Estd. 1962
"A++" Accredited by NAAC (2021)
With CGPA 3.52

SHIVAJI UNIVERSITY, KOLHAPUR
416 004, MAHARASHTRA
PHONE : EPABX – 2609000, BOS Section – 0231-2609094, 2609487
Web : www.unishivaji.ac.in Email: bos@unishivaji.ac.in

शिवाजी विद्यापीठ, कोल्हापूर
४१६ ००४, महाराष्ट्र
दूरध्वनी - इपीबीएक्स - २०६०९०००, अभ्यासमंडळे विभाग : ०२३१- २६०९०९४, २६०९४८७
वेबसाईट : www.unishivaji.ac.in ईमेल : bos@unishivaji.ac.in

SU/BOS/Sci & Tech/ 445 **Date: 01/08/2024**

To,

The Director,
Departments of Technology,
Shivaji University, Kolhapur.

Subject: Regarding New syllabus of **B. Tech. Programme (Department of Technology)** Part - II (Sem-III-IV) under the Faculty of Science and Technology as per National Education Policy 2020.

Sir/Madam,

With reference to the subject mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the revised syllabus B. Tech. Part - II (Sem - III & IV) under the Faculty of Science & Technology as per National Education Policy 2020.

As per NEP 2020 **B. Tech (Deparment of Technolgy) Syllabus -2024-25**		
No.	**BOS/Ad-hoc Board**	**Course Syllabus**
1	Civil Engineering and Technology	B.Tech. Part-II, (Sem- III – IV) Civil Engineering
2	Mechanical Engineering and Technology	B.Tech. Part-II, (Sem- III – IV) Mechanical Engineering
3	Computer Science Engineering and Technology	B.Tech. Part-II, (Sem- III – IV) Computer Science and Technology
4	Chemistry & Chemical Engineering	B.Tech. Part-II, (Sem- III – IV) Chemcial Engineering
5	Electronics Sciences, Electronics Engineering and Technology	B.Tech. Part-II, (Sem- III – IV) Electronics and Telecommunication Engineering
6	Food Science and Technology	B.Tech. Part-II, (Sem- III – IV) Food Technolgy

B. Tech First Year (Sem – I & II) all Branches syllabus and Rules, Regulation, Guidelines, Structure and equivalence shall be implemented from the academic year 2023- 2024 onwards. A soft copy containing syllabus is attached herewith and it is available on university website **www.unishivaji.ac.in. (Student Online Syllabus).**

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

Dr. S. M. Kubal
Dy. Registrar

Copy to:

1	The I/c Dean, Faculty of Science & Technology	6	Appointment Section A & B
2	The Chairpersan, Respective Board of Studies	7	Affiliation Section (T.1) (T.2)
3	OE 4	8	P.G.Admission Section, P.G Seminar Section
4	Eligibility Section,	9	Computer Centre

Shivaji University
Vidya Nagar, Kolhapur, Maharashtra 416004

Department of Technology

As per NEP2020 guidelines

Second Year B. Tech (Electronics and Telecommunication Engineering), Detailed Curriculum 2024-25 onwards

A. Component wise distribution of credits

(Expected range of credits as per AICTE & NEP2020 guidelines is 160-176)

Sr. No.	Category Suggested	Course Code	No. of Credits	Components %
1.	Humanities and Social Sciences including Management & Environment Courses	HSMEC	04	2.27
2.	Indian Knowledge System	IKS	05	2.84
3.	Ability Enhancement Course	AEC	03	1.70
4.	Value Education Courses	VEC	02	1.14
5.	Basic Science courses	BSC	27	15.34
6.	Engineering Science Courses including workshop, drawing, basics of civil/electrical/mechanical/computer etc.	ESC	34	19.32
7.	Professional Core Courses	PCC	54	30.69
8.	Professional Elective Courses relevant to chosen specialization/branch	PEC	06	3.41
9.	Open subjects – Electives from other technical and /or emerging subjects	OEC	12	6.82
10.	Project , Seminar and Internship	PSI	15	8.52
11.	Multidisciplinary Minor	MDM	14	7.95
11.	Vocational and Skill Enhancement Courses	VSEC	Audit Courses	-
12.	Project Based Learning	PBL		
13	Mandatory Audit Courses [Some other courses Decided at the Institute level but that do not get fit in the credits]	MAC (HSMEC)*		
	Total		176	**100**

* Please note that most of the courses under HSMEC have been covered under audit courses.

B. Engineering Graduate Attributes

1. Domain specific Engineering Knowledge
2. Problem Analysis Ability
3. Acquiring Skills that enable them to Design & Develop Solutions to the Problems
4. Capacity to investigate Complex Problems
5. Familiarity of using Modern Tools
6. Understanding Engineer's role and connectivity towards Society
7. Awareness about Environment & Sustainability
8. Practicing ethics and values
9. Ability to work as an Individual & in a Team also
10. Acquiring Communication skills
11. Becoming well verse with task of Project management & Finance aspects
12. Developing Lifelong Learning attitude

C. B. Tech (Electronics & Telecommunication Engineering) Program: Vision, Mission, PEOs and POS.

Vision

To develop competent professionals in electronics and communication engineering to serve industry, academia and society.

Mission

- To provide strong foundation of basic sciences, mathematics and electronics engineering to graduates.
- To create awareness of social, cultural, technological issues and inculcate strong ethical principles among graduates.
- To develop technological professionals with leadership, management and team qualities.
- To pursue continuous improvement in knowledge and skills.

Program Educational Objectives (PEOs)

The Program Educational Objectives (PEOs) provides a clear vision for the long-term achievements of your program's graduates, guiding curriculum design and teaching practices to align with industry and societal needs. PEOs also serve as benchmarks for assessing program success and ensuring that graduates are prepared for their careers and lifelong learning.

PEO 1- Providing strong fundamentals to graduates in Mathematics, Science and Engineering to enable them to provide solutions for problems in electronics, communications and other relevant disciplines.

PEO 2- Provide sound theoretical and practical knowledge in electronics and communication engineering to enable them to contribute in growth of industry and progress of society.

PEO 3- Development of analytical and thinking abilities for research and development activities, leadership and entrepreneurship.

PEO 4- Motivate the qualities required for team work, inter-personal communications, and professional skills and to act as good human being and responsible citizenship.

Program Outcomes (POs)

Program Outcomes provide a clear roadmap for the education and development of chemical engineering students, ensuring that your program is effective, relevant, and aligned with industry standards and expectations.

1. **Domain Specific Engineering Knowledge:** Apply principles from mathematics, physics, chemistry, and engineering to solve complex chemical engineering problems.
2. **Problem Analysis Ability:** Develop skills to analyse and solve problems encountered in chemical and allied industries and consultancy services.
3. **Acquiring Skills to Design/Develop Solutions to Problems:** Design and manage chemical processes and systems while considering current and emerging industrial practices.
4. **Capacity to Investigate Complex Problems:** Identify new research areas and utilize advanced research methods to analyse data and draw conclusions, aiming for innovative solutions in chemical engineering.
5. **Modern Tool Usage:** Select and apply modern engineering and IT tools, including modeling and prediction techniques, to complex engineering tasks.
6. **The Engineer's Connectivity with Society:** Assess and address societal, health, safety, legal, and cultural issues with informed engineering judgement.
7. **Environment and Sustainability Awareness:** Understand and integrate environmental impacts and sustainability into engineering solutions.
8. **Practicing Ethics and Values:** Uphold professional ethics and responsibilities in engineering practice.
9. **Ability to Work as an Individual and in Team:** Work effectively both individually and as a part of diverse and multidisciplinary teams.

10. **Acquiring Communication Skills:** Communicate complex engineering information effectively through written reports, presentations, and interpersonal communication.
11. **Well Versed with Task of Project Management and Finance Aspects:** Apply engineering and management principles to lead and manage projects in multidisciplinary environments.
12. **Life-Long Learning Attitude:** Recognize and engage in lifelong learning to stay abreast of technological advancements in engineering.

Shivaji University, Kolhapur
Department of Technology

Second Year B.Tech (Electronics & Telecommunication Engineering), Semester- III
Teaching & Evaluation Scheme

S.N.	Category	Code	Course Title	Hours per week			Contact Hours	Credits	Evaluation scheme	
									Theory	Practical
				L	T	P			ISE:ESE	IE:EE
1.	Basic Science Course	BSC211	Engineering Mathematics–III	03	01	-	04	04	30:70	50:00
2.	Professional Core Courses	PCC212	Electronic Circuit Design	03	-	02	05	04	30:70	00:50
3.	Professional Core Courses	PCC 213	Digital Electronics	03	-	02	05	04	30:70	00:50
4.	Professional Core Courses	PCC 214	Network Analysis	03	01	-	04	04	30:70	50:00
5.	Engineering Science Courses	ESC211	Programming Techniques	02	-	02	04	03	30:70	00:50
6.	Ability Enhancement Courses	AEC211	Soft Skills Development	01	-	-	01	01	-	50:00
							-	**20**	**500**	**300**
7.	Humanities, Social Sciences, Management, Environment	HSMEC 211	Environmental Studies	02	-	-	02	University Exam at the Even Semester End		
			Total Hours	17	02	06	**25**	-	-	-

Shivaji University, Kolhapur
Department of Technology

Second Year B. Tech (Electronics and Telecommunication Engineering), Semester- IV

Teaching and Evaluation Scheme

S.N.	Category	Code	Course Title	Hours per week			Contact Hours	Credits	Evaluation scheme	
									Theory	Practical
				L	T	P			ISE:ESE	IE:EE
1.	Basic Science Course	BSC 221	Measurements & Instrumentation	03	-	02	05	04	30:70	50:00
2.	Professional Core Course	PCC 221	Signals & Systems	03	01	-	04	04	30:70	50:00
3.	Professional Core Course	PCC 222	Analog & Digital Communication	03	-	02	05	04	30:70	00:50
4.	Professional Core Course	PCC 223	Analog Electronics	03	-	02	05	04	30:70	00:50
5.	Professional Core Course	PCC 224	Data Structures	02	01	-	03	03	30:70	00:50
6.	MDM Course	MDM 221	Multidisciplinary Minor Course I*	03	-	-	03	03	30:70	00:00
7.	Indian Knowledge Systems	IKS 221	Introduction to Performing Arts	01	-	-	01	01	-	50:00
							-	**23**	**600**	**300**
8.	Mandatory Audit Course	MAC 221	Aptitude Enhancement Course I	02	-	-	02	IE at Course in charge end		
9.	Humanities, Social Sciences, Management Environment	HSMEC 221	Environmental Studies	02	-	-	02	University Exam at the Even Semester End		
			Total Hours	22	02	06	**30**	-	-	-

*Note: The MDM course will be from the chosen multidisciplinary title.

<table>
<tr><td>Year, Program, Semester</td><td colspan="5">Second Year B.Tech (Electronics & Telecommunication Engineering), Part 2, During Semester III</td></tr>
<tr><td>Course Code</td><td colspan="5">BSC211</td></tr>
<tr><td>Course Category</td><td colspan="5">Basic Science Course</td></tr>
<tr><td>Course title</td><td colspan="5">Engineering Mathematics-III (Theory)
(Linear Algebra and Advanced Calculus)</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>03</td><td>01</td><td>-</td><td>04</td><td>04</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="2">ISE:30</td><td colspan="2">ESE: 70</td><td>Total=100</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="5">Knowledge of Matrix algebra, Differential Calculus and Integral Calculus</td></tr>
<tr><td>Course Rationale</td><td colspan="5">This course offers a mathematical understanding for engineering applications. This course produce graduates with mathematical knowledge, computational skills and the ability to deploy these skills effectively in the solution of problems, principally in the area of engineering.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. To familiarize students with Linear algebra
2. To provide knowledge of Linear differential equations and its applications
3. To study Laplace transform and its applications
4. To study Fourier series and Fourier transform
5. To Study Vector differentiation and its applications.</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">1. Apply the knowledge of Linear algebra to solve mathematical and Engineering Problems.
2. Solve linear differential equations and apply them on simple electric circuit.
3. Gain the basic knowledge of Laplace transform and their applicability in solving initial value problems.
4. Understands the new notion of Fourier series, Fourier transform and their usability.
5. Analyze and solve engineering problems using vector differentiation.</td></tr>
</table>

Course Outcome and Program Outcome Mapping

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

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	Hours
1.	**Linear Algebra:** Matrix Algebra, Rank of a matrix, Normal and echelon form of a matrix, Consistency of the system of linear equations, Solution of system of linear homogeneous equations, Solution of system of linear non-homogeneous equations,Linear dependence and independence of vectors, Eigen values and Eigen vectors, Cayley-Hamilton's Theorem (Without proof).	07
2.	**Linear Differential Equations:** Linear Differential Equations with constant coefficients, Homogenous Linear differential equations, Method of variation of parameters, Applications of LDE with constant coefficients to Electrical systems.	06
3.	**Laplace Transform**: Definition- Laplace transform, Properties of Laplace transform, Laplace transform of derivatives, Laplace transform of integral, Inverse Laplace transforms, Convolution theorem, Applications to initial value boundary problems, Laplace transform of Heaviside Unit step function, Laplace transform of Dirac delta function, Laplace transform of Periodic function.	07
4.	**Fourier Series:** Fourier series ,Fourier cosine series, Fourier sine series, Half range cosine series, Half range sine series, Full range series,	07
5.	**Fourier Transform:** Fourier transforms, Fourier sine transforms, Fourier cosine transforms, Complex form of Fourier integral, Finite Fourier sine transforms, Finite Fourier cosine transforms.	06
6.	**Vector Differentiation:** Differentiation of vectors, Gradient of scalar point function, Directional derivative, Divergence of vector point function, Curl of a vector point function, Irrotational and solenoidal vector field.	06

General Instructions:

1. Each Student has to write at least 6 assignments on entire syllabus.
2. Batch wise tutorials are to be conducted. The number of students per batch should be as per the practical batches.
3. Students must be encouraged to solve engineering mathematics problems using different mathematical software's like MATLAB, Scilab etc.

