SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)

Department of Electronics Engineering
Syllabus applicable to July 2022 admitted and later batches

Name of the course:	B. Tech in Electronics & Instrumentation Engineering
Semester and Year of study	B. Tech 2nd Year 3rd Semester
Subject Category	Departmental Course (DC)
SubjectCode:EI-301	Subject Name: Fundamentals of Instrumentation

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			**Total Marks**				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:

Basic Electrical Concepts, Mathematics (Matrices, Laplace Transform, Differential Equations and Complex Variables).

Course Objective:

The course aims at providing the fundamental concepts of the Instrumentation and Measurement, static and dynamic characteristics of instruments and their error analysis, provides an overview of the laboratory instruments such as CRO, function generators, multimeters etc. It also includes the measurement of passive electrical elements like R, L,C.

Course Outcomes:

Upon completion of the course, student will be able to

- CO1: Identify, conceptualize, demonstrate and apply the fundamentals of measurement science, measuring instruments and their characteristics.
- CO2: Investigate and analyze the working of electrical measuring instruments.
- CO3: Analyze the working of Cathode Ray Oscilloscope (CRO) and other laboratory equipments.
- CO4: Analyze DC bridges used for measurement of Resistance.
- CO5: Analyze AC bridges used for measurement of Capacitance and Inductance.

CO- PO Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1								
CO2	3	3	2	2								
CO3	3	3	2	2								
CO4	3	3	2	2								
CO5	3	3	2	2								

UNITs	Descriptions	Hrs.	CO's
I	**Basic concept of Instrumentation**: Functional elements of an instrument, classification of measuring instruments, static and dynamic characteristics of the instruments, Standards & Calibrations of Instruments, Errors in measurement, uncertainty analysis.	12	CO1
II	**Analog Instruments:** Classification of analog instruments, D' Arsonval type Galvanometer, Principle of operation and construction of various analog indicating types of instruments, sources of error, extension of ranges and calibration of ammeters & voltmeters.	10	CO3
III	**Laboratory Instruments**: Cathode Ray Oscilloscope-types, construction and operation, measurement of amplitude, phase and frequency with CRO,	08	CO2

	Lissajous patterns,Digital Storage Oscilloscope (DSO), Spectrum Analyzers, Harmonic Distortion Measurement, Function Generators, Digital Multimeter, Digital frequency meter.		
IV	**Measurement of Resistance:** Measurement of resistance (Low, Medium and High): voltmeter-ammeter method, ohmmeter, DC Bridges: Wheatstone bridge-design, arrangement of ratio arms, bridge sensitivity, errors in bridge circuits, Sensitivity and Calibration adjustments of Wheatstone bridge, Kelvin bridge, Various application of DC bridges, milli ohmmeter, mega ohmmeter, Meggar, Wagner earthing device	08	CO4
V	**Measurement of Inductance and Capacitance (A. C. Bridges):** Measurement of inductance using A. C. Bridges: Maxwell's bridge, Various applications of Maxwell Bridges, Hay's Bridge, Anderson's Bridge, vector impedance meter, Q factor measurement. Measurement of Capacitance using A. C. Bridges: Schering bridge, Wien's Bridge, storage and dissipation factors.	07	CO4
Guest Lectures (if any)		Nil	
Total Hours		45	

Suggestive list of experiments:

1. Study of different parts of CRO. Measure the amplitude, frequency & phase difference. Study of CRO demonstration unit and working of CRT and observe the effect of switched faults on the working of important sections.
2. Study of digital LCR meter and measurement of unknown L, C, R parameters.
3. Study of universal frequency counter and measurement of all parameters.
4. Determination of unknown inductance using Maxwell Inductance Bridge.
5. Determination of unknown inductance and Q factor using Maxwell Inductance Capacitance bridge method.
6. Measurement of unknown value capacitance using Wien's Capacitance Bridge.
7. Measurement of unknown value capacitance using Schering Bridge.
8. Measurement of unknown value of Inductance using Anderson Bridge.
9. Measurement of unknown value Inductance using Hay's Bridge.
10. Measurement of unknown Frequency using Wien's Bridge

Text Books -

1. Cooper W.D., Helfrick A.D. "Modern Electronic Instrumentation Measurement", Prentice Hall.
2. Sawhney A.K. "Electrical and Electronics Measurements & Instrumentation", DhanpatRai& sons.
3. Doeblin E.D., Measurement system, Tata McGraw Hill., 4th ed.
4. Kalsi, Electronic Instrumentation, Tata McGraw Hill

Reference Books

1. Terman& Petit, Electronic Measurement.
2. Carr, Instrumentation, Pearson Education

List and Links of e-learning resources: MCET – http://sgsmcet.co.in/eie .

