course	CO1	CO2	CO3	CO4	CO5	CO6	CO
23	304199	3.00	3.00	3.00	3.00	3.00	3.00	3.00
24	304200	3.00	3.00	3.00	3.00	3.00	3.00	3.00
25	404181	3.00	3.00	3.00	3.00	3.00	3.00	3.00
26	404182	2.60	2.60	3.00	3.00	3.00	3.00	2.87
27	404183	3.00	3.00	3.00	2.80	2.80	2.80	2.90
28	404184 A	3.00	3.00	3.00	2.40	3.00	2.40	2.80
29	404185 D	3.00	3.00	3.00	3.00	3.00	3.00	3.00
30	404188	3.00	3.00	3.00	3.00	3.00	3.00	3.00
31	404189	3.00	3.00	2.60	1.00	1.00	1.00	1.93
32	404190	2.60	2.60	2.60	1.00	1.00	1.00	1.80
33	404191 A	1.00	2.60	1.00	1.00	1.00	1.00	1.27
34	404192 C	1.00	1.00	3.00	1.40	1.40	1.40	1.53
35	404195	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Average		**2.76**	**2.85**	**2.63**	**2.47**	**2.47**	**2.47**	
% Average		**92.00**	**95.05**	**87.62**	**82.29**	**82.48**	**82.29**	

Course Co-ordinator

Program Co-ordinator

Director/Principal

PO and PSO Attainment

Calculating PO attainment for direct method

The PO attainment is calculated by using the predefined CO/PO matrix and the value of Final CO attainment for the subject

The PO attainment is calculated by using the formula

PO attainment = Avg, of CO's of a PO /3 X Final CO attainment for the subject

For Example, if you want to calculate the PO attainment value for PO1 in the below table

PO attainment for PO1 = (Avg. of CO's for PO1 / 3) X 2.97

PO attainment for PO1 = **2.97**

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PO-ATTAINMENT
Academic Year: 2021-22

Direct PO Attainment

Sr. No.	Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	207005	1.40	1.20	1.00	1.33	1.00	1.83	0.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00
2	204181	1.40	0.93	1.12	0.93	1.87	1.31	0.00	0.00	0.00	1.09	0.00	0.00	0.00	0.93	1.40
3	204182	1.00	1.17	1.75	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	2.00	0.00	0.00	1.00
4	204183	2.00	1.75	2.00	1.00	1.00	2.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00
5	204184	2.00	2.00	2.00	0.00	1.00	1.00	0.00	0.00	0.00	2.00	0.00	2.00	1.00	0.00	0.00
6	204191	1.67	1.17	1.00	1.00	1.00	0.00	0.00	0.00	0.00	1.00	0.00	1.33	1.00	0.00	1.00
7	204192	1.67	1.17	1.40	1.00	1.00	0.00	1.00	0.00	0.00	1.50	0.00	2.00	0.00	0.00	1.50
8	204193	1.20	1.17	1.17	1.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	1.00	1.00	0.00	1.00
9	204194	1.25	1.00	1.00	1.00	1.20	0.00	0.00	0.00	0.00	1.67	0.00	2.00	1.20	0.00	0.00
10	204198	1.25	1.00	1.00	1.00	1.20	0.00	0.00	0.00	0.00	1.67	0.00	2.00	1.20	0.00	0.00
11	204199	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.00	1.80	1.25	1.33	1.00	0.00	1.00	1.00
12	204200	2.00	1.33	1.00	1.50	2.00	1.00	0.00	1.50	1.33	2.00	1.00	1.00	0.00	1.00	1.00
13	304181	3.00	1.60	1.00	0.00	1.00	1.00	0.00	1.00	2.00	1.00	1.00	1.00	1.00	0.00	1.00
14	304182	2.17	1.50	1.80	1.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
15	304183	1.56	1.71	1.96	0.98	0.98	0.98	0.98	0.00	0.00	0.98	1.96	0.98	1.47	0.00	0.00
16	304184	2.00	0.00	1.67	0.00	2.00	1.67	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00
17	304185 C	1.33	0.00	1.33	1.33	1.67	0.00	0.00	1.33	1.17	1.00	0.00	1.50	0.00	1.33	1.67
18	304190	0.00	0.00	0.00	0.00	0.00	1.00	0.00	2.00	1.75	1.33	1.33	1.00	0.00	1.00	1.00
19	304192	1.51	0.00	0.00	0.00	1.51	1.51	1.51	1.15	0.82	0.96	1.44	1.64	1.23	1.10	0.99
20	304193	0.00	0.00	0.00	0.56	1.11	1.11	1.11	1.11	1.02	0.78	1.11	1.20	0.00	1.11	1.11
21	304194	1.63	0.89	0.89	0.00	0.00	1.63	0.00	1.78	1.78	1.78	1.78	1.63	1.04	0.89	0.89
22	304195 C	1.37	0.96	1.23	1.37	0.00	1.37	0.00	0.96	0.96	0.82	0.00	1.10	1.23	1.23	1.10
23	304199	3.00	2.00	3.00	3.00	3.00	2.00	2.00	3.00	3.00	3.00	2.00	2.00	2.00	3.00	1.00
24	304200	2.00	0.00	2.00	2.00	2.00	1.00	0.00	3.00	3.00	3.00	2.00	1.00	2.00	1.00	2.00
25	404181	1.00	1.00	1.60	1.00	2.00	1.33	0.00	1.25	0.00	1.33	1.50	1.00	2.00	1.33	1.67
26	404182	1.27	1.27	0.96	0.96	1.19	0.96	1.43	1.27	0.00	1.27	0.00	1.34	0.96	1.59	1.19
27	404183	1.21	0.97	1.29	0.97	0.97	0.97	0.97	1.45	1.45	1.21	0.97	1.29	1.29	1.29	1.45
28	404184 A	1.17	0.93	0.93	0.93	1.12	0.93	0.93	0.93	1.40	1.24	0.00	0.93	1.17	1.40	1.40
29	404185 D	1.00	1.20	1.20	1.25	1.33	1.00	1.00	1.33	1.33	1.00	1.00	1.00	1.00	1.20	1.20
30	404191 A	1.50	2.33	2.00	1.00	1.00	1.00	1.33	1.00	2.00	2.00	1.00	1.33	1.33	1.33	2.50
31	404192 C	1.33	1.17	1.67	1.60	1.25	1.00	1.00	0.00	0.00	0.00	0.00	1.00	1.00	0.00	1.00
	4195	0.60	0.60	0.60	0.60	0.60	0.80	0.60	0.80	0.60	0.60	0.60	0.60	0.60	0.60	1.00
	4191 A	0.42	0.42	0.42	0.56	0.59	0.42	0.42	0.42	0.42	0.42	0.42	0.56	0.56	0.56	0.53