Sr. No.	Reference Books
1.	Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons.
2.	B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi.
3.	N. P. Bali, Iyengar "A text book of Engineering Mathematics by", Laxmi Publications (P)Ltd., New Delhi.
4.	C. R. Wylie, "Advanced Engineering Mathematics", McGraw Hill Publication, New Delhi.
5.	H. K. Dass, "Advanced Engineering Mathematics", S. Chand Publishing.
6.	S. S. Sastry, "Engineering Mathematics (Volume-I)", Prentice Hall Publication, New Delhi.
7.	M. D. Greenberg, "Advanced Engineering Mathematics", Pearson Education.
8.	J. N. Wartikar & P. N.Wartikar , "A text book of Applied Mathematics: Vol. I, II and III" Vidyarthi Griha Prakashan, Pune.
9.	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi.
Sr. No.	**Important web links**

1.	https://nptel.ac.in/courses/111105121
2.	https://nptel.ac.in/courses/111105134
3.	https://nptel.ac.in/courses/111105035
4.	https://nptel.ac.in/courses/111105167
5.	https://nptel.ac.in/courses/111102133

<table>
<tr><td>Year, Program, Semester</td><td colspan="5">Second Year B.Tech (Electronics & Telecommunication Engineering), Part 2, During Semester III</td></tr>
<tr><td>Course Code</td><td colspan="5">BSC211</td></tr>
<tr><td>Course Category</td><td colspan="5">Basic Science Course</td></tr>
<tr><td>Course title</td><td colspan="5">Engineering Mathematics-III (Tutorial)</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>-</td><td>01</td><td>-</td><td>01</td><td>01</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="2">-</td><td colspan="2">IE: 50</td><td>Total=50</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="5">Knowledge of Matrix algebra, Differential Calculus and Integral Calculus</td></tr>
<tr><td>Course Rationale</td><td colspan="5">This course offers a mathematical understanding for engineering applications. This course produce graduates with mathematical knowledge, computational skills and the ability to deploy these skills effectively in the solution of problems, principally in the area of engineering.</td></tr>
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4. Understands the new notion of Fourier series, Fourier transform and their usability.
5. Analyze and solve engineering problems using vector differentiation.</td></tr>
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Course Outcome and Program Outcome Mapping

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

Level of Mapping as: Low 1, Moderate 2, High 3

	Course Content	Hours
1	Introduction and Examples on Consistency of the system of linear equations	**1**
2	Examples on Linear dependence and independence of vectors	**1**
3	Introduction to Eigen values and Eigen vectors	**1**
4	Examples on Linear Differential Equations with constant coefficients	**1**
5	Applications of LDE with constant coefficients to Electrical systems	**1**
6	Examples on Properties of Laplace transform	**1**
7.	Inverse Laplace transforms	**1**
8.	Applications of Laplace transform	**1**
9.	Examples on Fourier series	**1**
10.	Introduction of Fourier transforms	**1**
11.	Examples on Fourier transforms	**1**
12.	Examples on Divergence of vector point function	**1**
13.	Examples on Curl of a vector point function	**1**

General Instructions:

1. Minimum 8 tutorials should be carried out based on above list or syllabus.
2. Batch wise tutorials are to be conducted. The number of students per batch should be as per the practical batches.
3. Students must be encouraged to solve engineering mathematics problems using different mathematical software's like MATLAB, Scilab etc.

Sr. No.	**Reference Books**
1	Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons.
2	B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi.
3	N. P. Bali, Iyengar "A text book of Engineering Mathematics by", Laxmi Publications (P)Ltd., New Delhi.
4	C. R. Wylie, "Advanced Engineering Mathematics", McGraw Hill Publication, New Delhi.
5	H. K. Dass, "Advanced Engineering Mathematics", S. Chand Publishing.
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7	M. D. Greenberg, "Advanced Engineering Mathematics", Pearson Education.
8	J. N. Wartikar & P. N.Wartikar , "A text book of Applied Mathematics: Vol. I, II and III" Vidyarthi Griha Prakashan, Pune.
9	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi.
Sr. No.	**Important web links**
1	https://nptel.ac.in/courses/111105121

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3	https://nptel.ac.in/courses/111105035
4	https://nptel.ac.in/courses/111105167
5	https://nptel.ac.in/courses/111102133

Year, Program, Semester	Second Year B.Tech (Electronics & Telecommunication Engineering), Part II, Semester III				
Course Code	PCC212				
Course Category	Professional Core Courses				
Course title	Electronic Circuit Design				
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**
	03	-	02	05	04
Evaluation Scheme	**ISE:30**			**ESE: 70**	**Total=100**
Pre-requisites (if any)	Prerequisites: Basic understanding of mathematics, physics and electronics components and familiarity with principles of science and engineering.				
Course Rationale	This course deals with design and implementation aspects of primitive power supply and amplifier circuits.				
Course Objectives	1. Understand the operation principles of half-wave, full-wave, and bridge rectifiers. 2. Design filters for unregulated power supplies. 3. Identify the need for voltage regulator circuits. 4. Understand the importance of biasing in transistor circuits. 5. Analyze clipping circuits (diode and transistor clippers) and clamping circuits. 6. Study power considerations and types of distortion in power amplifiers.				
Course Outcomes	1. Analyze and design rectifier circuits. 2. Analyze and design the unregulated power supplies. 3. Analyze and design voltage regulator circuits. 4. Describe the transistor biasing circuits. 5. Analyze and design the passive wave shaping circuits. 6. Analyze and design power amplifier circuits.				

Course Outcome and Program Outcome Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1	1	1								
CO 2	3	2	3	3								
CO 3	3	2	3	3	3							
CO 4	3	1	3	3								
CO 5	3	3		1								
CO 6	3	2	3	3	3							3
PSO1	3	3	3	3	2							
PSO2	2	3	1	3	2							

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	Hours
1	**Rectifier analysis and design** Half wave rectifier, full wave rectifier, bridge rectifier, analysis and comparison of different parameters like PIV, TUF, efficiency, ripple factor, regulation, etc. specifications and ratings of diodes and transformers. Design of rectifier circuits.	06
2	**Filters and unregulated power supplies** Filters, need of filters, types of filters- C filter, L filter, LC filter, CLC filter, RC filter, ripple factor and regulation based analysis, design of all filters, advantages, disadvantages and applications of unregulated power supplies , Design of unregulated power supplies with filters	06
3	**Voltage regulator circuits** Need of voltage regulator circuits, types of voltage regulators, Zener voltage regulator, transistorized shunt voltage regulator, transistorised series voltage regulator, IC voltage regulators using ICs:78XX, 79XX, IC723, LM317, Switching regulator: Introduction and study of LM3524 IC.	06
4	**Transistor Biasing** Need of biasing, DC load line analysis, operating point, thermal runaway. Analysis of different biasing circuits: fixed bias, collector to base bias & voltage divider bias. Stability factor, General expression for stability factor, design of biasing circuits, Compensation techniques: Thermistor and diode compensation, CE, CB & CC configurations, Design of Single stage RC coupled amplifier.	06
5	**Wave Shaping Circuits** Low pass & high pass RC circuits (square & step response), High pass RC circuit as a differentiator, Low pass RC circuit as integrator. Clipping circuits: Classification, diode clippers transistor clippers, Transfer characteristics, Design & analysis of clipper circuits. Clamping circuits: Classification, clamping operations, Clamping circuit theorem, practical clamping circuits. Voltage multipliers: Doubbler, Trippler & Qudrappler circuits.	06
6	**Power Amplifiers** Need of Power amplifier, classification of power amplifier, Power considerations, Distortion in power amplifiers: Phase, Frequency, amplitude/ harmonic /nonlinear distortion, amplitude distortion using Three-point method. Class A single ended transformer coupled amplifier& class A Push pull amplifiers analysis and design, Class B amplifier & class B push pull amplifier analysis & design, crossover distortion, class AB Push pull amplifiers analysis and design Complementary symmetry power amplifier, class C amplifier.	06
Sr.No.	**Text Books**	
1.	J. B. Gupta, 'Electronics Devices and Circuits' , Katson Books	
Sr. No.	**Reference Books**	

1.	Robert L. Boylsted, Louis Nashelsky- 'Electronic devices & circuit theory'- 9th edition- Pearson Education
2.	vid A. Bell –'Electronic devices & circuits'- 4th Edition- Prentice- Hall India
3.	anufacturer data sheets
Sr. No.	**Important web links**
1	https://www.electronics-tutorials.ws/

Year, Program, Semester	Second Year B.Tech (Electronics & Telecommunication Engineering), Part II, Semester III						
Course Code	PCC212						
Course Category	Professional Core Courses						
Course title	Electronic Circuit Design Lab						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**		**Total Credits**	
	-	-	02	02		01	
Evaluation Scheme	**ISI**	**ESE**	**IOE**	**IPE**	**EOE**	**EPE**	**Total**
	-	**-**	**-**	**-**	**-**	**50**	**50**
Pre-requisites (if any)	Prerequisites: Basic understanding of mathematics, physics and electronics components and familiarity with principles of science and engineering.						
Course Rationale	This course deals with design and implementation aspects of primitive power supply and amplifier circuits.						
Course Objectives	1. Design of the rectifier. 2. Illustrate properties of unregulated power supply. 3. Discuss the need of regulated power supply. 4. Discuss the need of transistor biasing. 5. Discuss the need of wave shaping circuits 6. Discuss the working principle of power amplifiers.						
Course Outcomes	1. Analyze and design rectifier circuits 2. Analyze and design the unregulated power supplies. 3. Analyze and design voltage regulator circuits. 4. Design Single stage RC coupled amplifier. 5. Design the wave shaping circuits. 6. Analyze and design power amplifiers.						

Course Outcome and Program Outcome Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1	1	1								
CO 2	3	2	3	3								
CO 3	3	2	3	3	3							
CO 4	3	1	3	3								
CO 5	3	3		1								
CO 6	3	2	3	3	3							3
PSO1	3	3	3	3	2							
PSO2	2	3	1	3	2							

Expt. No.	Course Content
1	Design & analysis of Half wave rectifier (HWR) with & without filter by calculating performance parameters.
2	Design & analysis of Full wave rectifier (FWR) with & without filter by calculating performance parameters.
3	Design & analysis of Bridge rectifier with & without filter by calculating performance parameters.
4	Design & analysis of C, L, LC, CLC filter.
5	Design & analysis of fixed voltage regulator.
6	Design & analysis of adjustable voltage regulator.
7	Design and analysis of single stage RC coupled CE amplifier.
8	Design and analysis of series and parallel clippers.
9	Design and analysis of positive and negative clampers.
10	Design and analysis of RC low pass filter as an integrator.
11	Design and analysis of RC high pass filter as differentiator.
12	Design and analysis of Class A power amplifier.
13	Design and analysis of Class B power amplifier.
14	Design and analysis of Class AB power amplifier.
Sr. No.	**Text Books**
1	J. B. Gupta, 'Electronics Devices and Circuits' , Katson Books
Sr. No.	**Reference Books**
1	Robert L. Boylsted, Louis Nashelsky- 'Electronic devices & circuit theory'- 9th edition-Pearson Education

2	David A. Bell –'Electronic devices & circuits'- 4th Edition- Prentice- Hall India
3	Manufacturer data sheets
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1	https://www.electronics-tutorials.ws/

<table>
<tr><td>Year, Program, Semester</td><td colspan="5">Second Year B.Tech (Electronics & Telecommunication Engineering),
Part 2, Semester III</td></tr>
<tr><td>Course Code</td><td colspan="5">PCC 213</td></tr>
<tr><td>Course Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Digital Electronics</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>03</td><td>-</td><td>02</td><td>05</td><td>04</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="2">ISE:30</td><td colspan="2">ESE: 70</td><td>Total=100</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="5">Knowledge of basic Mathematics</td></tr>
<tr><td>Course Rationale</td><td colspan="5">The Digital Electronics course is designed to provide students with a fundamental understanding of the principles, theories, and applications of digital circuits and systems. In today's technologically driven world, digital electronics form the backbone of numerous devices and systems, ranging from computers to embedded systems. This course aims to equip students with the knowledge and skills required to design, analyze, and troubleshoot digital circuits, laying the foundation for careers in fields such as electronics, computer engineering, and information technology.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. Introduce fundamental concept of digital techniques.
2. Enhance basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.
3. Conduct the analysis and design of various digital electronic circuits.
4. Develop a skill to build and troubleshoot digital circuits.
5. Introduce to simulation tools for digital electronics</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">1. Understand number systems and its arithmetic operations and Illustrate use of Boolean algebra.
2. Formulate and apply Karnaugh Map to reduce Boolean expressions and logic circuits to their simplest forms.
3. Design and analyse of different combinational circuits.
4. Understand working of flip-flops and apply conversion of flip flops
5. Design and analyse of sequential circuits.
6. Understand logic families and Remembering concept of memory technology</td></tr>
</table>