Modes of Evaluation and Rubric

The evaluation modes consist of performance in Two mid-semester Tests, Quiz/ Assignments, term work, end-semester examinations, and end-semester practical examinations.

Recommendation by Board of studies on	05.06.2023
Approval by Academic council on	
Compiled and designed by	Dr.ShilpaDatar

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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(An Autonomous Institute Affiliated to RGPV Bhopal)

Department of Electronics Engineering

Syllabus applicable to July 2022 admitted and later batches

Name of the course:	B. Tech in Electronics & Instrumentation Engineering
Semester and Year of study	B. Tech 2nd Year 3rd Semester
Subject Category	Departmental Course (DC)
Subject Code:EI-302	Subject Name: Electronic Devices and Circuits

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			**Total Marks**				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:

Basic knowledge of electrical and electronic components and laws such as KCL, KVL, etc.

Course Objective:

1. The course intends to provide an overview of the principles, operation and application of the, JFET and MOSFETs for performing various functions.
2. This course relies on elementary treatment and qualitative analysis and makes use of simple models and equation to illustrate the concepts involved.
3. To provide an overview of MOS amplifiers.
4. Sufficient knowledge is provided so that students will be able to use this course as the basis for other advanced courses like Analog Circuits, Power Electronics.

Course Outcomes:

After completion of this course students will be able to

CO1: Acquire knowledge of JFETs and MOSFETs.

CO2: Analyze various JFETs and MOSFETs based electronic circuit configurations.

CO3: Analyze the circuit characteristics and compute its parameters.

CO4: Design various electronic circuits.

CO-PO Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1								2
CO2	2	3	3	2	2							
CO3	2	3	3	2	2							
CO4	2	3	3	3	2						2	

UNITs	Descriptions	Hrs.	CO's
I	Field Effect Transistors (FETs): Introduction, Advantages and Disadvantages of FET, Basic Construction; Characteristic curves; Principles of operations of the JFET, Effect of V_{DS} on channel conductivity, Channel Ohmic Region and Pinch-Off Region, Characteristic Parameters and Effect of temperature on FET parameters, FET Biasing. MOSFET: Introduction, Structure and Physical Operation of the nMOS, pMOS, Enhancement –Type MOSFET, Current-Voltage Characteristics of the Enhancement –Type MOSFET, The Depletion –Type MOSFET, Difference between JFETs and MOSFETs.	10	CO1,CO2, CO3, CO4
II	Common Source AC Amplifier, Fixed Bias with Self Bias, The Common Drain or Source Follower, The Common Gate FET Amplifier, Frequency Response of the FET Amplifier, Other Amplifier Configurations. MOSFET as an Amplifier, Biasing in MOS Amplifier Circuits, Basic Configurations of Single Stage IC MOS Amplifiers.	08	CO1,CO2, CO3, CO4

III	FET Small Signal Analysis: FET Small Signal Model, Voltage Gain, Source Follower Circuit, Common Gate Circuit, Design of FET Amplifier Circuits, Low frequency analysis, High Frequency Analysis of FET.	10	CO1,CO2, CO3, CO4
IV	IC Technology: Overview of IC fabrication process: crystal growth, wafer preparation, oxidation, epitaxial layer growth, lithography, diffusion, ion implantation, metallization, fabrication process of BJT and CMOS Transistors	9	CO1,CO2, CO3, CO4
V	The complementary MOS (CMOS) inverter-DC characteristics, Static load MOS inverters, Pseudo NMOS Transistors, Tristate inverter, Static CMOS gate circuits (NAND, NOR, XOR, XNOR etc.) Static and Dynamic Memory Cell.	8	CO1,CO2, CO3, CO4
Guest Lectures (if any)		May be arranged as required	
Total Hours		45	