Sr. No.	Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
34	404192 C	0.64	0.51	0.68	0.51	0.85	0.51	0.51	0.68	0.51	0.51	0.51	0.89	0.64	1.02	0.85
35	404195	2.00	2.00	2.33	1.33	1.33	2.00	2.00	1.00	2.50	1.50	2.00	1.50	1.33	1.50	2.00
DPOA	**27**	**1.52**	**1.25**	**1.39**	**1.13**	**1.30**	**1.20**	**1.11**	**1.36**	**1.49**	**1.38**	**1.31**	**1.30**	**1.17**	**1.19**	**1.24**

Indirect PO Attainment

Sr. No	Survey	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	Student	**2.63**	2.55	2.61	2.59	2.61	2.51	2.62	2.62	2.62	2.64	2.56	2.58	2.63	2.55	2.61
2	Parent	**2.61**	-	-	-	-	2.51	-	-	-	-	2.58	2.55	2.50	2.56	2.49
3	Teacher	**2.81**	2.76	-	2.76	2.54	2.74	-	-	2.74	-	2.78	2.84	2.62	2.59	2.38
4	Alumni	**-**	-	-	2.81	2.81	2.84	-	-	-	-	2.72	2.76	2.81	2.81	2.84
5	Placement	**2.78**	2.04	2.04	2.04	-	2.46	-	-	-	-	3.00	3.00	2.78	2.04	2.04
IPOA	**Average**	**2.71**	**2.45**	**2.33**	**2.55**	**2.65**	**2.61**	**2.62**	**2.62**	**2.68**	**2.64**	**2.73**	**2.75**	**2.67**	**2.51**	**2.47**

Direct PO Attainment	1.52	1.25	1.39	1.13	1.30	1.20	1.11	1.36	1.49	1.38	1.31	1.30	1.77	1.19	1.24
Indirect PO Attainment	2.71	2.45	2.33	2.55	2.65	2.61	2.62	2.62	2.68	2.64	2.73	2.75	2.67	2.51	2.47
A. 80% of Direct PO	1.21	1.00	1.11	0.91	1.04	0.96	0.89	1.09	1.19	1.11	1.05	1.04	0.94	0.95	0.99
B.20% of In Direct PO	0.54	0.49	0.47	0.51	0.53	0.52	0.52	0.52	0.54	0.53	0.55	0.55	0.53	0.50	0.49
PO Attainment (A+B)	**1.76**	**1.49**	**1.57**	**1.42**	**1.57**	**1.48**	**1.41**	**1.61**	**1.73**	**1.64**	**1.60**	**1.59**	**1.47**	**1.46**	**1.49**