Course Outcome and Program Outcome Mapping

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

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	urs
1	**Binary Codes and Boolean algebra** Binary Number System. Addition, Subtraction, Multiplication, Division of binary numbers, Subtraction using 2's complement method. Binary codes: weighted and non weighted codes, self complementary codes, BCD, Gray codes, Alphanumeric codes, ASCII Codes. Boolean algebra: Boolean Laws and Expression using Logic Gates, Realization of different gates using Universal gates, De-Morgan's Theorem, Duality Theorems.	**06**
2	**Boolean Function minimization Techniques** Standard forms: SOP, POS, Simplification of Switching function & representation (Maxterm & Minterm), Boolean expression & representation using logic gates, Propagation delay in logic gate. Karnaugh map: K-map, mapping and minimization of SOP and POS expression, Don't care condition, conversion from SOP to POS and POS to SOP form using K-map, Minimization of multiple output circuits	**06**
3	**Combinational Circuits Design** Adder & Subtractor(Half and Full), Parallel Binary adder, BCD Adder, Code Converters, Comparators, Decoder, BCD to 7-segment Decoder, Encoders, Priority Encoders, Multiplexers, De Multiplexers	**06**
4	**Sequential Circuits Elements** Introduction to sequential circuit, Flip-flop & Timing Circuits: SR latch, Gated latch, Tri state logic, Edge triggered flip-plop: - D, JK, T Flip-flop, flip-flop asynchronous inputs ,characteristic table of Flip-flop, excitation table of Flip-flop, master slave JK flip flop, inter conversion of Flip-flop.	**06**
5	**Shift Registers and Counters** Shift registers: buffer register, controlled buffer register. Data transmission in shift resistor SISO, SIPO, PISO, PIPO, Bidirectional shift register, universal shift registers. Counter: Classification, Ripple or asynchronous counter, Effect of propagation delay in ripple counters, up-down counter, Design of Mod-n counter, synchronous counter, Ring counter, Johnson counter.	**06**
6	**Logic Families and Memory Technology** Digital IC specification terminology, Logic families: TTL, CMOS families, comparison of TTL & CMOS, Memory Technology: Memory organization, Classification of Memory.	**06**
No.	**ference Books**	

1	M. Morris Mano ‘Digital Design’ (Third Edition). PHI Publications
2	Willim I. Fletcher.’An Engineering Approach to Digital Design’ PHI
3	Norman Balabanian Bradle Carlson. ‘Digital Logic Design Principals.’ Wiley Publication.
4	Rajkamal ‘Digital Systems Principals and Design’ Pearson Education
5	A.P. Malvino, D.P. Leach ‘Digital Principles & Applicatios’ -VIth Edition-TMH publication.
6	A. Anand Kumar ‘Fundamentals of Digital Circuits’. PHI Publications
7	R.P. Jain-‘Modern Digital Electronics’ IIIrd Edition- Tata Mc Graw Hill, Publication
Sr. No.	**portant web links**
1	https://onlinecourses.nptel.ac.in/noc24_ee52/preview

Year, Program, Semester	Second Year B.Tech (Electronics & Telecommunication Engineering), Part 2, During Semester III						
Course Code	PCC 213						
Course Category	Professional Core Courses						
Course title	**Digital Electronics Laboratory**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**		**Total Credits**	
	-	-	02	02		01	
Evaluation Scheme	**ISI**	**ESE**	**IOE**	**IPE**	**EOE**	**EPE**	**Total**
	-	**-**	**-**	**-**	**-**	**50**	**50**
Pre-requisites (if any)	Knowledge of basic Mathematics						
Course Rationale	The Digital Electronics course is designed to provide students with a fundamental understanding of the principles, theories, and applications of digital circuits and systems. In today's technologically driven world, digital electronics form the backbone of numerous devices and systems, ranging from computers to embedded systems. This course aims to equip students with the knowledge and skills required to design, analyze, and troubleshoot digital circuits, laying the foundation for careers in fields such as electronics, computer engineering, and information technology.						
Course Objectives	1. Introduce fundamental concept of digital techniques. 2. Enhance basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits. 3. Conduct the analysis and design of various digital electronic circuits. 4. Develop a skill to build and troubleshoot digital circuits.						
Course Outcomes	1. Understand number systems and its arithmetic operations and Illustrate use of Boolean algebra. 2. Formulate and apply Karnaugh Map to reduce Boolean expressions and logic circuits to their simplest forms. 3. Design and analyse of different combinational circuits. 4. Understand working of flip-flops and apply conversion of flip flops 5. Design and analyse of sequential circuits. **6.** Understand logic families and Remembering concept of memory technology						

Course Outcome and Program Outcome Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1	1	1								
CO 2	3	2	3	3								
CO 3	3	2	3	3	3							
CO 4	3	1	3	3								
CO 5	3	3		1								
CO 6	3	2	3	3	3							3
PSO1	3	3	3	3	2							

PSO2	2	3	1	3	2							

	List of Experiments 1. Study of basic gates 2. Study of Universal gates (NAND, NOR) 3. K map based implementation of combinational logic 4. Half and Full Adder, Half and Full Subtractor 5. 4- bit parallel Adder / Subtractor using IC 7483 6.Code Converters (Binary to Gray, Excess 3 to Binary) 7. Comparator using IC 7485 8. Implementation of combinational logic using MUX 9. Study of Decoder and DEMUX (IC 74138) 10. Study of 7 segment decoder driver. (IC 7447) 11. Study of Flip Flops (SR FF, D FF, JK FF, T FF) 12. Design Built and test MOD N counter 13. Design Built and test Shift Register 14. Design and implementation of Johnson Counter Design 3 bit sequence detector **Minimum eight experiments should be conducted from above list or based on syllabus.**

Sr. No.	**Reference Books**
1.	M. Morris Mano 'Digital Design' (Third Edition). PHI Publications
2.	Willim I. Fletcher.'An Engineering Approach to Digital Design' PHI
3.	Norman Balabanian Bradle Carlson. 'Digital Logic Design Principals.' Wiley Publication.
4.	Rajkamal 'Digital Systems Principals and Design' Pearson Education
5.	A.P. Malvino, D.P. Leach 'Digital Principles & Applicatios' -VIth Edition-TMH publication.
6.	A. Anand Kumar 'Fundamentals of Digital Circuits'. PHI Publications
7.	R.P. Jain-'Modern Digital Electronics' IIIrd Edition- Tata Mc Graw Hill, Publication
Sr. No.	**Important web links**
1.	https://onlinecourses.nptel.ac.in/noc24_ee52/preview

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<tr><td>Year, Program, Semester</td><td colspan="5">Second Year B.Tech (Electronics & Telecommunication Engineering), Part 2, During Semester III</td></tr>
<tr><td>Course Code</td><td colspan="5">PCC214</td></tr>
<tr><td>Course Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Network Analysis</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>03</td><td>01</td><td>-</td><td>04</td><td>04</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="3">ISE:30</td><td>ESE: 70</td><td>Total=100</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="5">Prerequisites for this course typically include Engineering Mathematics I and II, Electronic devices and circuits</td></tr>
<tr><td>Course Rationale</td><td colspan="5">This course will give fundamental knowledge of linear electronic circuits , the network theorems , two-port networks , filters , attenuators and their analysis.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. To introduce basic theorems used for network analysis.
2. To teach two port networks and its parameters.
3. To clarify series and parallel resonance and its use.
4. To demonstrate response of RL,RC and RLC circuits
5. To impart design methods for filters
6. To impart design methods for attenuators</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">1. Apply appropriate network theorem to find circuit solution.
2. Understand resonant circuits.
3. Analyze circuit using different network theorems.
4. Calculate parameters of two port network.
5. Understand the step input response in RL,RC and RLC circuits
6. Design different filters and attenuator</td></tr>
</table>

Course Outcome and Program Outcome Mapping

	PO 1	PO2	PO3	**PO4**	PO	PO6	PO7	PO8	PO9	PO 10	PO 11	PO12	PSO1	PSO2
CO 1	3	1											3	
CO 2	3	3	3	1									3	
CO 3	3	3	3	1	1								3	3
CO 4	3	3	1	1									3	3
CO5	3	3	3	1	1								3	3
CO6	3												1	

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	urs
1	**Circuit Fundamentals** Voltage sources, Current sources, Conversion of voltage sources to current sources and vice a versa. Network terminology :- Node ,Junction, Branch, Loop, Network solution by branch current method, Loop or Mesh current method, Node voltage method, Star delta connection and conversion Network Theorems:-Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Superposition Theorem, Millman's theorem	**06**
2	**Resonance Circuits** Series resonance circuit, Frequency response of a series resonant circuit, Effect of Q on bandwidth and selectivity, Relation between bandwidth and Q, Impedance of a series resonant circuit, Resonance by variation of L and C, Parallel resonant circuit	**06**
3	**Two-Port Networks** Two- port network parameters: y, z, h, A B C D Inter-conversion of two port networks, cascade connection series connection, series parallel connection, T and π network representation of a two port network.	**06**
4	**Network Functions** Transform of circuit elements, Network functions, Stability, Transient response: - step input response in R-L circuit, step input response in R-C circuit, step input response in R-L- C circuit	**06**
5	**Filters** Definitions, classification and characteristics of different filters, decibel, neper. Design and analysis of constant K filter (low pass, high pass, band pass, and band stop filters): T and PI sections	**06**
6	**Attenuators** Definitions, classification, relation between neper and decibel, analysis and design of T type, π type, lattice, bridged –T and L types attenuators	**06**

No.	Reference Books
1	A.Sudhakar, Shymmohan S. Palli, 'Circuit and Network – Analysis and Synthesis', 3rd Edition, Tata McGraw Hill Publication
2	D. Roy Choudhuri, 'Networks and Systems', New Age International Publisher.
3	A. Chakrabarti, 'Circuit theory (Analysis and Synthesis)', IIIrd edition, Dhanpat Rai and Co.
4	M.E.Van Valkenburg, 'Network Analysis', IIIrd edition, Pear sons Education/PHI.

5	Josheph Edministrar, 'Theory and Problems of Electronic Circuit (Schaum's Series) – Tata McGraw Hill Publication.
6	Soni Gupta, 'Electrical Circuit Analysis', Dhanpat Rai and Co.
Sr. No.	**Important web links**
1	https://onlinecourses.nptel.ac.in/noc22_ee07/preview
2	https://www.youtube.com/watch?v=7Nh7ISeqn6E&list=PLbRMhDVUMngfNnABo5mre45ZbHqJE2sUn

Year, Program, Semester	Second Year B.Tech (Electronics & Telecommunication Engineering), Part 2, During Semester III						
Course Code	PCC214						
Course Category	Professional Core Courses						
Course title	**Network Analysis Tutorial**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**		**Total Credits**	
	-	01	-	01		01	
Evaluation Scheme	**ISI**	**ESE**	**IOE**	**IPE**	**EOE**	**EPE**	**Total**
	-	**-**	**50**	**-**	**-**	**-**	**50**
Pre-requisites (if any)	Prerequisites for this course typically include Engineering Mathematics I and II, Electronic devices and circuits						
Course Rationale	This course will give fundamental knowledge of linear electronic circuits , the network theorems , two-port networks , filters , attenuators and their analysis.						
Course Objectives	1. To introduce basic theorems used for network analysis. 2. To teach two port networks and its parameters. 3. To clarify series and parallel resonance and its use. 4. To demonstrate response of RL,RC and RLC circuits 5. To impart design methods for filters 6. To impart design methods for attenuators						
Course Outcomes	1. Apply appropriate network theorem to find circuit solution. 2. Understand resonant circuits. 3. Analyze circuit using different network theorems. 4. Calculate parameters of two port network. 5. Understand the step input response in RL,RC and RLC circuits 6. Design different filters and attenuator						

Course Outcome and Program Outcome Mapping

	PO 1	PO2	PO3	**PO4**	PO	PO6	PO7	PO8	PO9	PO 10	PO 11	PO12	PSO1	PSO2
CO 1	3	1											3	
CO 2	3	3	3	1									3	
CO 3	3	3	3	1	1								3	3
CO 4	3	3	1	1									3	3
CO5	3	3	3	1	1								3	3
CO6	3												1	

Level of Mapping as: Low 1, Moderate 2, High 3

Sr.No.	Title of Tutorials
1.	Problems based on star and delta connections and their conversions
2.	Problems based on energy source transformations
3.	Problems based on series and parallel resonance circuits
4.	Problems based on z parameters of two –port networks
5.	Problems based on y parameters of two –port networks
6.	Problems based on h parameters of two –port networks
6.	Problems based on ABCD parameters of two –port networks

Sr.No.	**Reference Books**
1	A.Sudhakar, Shymmohan S. Palli, 'Circuit and Network – Analysis and Synthesis', 3rd Edition, Tata McGraw Hill Publication
2	D. Roy Choudhuri, 'Networks and Systems', New Age International Publisher.
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1	https://onlinecourses.nptel.ac.in/noc22_ee07/preview
2	https://www.youtube.com/watch?v=7Nh7ISeqn6E&list=PLbRMhDVUMngfNnABo5mre45ZbHqJE2sUn

<table>
<tr><td>Year, Program, Semester</td><td colspan="5">Part 2, Semester III</td></tr>
<tr><td>Course Code</td><td colspan="5">ESC211</td></tr>
<tr><td>Course Category</td><td colspan="5">Engineering Science Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Programming Techniques</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>02</td><td>-</td><td>02</td><td>04</td><td>03</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="2">ISE:30</td><td colspan="2">ESE: 70</td><td>Total=100</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="5">Basics of computer fundamentals, C Programming</td></tr>
<tr><td>Course Rationale</td><td colspan="5">This course intends to teach the students the basic concepts of object-oriented programming (OOP) that can be applied to solve real world problems. Because of complex nature of real world problems, programs are prone to error and programming errors can become expensive. Object-Oriented Programming offers a new and powerful way to coupe with this complexity. Its goal is clearer, more reliable, more easily maintained programs. This course will act as backbone for all other subjects that are based on Object Oriented concept.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. Explain the basic concepts and techniques which form the object oriented programming paradigm.
2. Strengthen their problem solving ability by applying the characteristics of an object-oriented approach.
3. Introduce object oriented concepts in C++.
4. Elaborate fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
5. Help to implement the object oriented concepts to solve problems
6. Demonstrate to develop an application applying the object oriented concepts</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">1. Explain what constitutes an object-oriented approach to programming and identify potential benefits of object-oriented programming over other approaches.
2. Apply an object-oriented approach to developing applications of varying complexities.
3. Take a problem and develop the structures to represent objects and the algorithms to perform operations.
4. Apply standards and principles to write truly readable code.
5. Test a program and, if necessary, find mistakes in the program and correct them.
6. Develop applications using object oriented concepts</td></tr>
</table>