Suggestive list of experiments:

1. To plot transfer and output characteristics of an n-channel Junction Field Effect Transistor (JFET).
2. To plot transfer and output characteristics of a p-channel Junction Field Effect Transistor (JFET).
3. To plot transfer and output characteristics of an n-channel Metal Oxide Semiconductor Field Effect Transistor (MOSFET) in Common-source configuration.
4. To plot transfer and output characteristics of a p-channel Metal Oxide Semiconductor Field Effect Transistor (MOSFET) in Common-source configuration.
5. To design a common source JFET amplifier and plot its frequency response.
6. To design a common source MOSFET amplifier and plot its frequency response.
7. Study and investigate various fabrication techniques of BJT and MOS ICs.

Text Book-

1. Integrated Electronics. – MillmanHalkias
2. Electronic Devices & Circuits – Boyelstad&Nashelsky – PHI
3. Electronic Devices & Circuits – David A. Bell – PHI
4. Principles of Electronic Devices – Malvino
5. Digital Integrated Circuits - D. A. Hodges, H. G .Jackson, R. A. Saleh, McGraw Hill

Reference Books-

1. Microelectronic Circuits- Sedra, Smith.
2. Electronics Circuits And Systems- Owen Bishop
3. Intuitive Analog Circuit Design- Marc T. Thompson
4. Starting Electronics (Fourth Edition)-Keith Brindley

List and Links of e-learning resources:

1. https://nptel.ac.in/courses/117103063/
2. https://www.electronics-tutorials.ws/

Modes of Evaluation and Rubric

The evaluation modes consist of performance in Two mid-semester Tests, Quiz/ Assignments, term work, end-semester examinations, and end-semester practical examinations.

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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Department of Electronics Engineering
Syllabus applicable to July 2022 admitted and later batches

Name of the course:	B. Tech in Electronics & Instrumentation Engineering
Semester and Year of study	B. Tech 2nd Year 3rd Semester
Subject Category	Departmental Course (DC)
SubjectCode:EI-303	Subject Name: Network Analysis

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			**Total Marks**				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	30	10	10	150	3	0	2	4

Prerequisites:

- Mathematics I & II
- Fundamentals of Electrical Engineering

Course Objective:

To make the students capable of analyzing any given electrical network.
To make the students learn how to synthesize an electrical network.

Course Outcomes:

CO1.Acquire and demonstrate the knowledge of circuit elements, different laws and theorems.-(BL1, BL2)
CO2. Analyze and solve different Electrical networks in time and frequency domain by utilizing fundamental concepts and mathematics.-(BL3, BL4)
CO3. Design/synthesize the electrical networks in time and frequency domain.(BL3, BL6)
CO4. Evaluate / Estimate the performance of a particular network.(BL3, BL5)

CO-PO Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2										
CO2	3	3		2	2							
CO3	3	2	3	2	2							
CO4	3	2		2	2							

UNITs	Descriptions	Hrs.	CO's
I	**DC circuits-** Current, voltage, power, energy, circuit elements, ideal & practical voltage & current sources, dependent & independent sources, Ohm's Law, Kirchhoff's law, Voltage and current division, Nodal & mesh analysis, Source transformation, Supermesh&supernode, Star-Delta transformation. **Steady state AC circuits-** RMS & Average value, Concept of phasor & vector, Impedance & admittance, Node and Mesh analysis of RL, RC and RLC networks with sinusoidal and other driving sources.	12	1, 2, 3, 4
II	**Network Theorems for AC & DC circuits-** Superposition, Thevenin's& Norton's, Reciprocity, Maximum power transfer, Millman's, Tellegen's, and Substitution theorem, Problems with dependent & independent sources.	8	1, 2, 3, 4