Target PO	**1.60**	**1.32**	**1.46**	**1.23**	**1.43**	**1.33**	**1.29**	**1.52**	**1.63**	**1.48**	**1.47**	**1.42**	**1.28**	**1.36**	**1.37**
Achieved PO	**1.76**	**1.49**	**1.57**	**1.42**	**1.57**	**1.48**	**1.41**	**1.61**	**1.73**	**1.64**	**1.60**	**1.59**	**1.47**	**1.46**	**1.49**
Action Required	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N

Course Co-ordinator

Program Co-ordinator

Director/Principal

Sinhgad Institutes

SINHGAD TECHNICAL EDUCATION SOCIETY'S
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NBN Sinhgad School of Engineering, Ambegaon, Pune -41.
DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING
POs & PSOs Attainment Levels and Actions for improvement
Academic Year: 2021-22

POs	Target Level	Attainment Level	Observations
PO1:	**Engineering knowledge:** Apply knowledge of mathematics, science and engineering to analyze, design and evaluate mechanical components & systems using state -of-the-art IT tools.		
PO1	**1.60**	**1.76**	Quiz and Debates to adopt learning in team for fundamental subject is required.
Action	Target is achieved		

POs	Target Level	Attainment Level	Observations
PO2:	**Problem analysis:** Analyse problems of mechanical engineering including thermal, manufacturing and industrial systems to formulate design requirements		
PO2	**1.32**	**1.49**	
Action	Target is achieved		

POs	Target Level	Attainment Level	Observations
PO3:	**Design/development of solutions:** Design, implement, and evaluate mechanical systems and processes considering public health, safety, cultural, societal and environmental issues.		
PO3	**1.46**	**1.57**	Project based learning to find the need of society is to be implemented at Third year.
Action	Target is achieved		

POs	Target Level	Attainment Level	Observations
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.		
PO4	**1.23**	**1.42**	
Action	Target level achieved		

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POs & PSOs Attainment Levels and Actions for improvement
Academic Year: 2021-22

POs	Target Level	Attainment Level	Observations
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.		
PO5	**1.43**	**1.57**	Training programs on modern tools and technique is to be arranged.
Action	Target level achieved		

POs	Target Level	Attainment Level	Observations
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.		
PO6	**1.33**	**1.48**	
Action	Target level achieved		

POs	Target Level	Attainment Level	Observations
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.		
PO7	**1.29**	**1.41**	
Action	Target level achieved		

POs	Target Level	Attainment Level	Observations
PO8:	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.		
PO8	**1.52**	**1.61**	
Action	Target level achieved		

POs	Target Level	Attainment Level	Observations
PO9:	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.		
PO9	**1.63**	**1.73**	
Action	Target level achieved		

POs	Target Level	Attainment Level	Observations
PO10:	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.		
PO10	**1.48**	**1.64**	
Action	Target level achieved		

POs	Target Level	Attainment Level	Observations
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.		
PO11	**1.47**	**1.60**	Significance of preparing project plan for Technology transfer is to be adopted in mini project and final year project.
	arget level achieved		

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POs & PSOs Attainment Levels and Actions for improvement
Academic Year: 2021-22

POs	Target Level	Attainment Level	Observations
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.		
PO12	**1.42**	**1.59**	
Action	Target level achieved		

PSOs	Target Level	Attainment Level	Observations
PSO1:	Analyze, Design and Development of systems based on Cognitive Technology from concept to completion.		
PSO1	**1.28**	**1.47**	
Action	Target level achieved		

PSOs	Target Level	Attainment Level	Observations
PSO2:	Graduate make their mark globally and will apply their knowledge to enrich the entrepreneurship.		
PSO2	**1.36**	**1.46**	
Action	Target level achieved		

PSOs	Target Level	Attainment Level	Observations
PSO3:	Graduate will demonstrate professional and personal growth in Electronics & Telecommunication for solving real life problems.		
PSO3	**1.37**	**1.49**	Training programs for students on modern tools and technique is to be arranged.
Action	Target level achieved		

Course Co-ordinator Program Co-ordinator Director/Principal