Course Outcome and Program Outcome Mapping

	PO 1	PO2	PO3	**PO4**	PO	PO6	PO7	PO8	PO9	PO 10	PO 11	PO12	PSO1	PSO2
CO 1	3	1											3	
CO 2	3	3	2	1									2	
CO 3	3	2	3	1	1								3	3
CO 4	3	3	1	1									2	1
CO5	3	3	2	1	1								3	3
CO6	3												1	

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	Hours
1	**Introduction to Object Oriented Programming Language.** Introduction to Procedural, Object oriented programming Language. Characteristics and applications of OOP, advantages of OOP over procedural programming, fundamentals of object-oriented programming: objects, classes, data members, methods, messages, data encapsulation, data abstraction and information hiding, inheritance, polymorphism. Functions in C++, Function prototype, call by value, call by reference, inline function, default & constant argument.	**06**
2	**Classes and Objects** Definition of a class, Declaring classes and object, Access specifiers: public, private, protected, defining member functions inside or outside class. Nesting of member functions, Private Member function, making outside function inline. Arrays within a Class, Memory allocation for objects. Static data member, Static member functions. Array of Objects & Passing Objects as Function Arguments in C++.	**06**
3	**Constructors & Destructors** Overview of constructors and destructors, Purpose and significance in C++ programming. Basic syntax and usage. Types of constructors: Default Constructors, Parameterized Constructors, Copy Constructors. Constructor overloading. Introduction to destructors, Role in resource management and clean-up.	**06**

4	**Polymorphism & Inheritance** Need of Polymorphism, concept, Compile time polymorphism or early binding: function over loading and operator overloading, operator overloading using member function and friend function, overloading - unary, binary, arithmetic operators, relational operators, Overloading new and delete operators, insertion and extraction operators, Run time polymorphism or late binding using Virtual function, pure virtual function, Abstract class, Type conversion. Need of Inheritance, Concept, public, private, protected inheritance, Single inheritance, Multiple and multilevel inheritance, Hybrid Inheritance, Virtual base class, overriding of member functions, static variable, static function, friend function, friend class.	**06**
5	**Pointers** Definition and purpose of pointers. Understanding memory addresses and variables. Basic syntax for declaring and using pointers. Pointer Operations: Dereferencing pointers to access data. Pointers and arrays: relationship and equivalence. Accessing array elements using pointers. Pointers basics of memory management, dynamic memory allocation using New and delete operators, Pointer to object, Pointer to data members, this pointer. Pointer to derived class.	**06**
6	**File handling & exception handling, STL** Introduction to file handling in C++ Opening and closing files, File streams: ifstream, ofstream, and fstream File modes: input, output, append. Reading from Files, Writing to Files File, Input/output Operations Exception handling: Introduction, syntax for exception handling code: trycatch-throw, Multiple Exceptions, Exceptions with arguments Exception Handling, STL: An overview, containers, vectors, lists, maps.	**06**

Sr. No.	**Text/reference Books**
1	E Balgurusamy –'Object oriented programming with C++' -, IInd Edition- Tata McGraw Hill Publication
2	Y Kanetkar- 'Let Us C++', BPB Publications
3	Herbert Schildt –'The Complete Reference C++' - IIIrd Edition - Tata McGraw Hill Publication
4	Ravichandran D.-'Programming with C++ '-IInd Edition- Tata McGraw Hill Publication
5	Robert Lafore –'C++ Programming' –. IV th Edition –Techmedia, New Delhi
Sr. No.	**Important web links**
1	https://www.geeksforgeeks.org/cpp-tutorial/
2	https://www.javatpoint.com/cpp-tutorial

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<tr><td>Year,
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Semester</td><td colspan="7">Second Year B.Tech (Electronics & Telecommunication Engineering), Part II, Semester III</td></tr>
<tr><td>Course Code</td><td colspan="7">ESC211</td></tr>
<tr><td>Course Category</td><td colspan="7">Engineering Science Courses</td></tr>
<tr><td>Course title</td><td colspan="7">Programming Techniques Laboratory</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td colspan="2">Total Contact Hours</td><td colspan="2">Total Credits</td></tr>
<tr><td>-</td><td>-</td><td>02</td><td colspan="2">02</td><td colspan="2">01</td></tr>
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<tr><td>-</td><td>-</td><td colspan="2">-</td><td>-</td><td>-</td><td>50</td><td>50</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="7">Basics of computer fundamentals, C Programming</td></tr>
<tr><td>Course Rationale</td><td colspan="7">The C++ Object-Oriented Programming (OOP) laboratory course aims to provide hands-on experience in applying the principles and features of object-
oriented programming using the C++ language.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">1. Understanding of the core concepts of object-oriented programming
2. Understanding Classes and Objects
3. Implementing Different Types of Constructors
4. Understanding Polymorphism and Inheritance
5. Understand how pointers can be used as function arguments to pass data by reference
6. Exploring File Stream Modes and Error Handling:</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">1.Implement class attributes and methods to encapsulate data and behavior effectively.
2.Proficiency in Class Definition and Object Creation
3.Knowledge of Constructor and Destructor Invocation
4.Proficiency in Designing Class Hierarchies
5.Proficiency in Function Pointers
6.Practicing File Reading and Writing</td></tr>
</table>

Course Outcome and Program Outcome Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	3	1	1	1								
CO 2	3	2	3	3								
CO 3	3	2	3	3	3							
CO 4	3	1	3	3								
CO 5	3	3		1								
CO 6	3	2	3	3	3							3
PSO1	3	3	3	3	2							
PSO2	2	3	1	3	2							

Level of Mapping as: Low 1, Moderate 2, High 3

List of Experiments

Sr.No.	Tittle
1.	Introduction to C++ programming Setting up IDEs (Integrated Development Environments) like Code::Blocks, Visual Studio, or any other preferred IDE.
2.	Exploring different data types and variable manipulation.
3.	Understanding and implementing various operators and expressions.
4.	Manipulating arrays and strings.
5.	Defining and calling functions with different parameter passing methods.
6.	Implementing structures and classes with their member functions.
7.	Introduction to classes and objects.
8.	Implementing constructors, destructors, and member functions.
9.	Implement function overloading with different argument types and/or number.
10.	Implement inheritance types: public, private, and protected.
11.	Declare friend functions and classes to access private members of a class.
12.	Utilizing pointers and managing dynamic memory.
13.	File Handling: Reading from and writing to files.
14.	Use exception handling mechanisms in member functions.

Sr. No.	Text/reference Books
1.	E Balgurusamy –'Object oriented programming with C++' -, IInd Edition- Tata McGraw Hill Publication
2.	Y Kanetkar- 'Let Us C++', BPB Publications
3.	Herbert Schildt –'The Complete Reference C++' - IIIrd Edition - Tata McGraw Hill Publication
4.	Ravichandran D.-'Programming with C++ '-IInd Edition- Tata McGraw Hill Publication
5.	Robert Lafore –'C++ Programming' –. IV th Edition –Techmedia, New Delhi
Sr. No.	**Important web links**
1.	https://www.geeksforgeeks.org/cpp-tutorial/

Year, Program, Semester	Part 2, Semester III				
Course Code	AEC211				
Course Category	Ability Enhancement Courses				
Course title	**Soft Skill Development**				
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**
	01	-	-	01	01
Evaluation Scheme	**IE:50**			**EE: 00**	**Total=50**
Pre-requisites (if any)	H.S.C. Level English Language competency				
Course Rationale	In today's competitive professional landscape, technical skills alone are insufficient. Soft skills such as communication, teamwork, problem-solving, and adaptability are essential for engineering graduates to thrive in their careers. This course aims to equip students with the necessary soft skills to complement their technical expertise and enhance their employability and success in the workplace.				
Course Objectives	The teacher will 1. Help to enhance communication, teamwork, problem-solving skills. 2. Help to foster adaptability and resilience in engineering contexts				
Course Outcomes	At the end of the course, the students will be- 1. Proficient in oral and written communication. 2. Effective as regards teamwork and collaboration skills. 3. Able to apply critical thinking to industrial problems. 4. Able to demonstrate adaptability and resilience in profession.				

Course Outcome and Program Outcome Mapping

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

Level of Mapping as: Low 1, Moderate 2 & High 3

Unit No.	Course Content	Hours
1	**Written communication** • Email Writing • Technical Report	**03**
2	**Oral Communication** • Presentation Skills	**02**
3	**Soft Skills** • Importance of Soft Skills • Overview of Various Soft Skills	**02**
4	**Team Spirit & Leadership Ability** • Understanding team dynamics and roles • Building trust and rapport within team	**02**
5	**Assessment** • Discussion on incorporating soft skills development into daily practice • Case Studies or Role-Play	**05**
Sr. No.	**Text/reference Books**	
1	Sharma R. & Krishna Mohan (2017), Business Correspondence and Report Writing, McGraw Hill Education	
2	P. D. Chaturvedi & Mukesh Chaturvedi (2013), *Business Communication: Skills, Concepts & Applications*, Pearson Publications, New Delhi, 3rd Edition, Seventh Impression	

3	K. K. Sinha (2006), *Business Communication*, 2nd Edition (Reprint), Galgotia Publishing, New Delhi
4	Khera, S. (1998). "You Can Win: A Step by Step Tool for Top Achievers." New Delhi: Macmillan Publishers India.
5	Covey, S. R. (2004). "The 7 Habits of Highly Effective People." New York: Free Press.
6	Carnegie, D. (2009). "How to Win Friends and Influence People." New York: Pocket Books.
7	Bradberry, T., & Greaves, J. (2009). "Emotional Intelligence 2.0." San Diego, CA: TalentSmart.
8	Dweck, C. S. (2006). "Mindset: The New Psychology of Success." New York: Ballantine Books.

Course Assessment Method

For the internal assessment of the course, with a total evaluation is of 50 marks. Combination of different evaluation methods can be utilized to ensure comprehensive assessment of the students' performance. Following Evaluation Components are suggested:

1. **Quizzes/Tests**
   Periodic quizzes or tests to evaluate students' understanding of key concepts and their ability to apply them.

2. **Activity 1**
   Group activity focusing application of creative thinking and teamwork; designed to assess both individual and group performance

3. **Activity 2**
   Group activity focusing application of creative thinking and teamwork; designed to assess both individual and group performance

4. **Classroom Participation and Engagement**
   Demonstrating engagement with course material and Active participation in class discussions, group activities and question-answer sessions.

<table>
<tr><td>Year, Program, Semester</td><td colspan="5">2024-25 Semester III</td></tr>
<tr><td>Course Code</td><td colspan="5">HSMEC211</td></tr>
<tr><td>Course Category</td><td colspan="5">Humanities, Social Science, Management, Environment</td></tr>
<tr><td>Course title</td><td colspan="5">Environmental Studies</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td></td></tr>
<tr><td>02</td><td>-</td><td>-</td><td>02</td><td></td></tr>
<tr><td>Evaluation Scheme</td><td colspan="5">SEE: 70 Marks + IOE: 30 Marks, evaluation only at Even Semester End.</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="5">-</td></tr>
<tr><td>Course Rationale</td><td colspan="5">The Course is all about learning the way we should live and how we can develop sustainable strategies to protect the environment. It helps individuals to develop an understanding of living and physical environment and how to resolve challenging environmental issues affecting nature.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The course teacher will
1. Introduce students to the fundamental concepts and principles of environmental science.
2. Describe the components of various ecosystems and their interrelationships.
3. Classify different types of natural resources and assess their availability and distribution.
4. Define biodiversity and its significance to ecosystem functioning and human well-being.</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">Upon completion of this course, student should be able to –
1. Define key terms and concepts related to environmental science.
2. Analyse ecosystem services and their importance to human well-being.
3. Identify various types of natural resources and their significance.
4. Describe the levels and patterns of biodiversity and their importance.</td></tr>
</table>

Course Outcome and Program Outcome Mapping

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

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	Hours
1	**Nature of Environmental Science** Definition, scope and importance. Multidisciplinary nature of environmental studies Need for public awareness. Introduction to sustainable development: Sustainable Development Goals (SDGs) -targets and indicators, challenges and strategies for SDGs.	04
2	**Ecosystem** Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession.Food chains, food webs and ecological pyramids, Introduction, types, characteristics features, structure and function of the Following ecosystem: -Forest ecosystem, b) Grassland ecosystem, c) Desert ecosystem, d) Aquaticecosystems (ponds, streams, lakes, rivers, oceans, estuaries) Degradation of ecosystems and its impacts.	06
3	**Natural Resources and Associated Problems** Overview of natural resources: Definition of resource; Classification of natural resources-biotic and abiotic, renewable and non-renewable. Forest resources: Use and over-exploitation, deforestation, dams and their effectson forests and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Water scarcity and stress; Conflicts over water. Soil and Mineral resources: Soil as resource and its degradation , Usage and exploitation, Environmental effects of extracting and using mineral resources., Wasteland reclamation, Energy resources: Growing energy needs, renewable and non- renewable energy resources, use of alternate energy sources. Solar energy, Biomass energy, Nuclearenergy, Role of Indian traditions and culture in conservation of the environment	08