III	**Transient analysis-** Transients in RL, RC & RLC Circuits, initial conditions and time constants, Network driven by constant driving sources & their solutions.	7	1, 2, 3, 4
IV	**Frequency domain analysis –** Review of Laplace transform and its properties, Initial and final value theorem, Application of Laplace transform: circuit element models, circuit analysis. **Resonance-** Series & parallel resonance, Quality factor. **Analysis of magnetically coupled circuits-** Mutual and self inductance, Energy in coupled circuit, Dot convention.	10	1, 2, 3, 4
V	**Two port networks-** Impedance parameter, admittance parameter, hybrid and inverse hybrid parameter, transmission line and inverse transmission line parameter, reciprocity and symmetry in two port network, relationship between parameters, Interconnection of two ports networks.	8	1, 2, 3, 4
Guest Lectures (if any)		Nil	
Total Hours		45	

Suggestive list of experiments:

1. To observe and plot the V-I characteristic of Constant Current Source. CO1
2. To observe and plot the V-I characteristic of Constant Voltage Source.CO1
3. To verify Superposition Theorem for a given electrical circuit. CO2
4. To verify Thevenin's Theorem for a given electrical circuit. CO2
5. To verify Norton's Theorem for a given electrical circuit. CO2
6. To verify Maximum Power Transfer Theorem for a given electrical circuit. CO2
7. To verify Millman's Theorem for a given electrical circuit. CO2
8. To observe the Response of RC Integrating Circuit using various input signals and measure the Time Constant of the circuit. CO2
9. To observe the Response of RC Differentiating Circuit using various input signals and measure the Time Constant of the circuit. CO2
10. To determine the Open Circuit and Short Circuit parameters of a Two Port Network. CO4
11. To determine the h- parameters of a Two Port Network. CO4
12. To determine the ABCD Circuit parameters of a Two Port Network. CO4
13. To determine the Inverse ABCD Circuit parameters of a Two Port Network. CO4

Text Book-

- Hayt, Kemmerley and Durbin, "Engineering Circuit Analysis", TMH.
- M.E. Van Valkenburg, "Network analysis", PHI.
- Charles K. Alexander and Matthew N. O. Sadiku "Fundamentals of Electric Circuits", 4th edition, McGraw Hill.

Reference Books-

- Artice M Davis "Linear Circuit Analysis", PWS Pub. Co.
- Van Valkenberg M.E., B.K. Kinarawala "Linear circuits", PHI.
- David K. Cheng "Analysis of Linear Systems", Narosa Publishing House.
- Bruce Carlson, "Circuits", Thomson Learning.

List and Links of e-learning resources:

Modes of Evaluation and Rubric

The evaluation modes consist of performance in Two mid-semester Tests, Quiz/ Assignments, term work, end-semester examinations, and end-semester practical examinations.

Recommendation by Board of studies on	
Approval by Academic council on	
Compiled and designed by	Dr.AnkitaShrivastava

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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Department of Electronics Engineering

Syllabus applicable to July 2022 admitted and later batches

Name of the course:	B. Tech in Electronics and Instrumentation Engineering
Semester and Year of study	B. Tech 2nd Year 3rd Semester
Subject Category	Departmental Course (DC)
Subject Code: EI-304	Subject Name:Signals & Systems

Maximum Marks Allotted							Contact Hours			Total Credits
Theory				Practical		**Total Marks**				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work		L	T	P	
60	20	10	10	-	-	100	3	1	0	4

Prerequisites:

Basic algebra, ***Differential equations,*** Trigonometry, Complex Arithmetic

Course Objective:

When a student completes this course, s/he should be able to:

- ***Understand the fundamentals of the Signals and Systems.***
- ***Understand LTI systems and able to obtain mathematical equation of the system.***
- ***Apply the concepts of frequency domain representations to analyze continuous and discrete time signals and systems.***
- ***To get understanding of sampling and its role in discrete-time signals and system.***
- To examine the discrete time signals and system in the Fourier and Z transform domain.
- To correlate the signals and systems in real time applications.

Course Outcomes:

Upon completion of this course, the student will be able to:

CO1: Discriminate the nature of the given signals and systems.
CO2: AnalyzeLinear Time Invariant Systems and its representation.
CO3: Analyze the discrete and continuous time signals in frequency domain.
CO4: Understand the process of sampling and the effects of under sampling.
CO5: Compute the output of an LTI system in the time and frequency domains.