4	**Biodiversity and its conservation** Introduction- Definition: genetic, species and ecosystem diversity, Bio-geographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, India as a mega- diversity nation. Western Ghats as a biodiversity region. Hot-spots of biodiversity, Threats to biodiversity habitat loss, poaching of wildlife, man- wildlife, Conflicts, Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation Ramsar sites; Biosphere reserves; Protected Areas; Ecologically Sensitive Areas; Coastal Regulation Zone	**07**

Sr.	**Text Books**
1	Agarwal, K. C., 2001, Environmental Biology, Nidi Publ. Ltd., Bikaner.
2	Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad, 380013, India.
3	Brunner R. C., 1989, Hazardous Waste Incineration, McGraw Hill Inc,
	Text/reference Books
1	Cunningham, W. P. Cooper, T. H. Gorhani, E. & Hepworth, M. T. ,2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai,
2	Gleick, H., 1993, Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press.
3	Hawkins R. e., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R).
4	Heywood, V. H. & Watson, R. T., 1995, Global Biodiversity Assessment, Cambridge Univ. Press.
5	Jadhav, H. & Bhosale, V. M., 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi.
6	Mckinney, M. L. & Schocl. R. M. ,1996, Environmental Science Systems & Solutions, Web enhanced edition
	Important web links

1	https://onlinecourses.swayam2.ac.in/cec19_bt03/previewrwrr3
2	http://nitttrc.edu.in/nptel/courses/video/109105203/L41.html

<table>
<tr><td>Year, Program, Semester</td><td colspan="5">Second Year B.Tech (Electronics & Telecommunication Engineering),
Part 2, Semester IV</td></tr>
<tr><td>Course Code</td><td colspan="5">BSC 221</td></tr>
<tr><td>Course Category</td><td colspan="5">Basic Science Course</td></tr>
<tr><td>Course title</td><td colspan="5">Measurements and Instrumentation</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>03</td><td>-</td><td>02</td><td>05</td><td>04</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="2">ISE:30</td><td colspan="2">ESE: 70</td><td>Total=100</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="5"></td></tr>
<tr><td>Course Rationale</td><td colspan="5">The Measurements and Instrumentation course is designed to provide students with a foundational understanding of the principles, techniques, and instruments used in the field of measurements. In engineering and scientific disciplines, accurate and precise measurements are essential for analysis, control, and optimization of various processes. This course aims to equip students with the theoretical knowledge and practical skills needed to perform accurate measurements and effectively use instrumentation in diverse applications. Through this course, students will develop a strong foundation for pursuing advanced studies and careers in fields such as electrical engineering, physics, and related disciplines.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. Introduce students to the fundamental concepts of measurements, including units, standards, and measurement errors.
2. Familiarize students with the principles of instrumentation and measurement devices.
3. Provide an in-depth understanding of sensors and transducers used for converting physical quantities into measurable electrical signals.
4. Explore techniques for conditioning signals from sensors and transducers.
5. Introduce students to data acquisition systems for capturing, storing, and processing measurement data.</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">1. Explain fundamental principles of measurement and instrumentation.
2. Identify and use different type’s transducers for various measurement applications.
3. Evaluate the selection criteria for choosing specific AC or DC Bridge in different applications.
4. Demonstrate different types of display devices and oscilloscopes and handling these instruments.
5. Demonstrate different signal generators and spectrum analyser.
6. Describe the components and functions of data acquisition systems</td></tr>
</table>

Course Outcome and Program Outcome Mapping

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

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	Hours
1	**Introduction to Measurements Systems and Measuring Instruments** Measurements, elements of generalized measurement system, measurement system performance, static and dynamic characteristic, Errors- Types & source of error. Dual Slope Integrating type DVM, digital frequency meter, Q meter, phase measurement.	04
2	**Transducers** Definition, classification, transducer selection, different types of transducers, strain gauges, RTD, thermistor, thermocouple, LVDT, capacitive transducers, piezoelectric transducer, photovoltaic cell, LDR, Elastic pressure transducer – bellows, bourdon tubes, ultrasonic transducers – level measurement	08
3	**AC and DC Bridges** DC bridges: Introduction, wheatstone's bridge, Kelvin bridge, guarded Wheatstone bridge, AC bridges: Condition for bridge balance .Maxwell bridge, Hay bridge, Schering bridge, wein bridge.	06
4	**Oscilloscope & Display Devices** Introduction of Dual Beam and dual trace oscilloscope , Sampling, Digital storage, digital readout, measurement of phase and frequency using Lissajous pattern, CRO probes, Display devices: classification of display devices & principle: LED,LCD	06
5	**Signal Generators and Analyzers** Signal generators: Function generators, Sweep, pulse and square wave generator. Wave Analyzers: basic wave analyzer, heterodyne harmonic distortion analyzer, spectrum analyzer, logic analyser.	06
6	**Data Acquisition System and Conversion** Introduction, Objective of DAS, ,Single channel & Multichannel DAS ,DAC concepts: Binary weighted DAC, R-2R ladder circuit DAC, ADC concepts: flash, single slope, dual slope, stair case Ramp ADC, successive approximation ADC, Data Loggers	06

Sr. No.	Reference Books
1	A.K.Sawhney 'A Course in Electrical & Electronics Measurement & Instrumentation.' –11th Edition, 1996 --Dhanpat Rai & sons
2	C.S. Rangan ,G.R. Sharma , V.S.V. Mani 'Instrumentation devices and system' 2nd edition --Tata McGraw Hill Publication
3	B.C.Nakra, K.K.Choudhary 'Instrumentation, Measurement and Analysis', 2nd edition -- Tata McGraw Hill Publication
4	E.O.Doebeline.'Measurement systems application and design 'Tata McGraw Hill Publication
5	Oliver Cage 'Electronic measurement and instrumentation 'Tata McGraw Hill PublicationPublishers.
6	H .S. Kalsi 'Elecronic Instrumentation' – 2nd edition --Tata McGraw Hill Publication
7	A. D. Helfrick , W. D. Cooper ' Modern Electronic Instrumentation and Measurement Techniques'--Pearson Education
Sr. No.	**Important web links**
1	https://onlinecourses.nptel.ac.in/noc24_me12/preview

<table>
<tr><td>Year, Program, Semester</td><td colspan="7">Second Year B.Tech (Electronics & Telecommunication Engineering),
Part 2, Semester IV</td></tr>
<tr><td>Course Code</td><td colspan="7">BSC 221</td></tr>
<tr><td>Course Category</td><td colspan="7">Basic Science Course</td></tr>
<tr><td>Course title</td><td colspan="7">Measurements and Instrumentation Laboratory</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td colspan="2">Total Contact Hours</td><td colspan="2">Total Credits</td></tr>
<tr><td>-</td><td>-</td><td>02</td><td colspan="2">02</td><td colspan="2">01</td></tr>
<tr><td rowspan="2">Evaluation Scheme</td><td>ISI</td><td>ESE</td><td>IOE</td><td>IPE</td><td>EOE</td><td>EPE</td><td>Total</td></tr>
<tr><td>-</td><td>-</td><td>-</td><td>50</td><td>-</td><td>-</td><td>50</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="7"></td></tr>
<tr><td>Course Rationale</td><td colspan="7">This course deals with analysis and design of various digital electronic circuits with its applications.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">1. Specify clear objectives for measurements based on the properties of the physical quantity being measured.
2. Choose appropriate instruments for specific measurement tasks.
3. Perform calibration procedures for various instruments.
4. Set up and configure data acquisition systems.</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">1. Explain fundamental principles of measurement and instrumentation.
2. Identify and use different type’s transducers for various measurement applications.
3. Evaluate the selection criteria for choosing specific AC or DC Bridge in different applications.
4. Demonstrate different types of display devices and oscilloscopes and handling these instruments.
5. Demonstrate different signal generators and spectrum analyser.
6. Describe the components and functions of data acquisition systems.</td></tr>
</table>

	List of Experiments **1.** Study of temperature transducers: a) RTD b) Thermocouple c) Thermistor **2.** Study of displacement transducers: a) Inductive b) Capacitive c) Resistive **3.** Study of weight measurement using strain gauge: **4.** Study of speed measurement using : a) Magnetic pick up b) Photoelectric pick up **5.** Study of AC and DC bridges: a) Wheastones' bridge b) Maxwell's bridge c) Wein bridge **6.** Measurement of frequency and phase using Lissageous patterns **7.** Study of digital storage oscilloscope **8.** Study of spectrum analyzer **9.** Study of pressure measurement using bourdon tube **10.** Study of DAC using R-2R ladder network

Sr. No.	**Reference Books**
1	A.K.Sawhney 'A Course in Electrical & Electronics Measurement & Instrumentation.' – 11th Edition, 1996 --Dhanpat Rai & sons
2	C.S. Rangan ,G.R. Sharma , V.S.V. Mani 'Instrumentation devices and system' 2nd edition --Tata McGraw Hill Publication
3	B.C.Nakra, K.K.Choudhary 'Instrumentation, Measurement and Analysis', 2nd edition -- Tata McGraw Hill Publication
4	E.O.Doebeline.'Measurement systems application and design 'Tata McGraw Hill Publication
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7	A. D. Helfrick , W. D. Cooper ' Modern Electronic Instrumentation and Measurement Techniques'-- Pearson Education

Sr. No.	Important web links
1	https://onlinecourses.nptel.ac.in/noc24_me12/preview
2.	https://www.udemy.com/course/electronic-measurements-and-instrumentation/?utm_source=adwords&utm_medium=udemyads&utm_campaign=DSA_Catchall_la.EN_cc.INDIA&utm_content=deal4584&utm_term=_.ag_82569850245_.ad_533220805574_.kw_.de_c_.dm_.pl_.ti_dsa-21781902600_.li_9146233_.pd_.&matchtype=&gad_source=1&gclid=CjwKCAiAivGuBhBEEiwAWiFmYXAIWhj2TLlhm3TFFSlbmrGOXGKs3X9IchTQR8PLJ_M25NqgNyt4aRoC79cQAvD_BwE&couponCode=IND21PM

<table>
<tr><td>Year, Program, Semester</td><td colspan="5">Second Year B.Tech (Electronics & Telecommunication Engineering), Part 2, During Semester IV</td></tr>
<tr><td>Course Code</td><td colspan="5">PCC 221</td></tr>
<tr><td>Course Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Signals and Systems</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>03</td><td>01</td><td>-</td><td>04</td><td>04</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="2">ISE:30</td><td colspan="2">ESE: 70</td><td>Total=100</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="5">Differential Equations, Laplace Transform, z-Transform.</td></tr>
<tr><td>Course Rationale</td><td colspan="5">In typical applications of science and engineering, we have to process signals, using systems. The applications may vary from communication systems to control systems, but the basic analysis and design tools can be common. In this course, we are going to study all the fundamental mathematical signal processing tools like convolution, Fourier analysis, Laplace and Z transform. Main aim of the course is to study the use of these said tools in the analysis of linear time-invariant (LTI) systems. This course is fundamental course in the field of Signal Processing. This course builds concrete base for advanced courses like Digital Signal Processing, Audio and Speech Signal Processing, Image processing, Biomedical signal processing etc.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. Explain classification of continuous and discrete time signals and systems
2. Demonstrate Analysis and Characterization of the CT and DT systems through Time domain method.
3. Discuss Spectral analysis of CT periodic and aperiodic signals using CT Fourier methods.
4. Explain Characterization of the CT systems through Laplace Transform and Fourier Transform.
5. Explain Analysis and Characterization of the DT systems through Z Transform.</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">1. Differentiate between different types of signals.
2. Identify type of Systems.
3. Analyze LTI systems in time domain.
4. Apply Fourier techniques to transform the signals in frequency domain.
5. Analyze LTI systems using Laplace transform and Z- transforms.
6. Demonstrate signals and interdependencies of time and frequency domain parameters.</td></tr>
</table>

Course Outcome and Program Outcome Mapping

	PO1	PO2	PO3		PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													3	
CO 2	3	1												3	2
CO 3	3	2	1		2									3	2
CO 4	3	3	1		2									3	2
CO 5	3	3	1		2									3	2
CO 6	3	2				1								3	2

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	Hours
1	**Introduction to Signals:** Signals, Continuous and discrete time signals, Classification of Signals , Periodic aperiodic, even & odd energy and power signals, deterministic and random signals, complex exponential and sinusoidal signals , periodicity properties of discrete time signals, complex exponential, unit impulse, unit step, impulse functions, transformation of independent variable.	**05**
2	**Systems and Time domain analysis** Properties of systems: Linearity, Causality, Time invariance, Stability, Invertability. Time domain analysis of LTI systems: System modeling, Solution of Differential equation with initial conditions, Zero state response and Zero input response, representation of LTI system by impulse response (continuous and discrete Convolution), Identifying properties of system from impulse	**08**
3	**Frequency domain Analysis of systems** Fourier series representation of continuous time and discrete time periodic signals (Exponential), properties of continuous time and discrete time Fourier series. Continuous time and discrete time Fourier Transform, properties of the CT and DT Fourier Transform, Characterization using differential and difference equation, Parseval's relation, convolution in time and frequency domains, applications of Fourier transform.	**08**
4	**Sampling Theorem** Representation of continuous time signals by its sample, Sampling theorem, aliasing effect, antialiasing , methods reconstruction of a Signal from its samples, Interpolation techniques, discrete time processing of continuous time signals, sampling of band pass signals.	**03**
5	**Laplace Transform** Introduction, pole-zero plot, ROC, Properties of Laplace Transform, Inverse Laplace transform using partial fraction method, transfer function of LTI-CT system, impulse response and transfer function, convolution and de-convolution using LT, stability in S domain, system realization of LTI system in S domain. Application: solution of electronics circuit, solution of differential equation.	**08**
6	**Z-Transform** Basic principles of z-transform, z-transform definition, region of convergence, properties of ROC, Properties of z-transform, Poles and Zeros, inverse z-transform using residue Theorem, power Series expansion and partial fraction expansion, Computation of Impulse response & Transfer	**07**

	function using Z Transform, stability of LTI Systems, system realization of LTI system in Z domain. Applications: solution of difference equation.	

Sr. No.	Reference Books
1	Nagoor Kani, “Signals & Systems”, Tata McGraw Hill
2	Anand Kumar, “Signals & Systems”, PHI
3	AlanV.Oppenheim, Alan S.Willsky with S.Hamid Nawab, “Signals & Systems”, Pearson Education.
4	K.Lindner, “Signals and Systems”, McGraw Hill International, 1999.
5	Michael J. Roberts “Fundamentals of signals & systems”, Tata McGraw Hill, 2007
Sr. No.	**Important web links**
1	https://onlinecourses.nptel.ac.in/noc24_ee36/preview

<table>
<tr><td>Year, Program, Semester</td><td colspan="5">Second Year B.Tech (Electronics & Telecommunication Engineering), Part 2, During Semester IV</td></tr>
<tr><td>Course Code</td><td colspan="5">PCC 221</td></tr>
<tr><td>Course Category</td><td colspan="5">Compulsory Course for Certification in Electronics & Telecommunication Engineering</td></tr>
<tr><td>Course title</td><td colspan="5">Signals and Systems (Tutorial)</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>--</td><td>01</td><td>--</td><td>01</td><td>01</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="3">---</td><td>IE: 50</td><td>Total=50</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="5">Basic programming, MATLAB.</td></tr>
<tr><td>Course Rationale</td><td colspan="5">In typical applications of science and engineering, we have to process signals, using systems. The applications may vary from communication systems to control systems, but the basic analysis and design tools can be common. In this course, we are going to study all the fundamental mathematical signal processing tools like convolution, Fourier analysis, Laplace and Z transform. Main aim of the course is to study the use of these said tools in the analysis of linear time-invariant (LTI) systems. This course is fundamental course in the field of Signal Processing. This course builds concrete base for advanced courses like Digital Signal Processing, Audio and Speech Signal Processing, Image processing, Biomedical signal processing etc.</td></tr>
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6.Demonstrate signals and interdependencies of time and frequency domain parameters.</td></tr>
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Course Outcome and Program Outcome Mapping

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

Level of Mapping as: Low 1, Moderate 2,

Minimum 8 Tutorials should be carried out based on following list or Syllabus

	Course Content	**Hours**
1.	Introduction to MATLAB. Different operators and commands in MATLAB.	01
2.	Generation of Different Continuous Time (CT) and Discrete time (DT) signals	01
3.	Convolution of CT and DT signals	01
4.	Generation of Exponential and Trigonometric Fourier series of Periodic Signal	01
5.	Fourier Transform and IFT of signals. Effect of Time and Frequency Domain.	01
6.	Verification of sampling theorem	01
7.	Reconstruction of Signals	01
8.	Reconstruction of Signals	01
9.	Determination of Laplace transform of signals and verification of properties of LT.	01
10.	Determination of Z- transform of signals and verification of properties of ZT.	01
11.	Pole zero plots.	01
12.	Introduction to SIMULINK.	01
Sr. No.	**Reference Books**	
1	Nagoor Kani, “Signals & Systems”, Tata McGraw Hill	
2	Anand Kumar, “Signals & Systems”, PHI	
3	AlanV.Oppenheim, Alan S.Willsky with S.Hamid Nawab, “Signals & Systems”, Pearson Education.	
4	K.Lindner, “Signals and Systems”, McGraw Hill International, 1999.	
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<table>
<tr><td>Year, Program, Semester</td><td colspan="5">Second Year B.Tech (Electronics & Telecommunication Engineering), Part 2, During Semester IV</td></tr>
<tr><td>Course Code</td><td colspan="5">PCC 222</td></tr>
<tr><td>Course Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Analog and Digital Communication</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>03</td><td>-</td><td>02</td><td>05</td><td>04</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="2">ISE:30</td><td colspan="2">ESE: 70</td><td>Total=100</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="5">Electronic Circuit Design</td></tr>
<tr><td>Course Rationale</td><td colspan="5">This course aims to enable students to be familiar with fundamental concepts and issues, to develop good understanding of basic analogue and digital communication techniques, to perform simple analysis and assessment of system performance.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. To study the fundamental concept of the analog communication systems.
2. To introduce the concepts of angle modulation.
3. To understand the working of various receivers.
4. Explain various waveform coding techniques.
5. To introduce the baseband data communication
6. To understand digital modulation techniques.</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">After the completion of the course students will be able to -
1. Illustrate the principles of amplitude modulation.
2. Analyze and compare angle modulation techniques
3. Differentiate types of receivers used for particular application.
4. Analyse the performance of waveform coding techniques
5. Evaluate baseband data communication techniques.
6. Compare bandpass digital modulation techniques</td></tr>
</table>

Course Outcome and Program Outcome Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2									3	2
CO 2	3	2	1	2									3	1
CO 3	3	2	1	2									3	2
CO 4	3	2	1	2									3	
CO 5	3	2	1	2									3	
CO 6	3	2	1	2									3	

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	Hours
1	**Amplitude Modulation** Block schematic of communication system, Necessity of modulation, Types of modulation – AM, FM, PM and Pulse Modulation. Noise , Amplitude Modulation (AM) Techniques, Modulation index, % modulation, Power relations in AM,AM Generation: Low level and High Level Modulation, Modulator Circuits, Balanced modulator , SSB Principle, Vestigial sideband(VSB)	07
2	**Angle Modulation** Theory of Angle Modulation Techniques, FM and Phase Modulation(PM), Frequency deviation and Percentage Modulation, Deviation Sensitivity, Deviation ratio, Phase Deviation and Modulation Index, Bandwidth Requirements , FM Modulators(Direct & Indirect methods)	05
3	**Receivers** Types: TRF and Superhetrodyne ,Receiver Parameters: Sensitivity, Selectivity, Bandwidth, Dynamic Range, Fidelity, AM Detection : Using Diode, Practical Diode Detector FM receiver -Block diagram, Comparison with AM Receivers, Basic FM Demodulators.	06
4	**Waveform Coding** Sampling theorem and recovery of original signal, Quantization – Uniform & Non uniform , PCM, DPCM, need of predictors, implementation of predictors at transmitter, Bandwidth requirement in each system, Delta Modulation, limitations of DM, ADM, comparison between DM, PCM and ADM.	07
5	**Baseband Data Communication** Introduction, Baseband pulse shaping, Shaping of transmitted spectrum, Baseband signal receiver: Integrate and Dump filter, optimum filter, matched filter transfer function, correlate filter transfer function, Inter symbol interference.	04

6	**Digital Modulation Schemes** ASK, PSK, FSK, DPSK, QPSK, QAM, coherent and non-coherent detection, Probability of errors and comparison of noise performances in ASK, FSK, PSK.	**07**

Sr. No.	**Reference Books**
1	Wayne Tomasi, 'Electronics Communication Systems Fundamentals through Advanced' - Pearson Education.
2	George Kennedy, 'Electronics Communication System'--Tata McGraw Hill Publication.
3	Louis E. Frenzel, 'Principles of Electronic Communication Systems' -Tata McGraw Hill Publication.
4	Dennis Roddy, John Coolen, 'Electronics Communications '4th Edition-Pearson Education
5	Taub & Schling, "Principles of Communication System" TMH 2.
6	Apurba Das, "Digital Communication: Principles and System Modelling", Springer Publications
7	K. Sam Shanmugan, "Digital & Analog Communication systems" Wiley Publication
8	B.P. Lathi, " Modern Digital & Analog Communication System" Oxford University Press
9	Siman Haykin, "Digital Communication ", Wiley Publication
10	Bernard Scalar, "Digital Communication Fundamentals & Applications" PHI
Sr. No.	**Important web links**
1	https://onlinecourses.nptel.ac.in/noc21_ee74/preview
2	https://nptel.ac.in/courses/117101051

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<tr><td>Course Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Analog and Digital Communication Laboratory</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>-</td><td>-</td><td>02</td><td>02</td><td>01</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="3"></td><td>EE: 50</td><td>Total=50</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="5">Electronic Circuit Design</td></tr>
<tr><td>Course Rationale</td><td colspan="5">This course aims to enable students to be familiar with fundamental concepts and issues, to develop good understanding of basic analogue and digital communication techniques, to perform simple analysis and assessment of system performance.</td></tr>
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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1	2									3	3
CO 2	3	2	1	2									3	2
CO 3	3	2	1	2									3	1
CO 4	3	2	1	2									3	
CO 5	3	2	1	2									3	
CO 6	3	2	1	2									3	

Level of Mapping as: Low 1, Moderate 2, High 3

Expt. No.	**Course Content**
1	Study of Amplitude Modulation (A.M.)
2	Study of Frequency Modulation.(F.M.)
3	Study of AM Detection.
4	Study of SSB Modulation & Demodulation.
5	Study of DSB Modulation & Demodulation.
6	Study of FM Demodulation.
7	Sampling and Reconstruction.
8	Study of Pulse Amplitude Modulation & Demodulation.
9	Study of Pulse Width Modulation& Demodulation.
10	Study of Pulse Position Modulation & Demodulation
11	Experiment on ASK Modulation and Demodulation
12	Study of FSK Modulation and Demodulation
13	Study of PSK Modulation and Demodulation
14	Study of QPSK Modulation and Demodulation
15	Study of Delta Modulation and Demodulation
16	Study of Adaptive Delta Modulation and Demodulation
17	Study of TDM-PCM Modulation and Demodulation
18	Study of DPCM Modulation and Demodulation
19	Visit to radio station (AM/FM)
General Instruction: Minimum 8 experiments should be conducted from above experiment list or based on the syllabus	
Sr. No.	**Reference Books**
1	Wayne Tomasi, 'Electronics Communication Systems Fundamentals through Advanced' - Pearson Education.

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<tr><td>Course Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Analog Electronics</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>03</td><td>-</td><td>02</td><td>05</td><td>04</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="2">ISE:30</td><td colspan="2">ESE: 70</td><td>Total=100</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="5">Basic knowledge of electronic Devices like R,L,C, BJT, Diode etc</td></tr>
<tr><td>Course Rationale</td><td colspan="5">Analog Circuits plays a vital role in the design of an electronic system. This course is detail study of important Analog / Linear Integrated Circuits (ICs). This course is a Circuit Design course planned to give exposure on use of operational amplifier (Op. Amp.) For Different applications and its significance in real world. It also includes other Analog ICs like Timer IC 555 and PLL.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1.Impart information about OPAMP 741 internal circuit and characteristics.
2.Explore OPAMP parameters
3.Explore OPAMP frequency response
4.Discuss OPAMP linear and nonlinear applications
5.Discuss OPAMP based filters and signal generator
6.Explore linear IC PLL and Timer 555</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">1.Analyze the internal circuits of op. amp. 741.
2.Analyze the op. amp. For different Parameters.
3.Analyze linear and non-linear applications of op. amp.
4.Describe the open loop and closed loop frequency response of op. amp.
5.Design Filter and Signal generator circuits using op. amp.
6.Describe the PLL and Timer IC with application circuits.</td></tr>
</table>

Course Outcome and Program Outcome Mapping

	P PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3													
CO 2	3	1											2	
CO 3	3				2									
CO 4	3	3			2								2	
CO 5	3	3			2									
CO 6	3	3			2									

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	Hours
1	**Op-Amp basics and Characteristics** Differential amplifier: common mode, differential mode, configurations, DC and AC analysis, constant current bias, current mirror circuit, cascade diff-amp stages, level shifter. Block Diagram of Op-Amp, Study of µA 741: Ideal & Practical Op-amp specifications, Transfer characteristics of Op amp.	**08**
2	**Op-Amp Parameters and basic Configurations** Op. Amp. Parameters: offset voltages and offset currents with compensation techniques, Input Bias current, slew rate, CMRR, PSRR, Thermal drift, open loop gain, closed loop gain, Comparative study of OP 07, LM 741, LM 311. Open Loop & Closed Loop Inverting, Non inverting and Differential amplifier with analysis of parameters like Av, Ri, Ro, Bandwidth.	**05**
3	**Op-Amp frequency response** Open loop and closed loop frequency response, unity gain BW, need for compensation, Internal and external compensated op amps and frequency response, effect of slew rate.	**06**
4	**Op-Amp Applications** Summing amplifier, Subtractor, Integrator, Differentiator, Instrumentation Amplifier, I to V and V to I converters. Comparators, Zero Crossing Detector, Window detector, Schmitt trigger, peak detector, log and antilog amplifier, precision rectifier, sample and hold circuit, clippers and clampers.	**08**
5	**Op-Amp Active Filters and signal generators** Filters: First & Second Order Butterworth Low Pass, High Pass, Band Pass, Band Reject and All Pass Filters. Signal generators: RC phase Shift, Wein Bridge, Hartely, Colpitts oscillators, op amp as multivibrators and triangular wave generators.	**05**
6	**PLL and Timer** Phase Lock Loop: Introduction, Operating principle, Study of Block Diagram of PLL, case study IC 565 PLL and application, Timer IC 555: block diagram, IC 555 as astable, mono-stable, bi-stable multivibrators, VCO.	**07**
Sr. No.	**Reference Books**	

1	J. Michael. Jacob —Application & Design with Analog Integrated Circuits, PHI.
2	Ramakant. A.Gayakwad — Op-Amps & Linear Integrated Circuits, 3rd Edition, PHI.
3	S.Salivahanan & Bhaaskaran —Linear Integrated Circuits, 1st Edition, Tata McGraw Hill
4	Sergio Franco —Design with op-amp & Analog Integrated Circuits, Tata McGraw Hill.
Sr. No.	**Important web links**
1	https://archive.nptel.ac.in/courses/108/108/108108111/
2	https://archive.nptel.ac.in/courses/108/108/108108114/

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<tr><td>Course Code</td><td colspan="5">PCC 223</td></tr>
<tr><td>Course Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Analog Electronics lab</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>-</td><td>-</td><td>02</td><td>02</td><td>01</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="3"></td><td>EE: 50</td><td>Total=50</td></tr>
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<tr><td>Course Rationale</td><td colspan="5">Analog Circuits plays a vital role in the design of an electronic system. This course is detail study of important Analog / Linear Integrated Circuits (ICs). This course is a Circuit Design course planned to give exposure on use of operational amplifier (Op. Amp.) For Different applications and its significance in real world. It also includes other Analog ICs like Timer IC 555 and PLL.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. Demonstrate linear application of op amp.
2. Demonstrate Non-linear application of op amp.
3. Demonstrate filter circuits using op amp.
4. Demonstrate measurement of op amp parameters.
5. Demonstrate oscillator using op amp.
6. Demonstrate application circuit using 555.</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">1. Design and implement linear application of op amp.
2. Design and implement Non-linear application of op amp.
3. Design and implement filter circuits using op amp.
4. Demonstrate measurement of op amp parameters.
5. Design and implement oscillator using op amp.
6. Design and implement application circuit using 555.</td></tr>
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Course Outcome and Program Outcome Mapping

	P PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO 2	3	1											2	
CO 3	3				2									
CO 4	3	3			2								2	
CO 5	3	3			2									
CO 6	3	3			2									

Level of Mapping as: Low 1, Moderate 2, High 3

Expt.No.	List of Experiments	Hours
1	Study of Inverting amplifier for DC & AC inputs using opamp	
2		
3	Study of Non-Inverting amplifier for DC & AC inputs using opamp	
4	Frequency Response of Inverting & Non-Inverting amplifier using opamp	
5	Study of op-amp as Summing, Scaling, & Averaging amplifier in Inverting & Non-Inverting	
6	Study of Instrumentation Amplifier using LM 324	
7	Study of V-I & I-V Converter	
8	Study of Schmitt Trigger using opamp & Window detector using opamp	
9	Study of Comparator & Zero Crossing Detector using opamp	
10	Study of Precision Rectifier using opamp	
11	Study of Butterworth Filter using opamp	
12	Study of Triangular & square wave generator using opamp	
13	Design of IC 555 Timer as Astable & Monostable Multivibrator	
14	Study of IC NE 565 PLL	
15	Study of Weins Bridge Oscillator using opamp	
16	Study of Function Generator using IC 8038	

Sr.No.	Reference Books
1	J. Michael. Jacob —Application & Design with Analog Integrated Circuits, PHI.
2	Ramakant. A.Gayakwad — Op-Amps & Linear Integrated Circuits, 3rd Edition, PHI.
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4	Sergio Franco —Design with op-amp & Analog Integrated Circuits, Tata McGraw Hill.
Sr. No.	**Important web links**

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2	https://archive.nptel.ac.in/courses/108/108/108108114/

<table>
<tr><td>Year, Program, Semester</td><td colspan="5">Second Year B.Tech (Electronics & Telecommunication Engineering), Part I, Semester III</td></tr>
<tr><td>Course Code</td><td colspan="5">PCC 224</td></tr>
<tr><td>Course Category</td><td colspan="5">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="5">Data Structures</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>02</td><td>01</td><td>-</td><td>03</td><td>03</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="2">ISE:30</td><td colspan="2">ESE: 70</td><td>Total=100</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="5">Prerequisites: Basics of computer fundamentals, Programming knowledge of C and C++ language.</td></tr>
<tr><td>Course Rationale</td><td colspan="5">This course helps student in understanding logical & mathematical models of storing & organizing data in a particular way in a processor-based system. In system programming, application programming the methods & techniques of data structures are widely used. The study of data structure helps the students in developing logical & structured programs.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1. Inculcate basic principles and concepts of data structures in student.
2. Familiarize students with commonly used data structures and their associated algorithms used in industry.
3. Introduce techniques for efficient storage, manipulation and retrieval of data using data structures.
4. Apply data structures and algorithms to solve programming problems efficiently.
5. Enhance problem-solving skills through practical implementation and programming assignments.</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">1. Develop knowledge of basic data structures for storage and retrieval of ordered or unordered data.
2. Implement linked list data structure to solve various problems.
3. Understand and apply linear data structure such as stacks, queues to solve various computing problems.
4. Identify problems that can be solved using tree structures and apply appropriate tree-based algorithms to solve them effectively
5. Implement basic graph operations, such as adding and removing vertices and edges, and perform operations like traversals and topological sorting
6. Analyze the time and space complexities of searching and sorting algorithms and understand factors influencing algorithm efficiency, including algorithm design, input size, and data distribution</td></tr>
</table>

Course Outcome and Program Outcome Mapping

	P PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO 2	3	1											2	
CO 3	3				2									
CO 4	3	3			2								2	
CO 5	3	3			2									
CO 6	3	3			2									

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	Hours
1	**Introduction to Data Structures** Data types– primitive and non-primitive, Types of Data Structures, Linear & non-linear Data Structures, Arrays: Definition, One Dimensional Array and Multidimensional Arrays Strings: Definition, Library Functions of Strings, Basics of Algorithms, the time and space complexity of algorithms using asymptotic notation, Abstract Data Type (ADT).	04
2	**Linear Data Structure: Linked List** Introduction to linked list, Representation of Linked Lists in Memory, Singly Linked List, Doubly Linked List, Circular Linked List, Circular, Operations on linked list: Traversal, Searching node, Inserting node, Deleting node, Concatenation, Applications of Linked List: Representation & manipulations of polynomials using linked lists.	06
3	**Linear Data Structures: Stack and Queue** Stack: Introduction, Array Representation of Stack, Linked Representation of Stack, Applications of stack:, Expression conversion (Conversion of Infix to prefix and postfix expression) and Evaluation, Quicksort, Recursion, etc. Queue: Introduction, Array Representation of Queue, Linked list representation of Queue, Types of Queues: Circular Queue, Priority Queue, Dequeue, double ended queue, Applications of Queue.	08
4	**Nonlinear Data Structure: Tree**	06

	Introduction, Binary Tree: Binary tree representation in Memory, Binary tree traversal algorithms (Preorder, Inorder, Postorder), Threaded Binary tree, Binary Search Tree: operations (Searching, Insertion, Deletion), AVL Search Trees: Definition, Representation of an AVL search tree, Operations – Insertion, Deletion. B-Trees: Definition, Representation of B trees, Operation: Insertion, deletion and searching. Applications: Huffman coding	
5	**Nonlinear Data Structure: Graphs** Basic concepts, Sequential representation of Graph: Adjacency Matrix, Path Matrix, Linked representation of graph Operation on graphs: Traversal techniques (BFS and DFS), Searching, Insertion. Applications of Graphs -Topological sorting.	**06**
6	**Searching and Sorting Algorithms** Searching: Importance of searching, Linear Search, Binary Search, complexity of searching algorithms. Sorting: Importance of Sorting, Quick sort, Selection sort, Bubble sort, Insertion Sort, Merge Sort, Radix sort, Complexity of sorting algorithms. Hashing: Hash Functions, Overflow handling, Collision & Collision Resolution Techniques, (chaining, open addressing).	**06**

Sr. No.	**Text Books**
1	S. Lipschutz , 'Data Structures with C', Tata McGraw-Hill
2	Horowitz Ellis, Sahani –'Fundamentals of Data Structures in C++' -, Universities Press Publication
3	Richard F. Gilberg and Behrouz A. Forouzon, 'Data Structures- A Pseudocode Approach with C', Cengage Learning 2rd 2004 2 Data
4	Rajesh K. Shukla, "Data Structure Using C and C++" Wiley Dreamtech Publication
Sr. No.	**Reference Books**
1.	Michael T Goodrich –'Data Structures and Algorithms in C++' – 2nd Edition –Wiley Publication
2.	Mark Allen Weiss -' Data Structures and Algorithm Analysis in C++ '-3rd Edition - Pearson Publication
3.	J. R. Hubbard – 'SCHAUM'S OUTLINE OF DATA STRUCTURES WITH C++ '–. 1st Edition – McGraw Hill Education
4.	Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++", PHI Learning Private Limited, Delhi India
Sr. No.	**Important web links**
1	https://www.sanfoundry.com/cpp-programming-examples-data-structures/
2	https://www.geeksforgeeks.org/data-structures/

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<tr><td>Course Category</td><td colspan="7">Professional Core Course</td></tr>
<tr><td>Course title</td><td colspan="7">Data Structures Tutorial</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td colspan="2">Total Contact Hours</td><td colspan="2">Total Credits</td></tr>
<tr><td>-</td><td>01</td><td>-</td><td colspan="2">01</td><td colspan="2">01</td></tr>
<tr><td rowspan="2">Evaluation Scheme</td><td>ISI</td><td>ESE</td><td>IOE</td><td>IPE</td><td>IE</td><td>EE</td><td>Total</td></tr>
<tr><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>50</td><td>50</td></tr>
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CO 5	3	3		1								
CO 6	3	2	3	3	3							3
PSO1	3	3	3	3	2							
PSO2	2	3	1	3	2							

Level of Mapping as: Low 1, Moderate 2, High 3

Lab No.	**Lab Title**
1	Array operations
2	Linear and Binary Search Techniques
3	Factorial and Fibonacci Series with and without Recursion
4	Insertion, deletion and traversal operations on singly linked list
5	Insertion, deletion and traversal operations on doubly linked list
6	Implementation of Stack using arrays and linked list
7	Sorting Techniques (Bubble sort, Quick sort, Merge sort)
8	Operation on Queue (Enqueue and Dequeue)
9	Binary tree traversal (Pre-order, Post-order, In-order traversal)

10	Insertion, traversal, search operations on Binary Search tree.
Sr. No.	**Text Books**
1	S. Lipschutz , 'Data Structures with C', Tata McGraw-Hill
2	Horowitz Ellis, Sahani –'Fundamentals of Data Structures in C++' -, Universities Press Publication
3	Richard F. Gilberg and Behrouz A. Forouzon, 'Data Structures- A Pseudocode Approach with C', Cengage Learning 2rd 2004 2 Data
4	Rajesh K. Shukla, "Data Structure Using C and C++" Wiley Dreamtech Publication
Sr. No.	**Reference Books**
1	Michael T Goodrich –'Data Structures and Algorithms in C++' – 2nd Edition –Wiley Publication
2	Mark Allen Weiss -' Data Structures and Algorithm Analysis in C++ '-3rd Edition - Pearson Publication
3	J. R. Hubbard – 'SCHAUM'S OUTLINE OF DATA STRUCTURES WITH C++ '–. 1st Edition – McGraw Hill Education
4	Aaron M. Tenenbaum, Yedidyah Langsam and Moshe J. Augenstein "Data Structures Using C and C++", PHI Learning Private Limited, Delhi India
Sr. No.	**Important web links**
1	https://www.sanfoundry.com/cpp-programming-examples-data-structures/
2	https://www.geeksforgeeks.org/data-structures/

<table>
<tr><td>Year, Program, Semester</td><td colspan="5">2024-25 Second Year B.Tech (Electronics & Telecommunication Engineering), Semester IV</td></tr>
<tr><td>Course Code</td><td colspan="5">IKS 221</td></tr>
<tr><td>Course Category</td><td colspan="5">Indian Knowledge System</td></tr>
<tr><td>Course title</td><td colspan="5">Introduction to Performing Arts</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>01</td><td>-</td><td>-</td><td>01</td><td>01</td></tr>
<tr><td rowspan="2">Evaluation Scheme</td><td colspan="2">I8SE</td><td>ESE</td><td>IE</td><td>EE</td><td>Total</td></tr>
<tr><td colspan="2">-</td><td>-</td><td>50</td><td></td><td>50</td></tr>
<tr><td>Course Rationale</td><td colspan="5">The course "Introduction to Performing Arts" seeks to broaden the horizons of engineering students by integrating the rich and diverse realm of performing arts into their curriculum. By exploring various performing arts forms, students will not only develop a deeper understanding of human expression but also enhance their creativity, communication skills, and cultural awareness. This interdisciplinary approach aligns with NEP 2020's vision of holistic education and fosters the development of well-rounded individuals equipped to thrive in a rapidly evolving world.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The course teacher will ensure
1. Introduce fundamental concepts, history, and theoretical frameworks of various performing arts forms.
2. Cultivate appreciation for cultural, social, and aesthetic dimensions of performing arts.
3. Develop critical thinking and analytical skills through performance analysis.
4. Enhance communication and presentation skills through practical exercises.
5. Foster creativity and imagination through exploration of diverse performing arts mediums.</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">By the end of the course, students will be able to
1. Identify and analyze key elements and techniques across theater, dance, music, and visual arts.
2. Demonstrate understanding of historical, cultural, and social contexts in performing arts.
3. Critically evaluate performances using appropriate terminology.</td></tr>
</table>

	4. Apply performance principles to effectively communicate ideas and emotions. 5. Engage in creative expression through original performances.

Course Outcome and Program Outcome Mapping

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

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	Hours
1	Foundations of Performing Arts • Introduction to Performing Arts: Definition, scope, and significance. • Historical overview: Evolution of performing arts across cultures and civilizations.	**02**
2	Theatrical Arts • Introduction to theater: Origins, elements, and dramatic conventions. • Major theatrical movements and styles: Realism, surrealism, absurdism, etc. • Analysis of selected plays and playwrights.	**03**
3	Dance Forms • Introduction to dance: Styles, techniques, and cultural contexts. • Exploration of classical, folk, and contemporary dance forms. • Practical exercises and choreography workshops. .	**03**
4	Musical Expressions Introduction to music: Basic principles, genres, and traditions. • Appreciation of classical, folk, and popular music styles. Analysis of musical compositions and performances	**02**

5	Visual Performing Arts • Introduction to visual arts in performance: Set design, costume, and makeup. • Role of visual elements in enhancing the theatrical experience. • Case studies and practical demonstrations.	**02**
6	Performance and Presentation • Practical application of performing arts principles: Group performances and presentations. • Rehearsal techniques, stage presence, and audience engagement. Reflection and feedback on individual and group performances.	**02**

Assessment

For the internal assessment of the course, with a total evaluation is of 50 marks. Combination of different evaluation methods can be utilized to ensure comprehensive assessment of the students' performance. Following Evaluation Components are suggested:

- Written Assignments: 20 Marks
- Practical Assessments: 20 Marks
- Class Participation and Engagement: 10 Marks

Sr. No.	**Reference Books**
1	Bharata Muni, *Natyashastra*, An ancient Indian treatise on performing arts covering various aspects of classical dance, music, and drama, composed between 200 BCE and 200 CE, influencing the theory and practice of Indian performing arts for centuries.
2	Girish Karnad. (2005). Collected Plays: Volume 1. Oxford University Press.
3	Mohan Khokar. (2000). Traditions of Indian Classical Dance. Clarion Books.
4	Sunil Kothari. (2001). Kathak, Indian Classical Dance Art. Abhinav Publications. .

5	Sangeet Natak Akademi. (2005). Indian Music: Tradition and Trends. Sangeet Natak Akademi.
6	P. Sambamurthy. (2010). South Indian Music, Vol. 1. The Indian Music Publishing House.
7	Kapila Vatsyayan. (2007). Indian Classical Dance: Tradition in Transition. Publications Division, Ministry of Information and Broadcasting, Government of India.
8	Vijay Tendulkar. (2010). Collected Plays in Translation. Oxford University Press.

Sr. No.	**Important web links**
1	https://www.youtube.com/watch?v=W7bEzgZrN7s
2	https://www.youtube.com/watch?v=DQbNpx_CfJY
3	https://www.youtube.com/watch?v=eGiz50aVYWQ

<table>
<tr><td>Year, Program, Semester</td><td colspan="5">2024-25 Second Year B.Tech (Electronics & Telecommunication Engineering), Semester IV</td></tr>
<tr><td>Course Code</td><td colspan="5">MAC 221</td></tr>
<tr><td>Course Category</td><td colspan="5">Mandatory Audit Course</td></tr>
<tr><td>Course title</td><td colspan="5">Aptitude Enhancement Course I</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td>02</td><td>-</td><td>-</td><td>02</td><td>00</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="5">IE at course end</td></tr>
<tr><td>Course Rationale</td><td colspan="5">This Aptitude Enhancement Course I aims to nurture holistic development among second-year B. Tech. Engineering students by focusing on enhancing their critical thinking, problem-solving skills, creativity, and emotional intelligence. Aligned with the NEP 2020 and Outcome-Based Education (OBE) philosophy, the course seeks to empower students with essential aptitudes required for success in both academic and professional domains.</td></tr>
<tr><td>Course Objectives</td><td colspan="5">1.The course teacher will ensure to-
2.Equip students with critical thinking skills through analytical exercises and problem-solving tasks.
3.foster creativity and innovation by engaging students in structured workshops and practical projects.
4.Develop students' emotional intelligence through self-awareness activities and stress management techniques.
5.Enhance collaborative skills and effective communication through group discussions and team-based projects.</td></tr>
<tr><td>Course Outcomes</td><td colspan="5">1. By the end of the course, the students will be able to
2. Demonstrate proficiency in critical thinking by analysing complex problems and proposing effective solutions.
3. Exhibit creativity through the development of innovative projects and solutions.
4. Display heightened emotional intelligence by managing stress, communicating empathetically, and resolving conflicts constructively.
5. Showcase collaborative skills by actively participating in group activities, contributing to team goals, and communicating ideas effectively.</td></tr>
</table>

Course Outcome and Program Outcome Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	-	3	-	3	-	-	-	-	-	2	-	-
CO 2	-	2	-	-	2	1	-	-	-	-	-	-
CO 3	-	-	-	-	-	3	2	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	3	3	2	1

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	Hours
1	Inter-Personal & Inter-Organizational Communication	**02**
2	Creative & Critical Thinking	**02**
3	Group Dynamics & Decision-Making Techniques .	**02**
4	Emotional Intelligence & Stress Management Strategies	**03**
5	Assessment	**05**

Assessment

For the internal assessment of the course, with a total evaluation is of 50 marks. Combination of different evaluation methods can be utilized to ensure comprehensive assessment of the students' performance. The assessment will focus real-world scenarios that require the application of critical thinking, problem-solving, creativity, emotional intelligence, and teamwork. Following Evaluation Components are suggested:

1. Activity 1- Group Presentation (20 marks)

2. Activity 2- Group Discussion (20 marks)

3. Classroom Participation and Engagement (10 marks)
   Active participation in class discussions, group activities and question-answer sessions.

Sr. No.	Reference Books

1	Chakravarthi T. Kalyana and Chakravarthi T. Latha, *Soft Skills for Managers* (Biztantra Publications, 2014 (ISBN: 978-81-7722-568-6))
2	Kumar Sanjay and Pushp Lata (2015), *Communication Skills*, 2nd Edition, Oxford University Press, (ISBN: 9780199457069)
3	P. D. Chaturvedi and Mukesh Chaturvedi (2017), *The Art and Science of Business Communication- Skills, Concepts, Cases and Applications*, 4th Edition, Pearson India Education Services Pvt. Ltd., (ISBN 978-93-325-8728-1)
4	Wright, L. (2001). Critical Thinking: An Introduction to Analytical Reading and Reasoning. Oxford University Press.
5	Kallet, M. (2014). Think Smarter: Critical Thinking to Improve Problem-Solving and Decision-Making Skills. Wiley.
6	Bradberry, T., & Greaves, J. (2009). Emotional Intelligence 2.0. TalentSmart.
7	Dweck, C. S. (2007). Mindset: The New Psychology of Success. Ballantine Books.
Sr. No.	**Important web links**
1	https://www.sanfoundry.com/cpp-programming-examples-data-structures/
2	https://www.geeksforgeeks.org/data-structures/

<table>
<tr><td>Year, Program, Semester</td><td colspan="4">2024-25 Second Year B.Tech (Electronics & Telecommunication Engineering), Semester IV</td></tr>
<tr><td>Course Code</td><td colspan="4">HSMEC 221</td></tr>
<tr><td>Course Category</td><td colspan="4">Humanities, Social Science, Management, Environment</td></tr>
<tr><td>Course title</td><td colspan="4">Environmental Studies</td></tr>
<tr><td rowspan="2">Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Total Contact Hours</td></tr>
<tr><td>2</td><td>-</td><td>-</td><td>02</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="4">SEE: 70 Marks + IOE: 30 Marks, evaluation only at Even Semester End.</td></tr>
<tr><td>Course Rationale</td><td colspan="4">The Course is all about learning the way we should live and how we can develop sustainable strategies to protect the environment. It helps individuals to develop an understanding of living and physical environment and how to resolve challenging environmental issues affecting nature.</td></tr>
<tr><td>Course Objectives</td><td colspan="4">The course teacher will -
1. Describe the various types and sources of environmental pollution.
2. Explore other global environmental issues, such as biodiversity loss, deforestation, and ocean acidification.
3. Explain key environmental laws and regulations at the national and international levels.
4. Explain the relationship between human society and the environment.</td></tr>
<tr><td>Course Outcomes</td><td colspan="4">Upon completion of this course, student should be able to –

1. Classify different types of environmental pollutants and their sources.
2. Analyze the interconnections between climate change and other global environmental issues.
3. Understand the legal frameworks and regulations governing environmental protection and management.
4. Describe the socio-economic drivers of environmental degradation and inequality</td></tr>
</table>

Course Outcome and Program Outcome Mapping

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

Level of Mapping as: Low 1, Moderate 2, High 3

Unit No.	Course Content	Hours
1	**Environmental Pollution** Definition: Causes, effects and control measures of: Air pollution, Water pollution: Causes, effects and control measures, Marine pollution, Soil pollution: Causes, effects and control measures, Noise pollution: Causes, effects and control measures, Thermal pollution: Causes, effects and control measures, Nuclear hazards and their effects. Solid waste Management: Causes, effects and control, measures of urban and Industrial wastes, Role of an individual in prevention of pollution.	07
2	**Understanding climate change and other global environmental issues** -Structure of atmosphere; greenhouse gas emissions; Projections of global climate change, Importance of 1.5 °C and 2.0 °C limits to global warming; Carbon foot print, -Impacts of climate change: on ocean and land systems; Sea level rise, changes in marine and coastal ecosystems; Impacts on forests and natural ecosystems; Impacts on animal species, agriculture, health, urban infrastructure;-Mitigation of climate change: Green House Gas (GHG) reduction, sink enhancement; Concept of carbon intensity, energy intensity and carbon neutrality; National and international policies for mitigation, net zero targets for the future; Energy efficiency measures; Renewable energy sources for carbon reduction; Carbon capture and storage, Acid Rain: Causes, effects and mitigation, Ozone Layer Depletion: Causes, effects and mitigation	08
3	**Environmental legislation** Introduction to environmental laws and regulation: Constitutional provisions- Article 48A, Article 51A (g), Environmental Protection Act., Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.	06
4	**Social Environment**	04

	Environmental ethics, Environmental movements- Chipko Movement, Appiko Movement, Silent Valley Movement. Water conservation: rain water harvesting, watershed management, Disaster management: floods, earthquake, cyclone, tsunami and landslides.	

Sr. No.	Text Books
1	Agarwal, K. C. 2001, Environmental Biology, Nidi Publ. Ltd., Bikaner.
2	Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad, 380013, India.
3	Brunner R. C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
Sr. No.	**Reference Books**
1	Cunningham, W. P. Cooper, T. H. Gorhani, E. & Hepworth, M. T. ,2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai,
2	Gleick, H., 1993, Water in crisis, Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute. Oxford Univ. Press.
3	Hawkins R. e., Encyclopedia of Indian Natural History, Bombay Natural History Society, Bombay (R)
4	Heywood, V. H. & Watson, R. T., 1995, Global Biodiversity Assessment, Cambridge Univ. Press.
5	Jadhav, H. & Bhosale, V. M., 1995, Environmental Protection and Laws, Himalaya Pub. House, Delhi.
6	Mckinney, M. L. & Schocl. R. M. ,1996, Environmental Science Systems & Solutions, Web enhanced edition.
7	Miller T. G. Jr., Environmental Science, Wadsworth Publishing Co. (TB).
8	Odum, E. P., 1971, Fundamentals of Ecology, W. B. Saunders Co. USA.
9	Rao M. N. & Datta, A. K. ,1987, Waste Water Treatment, Oxford & IBH Publ. Co. Pvt. Ltd.
10	Sharma B. K., 2001, Environmental Chemistry, Goel Publ. House, Meerut.
11	Survey of the Environment, The Hindu (M).
12	Trivedi R. K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media (R).
13	Wagner K. D., 1998, Environmental Management, W. B. Saunders Co. Philadelphia, USA.
Sr. No.	**Important web links**
1	https://onlinecourses.swayam2.ac.in/cec19_bt03/preview
2	http://nitttrc.edu.in/nptel/courses/video/109105203/L41.html

SEM – III

Sr. No.	Second Year B. Tech Semester III Pre-revised syllabus	Second Year B. Tech Semester III Revised syllabus	Remark
1	Engineering Mathematics-III	Engineering Mathematics-III	Content is revised
2	Electronics Circuit Design-I	Electronic Circuit Design (Theory & Lab)	Clubbed in another course with content revision.
3	Digital Electronics (Theory & Lab)	Digital Electronics (Theory & Lab)	Content is revised.
4	Network Analysis	Network Analysis	Content revision
5	Programming Techniques	Programming Techniques	Content revision
7	Soft Skills Development	Soft Skills Development	Content is revised
8	Environmental Studies	Environmental Studies	No change as it is centrally offered by the University.
9	Aptitude and Professional communication	------	Shifted to next semester.

SEM – IV

Sr. No.	Second Year B. Tech Semester IV Pre-revised syllabus	Second Year B. Tech Semester IV Revised syllabus	Remark
1	Measurements & Instrumentation	Measurements & Instrumentation	Content revision.
2	----------	Signals & Systems	Shifted from next semester
3	Analog Communication	Analog & Digital Communication	Title change & Clubbed in a another course with content revision.
4	Linear Integrated Circuits	Analog Electronics	Title change & content revision.
5	Data Structures	Data Structures	Content revision.
6	---------	Multidisciplinary Minor Courses are introduced	Added as per the guidelines of NEP- 2020
7	Electronics Circuit Design -II	----------	Clubbed & shifted to previous semester
8	Electronics Circuit Design –II (Lab)	----------	Clubbed & shifted to previous semester
9	Introduction to Performing Arts	Introduction to Performing Arts	Made it as a Credit course with content revision.
11	------	Aptitude Enhancement Course I	Newly introduced.
12	Environmental Studies	Environmental Studies	Modified as per University prescribed. But there are no credits. The evaluation is at the end of Even Semester.