CO-PO Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1		2		1			1			1
CO2	3	2	2		1							
CO3	3	3	2	3	1							
CO4	3	2	2	3								
CO5	3	2	1	3	1	1			1			1

UNITs		Hrs.	CO's
I	Signals and systems in everyday life, Definition of signal and system, Classification of signals: Continuous time and Discrete-time signal, Elementary signals: The unit step, impulse, ramp exponential, sine, triangular etc., Operations on signals: Amplitude scaling, addition, multiplication, time scaling, time shifting, time folding, differentiation, and integration. Classification of systems, System representation and properties of systems.	8	1
II	Linear Time-Invariant Systems: Introduction, Convolution: impulse response representation for LTI systems, properties of the impulse response representation for LTI systems, differential and difference equation for LTI Systems, block diagram representations (direct form-I, direct form-II, cascade and parallel).	8	2
III	Fourier series and their properties; Application of Fourier series to LTI	10	3, 4

	systems; Dirichlet's conditions; Fourier Transform & its properties; Applications of Fourier Transform to LTI systems; Magnitude and phase response; Parseval's theorem; Sampling theorem; Reconstruction of a signal from its samples; Aliasing and its effect in frequency domain, Basic concept of DTFT and DFT.		
IV	Introduction of Laplace transform; Region-of-convergence; Properties of Laplace transform; Inverse Laplace Transform, Applications of Laplace Transform in analysis of LTI systems, Unilateral Laplace transform & its applications to solve differential equations.	6	3,5
V	Z-transform: Basic principle of z-transform, definition, region of convergence, transfer functions, poles and zeros of systems and sequences, properties of z-transform, Inverse z-transform relationship between z-transform and Fourier transform, Unilateral z-transform & its applications to solve difference equations.	8	3,5
Guest Lectures (if any)		Nil	
Total Hours		40	

Suggestive list of experiments:

Nil

Text Book-

- Signals and Systems, ANagoorKani, 2e, TMH, 2010.
- Signals and Systems, A. Anand Kumar, 2e, PHI, 2012.
- Signals and Systems, Tarun Kumar Rawat, Oxford University Press, 2010.
- Signals and Systems, B. Kumar, New Age International Publishers, 2011.

Reference Books-

- Signals and Systems, H P Hsu, Schaum's Outline Series, 2e, McGraw Hill, 2008.
- B.P. Lathi, "Signal Processing and Linear Systems", Oxford University Press, 1998.
- Signals and Systems, Simon Haykin, Barry van Veen, John Wiley and Sons (Asia) Private Limited, 1998.

List and Links of e-learning resources:

- NPTEL Course.
- MOOC, IIT Bombay, EE210x, Signals and Systems.

Modes of Evaluation and Rubric

The evaluation modes consist of performance in Two mid-semester Tests, Quiz/Assignments, end-semester examinations.

Recommendation by Board of studies on	05.06.2023
Approval by Academic council on	
Compiled and designed by	Dr.D.K.Shakya

SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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Department of Electrical and Electronics Engineering
Syllabus applicable to July 2022 admitted and later batches

Name of the course:	B. Tech in Electronics & Instrumentation Engineering
Semester and Year of study	B. Tech 2nd[st] Year 3[rd]Semester
Subject Category	Open Elective (OE-I)
SubjectCode:OE-305(A)	Subject Name: Basic Electronics

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			**Total Marks**				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	0	0	3

Prerequisites:

Fundamentals of Physics

Course Objective:

1. The course intends to provide an overview of the principles, operation and application of the analog building blocks like diodes, BJTetc. for performing various functions.
2. This course relies on elementary treatment and qualitative analysis and makes use of simple models and equation to illustrate the concepts involved.
3. To provide an overview of amplifiers.
4. Sufficient knowledge is provided so that students will be able to use this course as the basis for other advanced courses like Analog Circuits and Linear IC's, Power Electronics etc.
5. Continue to enhance oral and written communication skills specifically directed to the practice of electronics engineering.

Course Outcomes:

After completion of this course students will be able to

CO1: Acquire knowledge of semiconductor devices and their working mechanism.

CO2: Analyze various electronic circuit configuration.

CO3: Analyze the circuit characteristics and compute its parameters.

CO4: Design various electronic circuits.

CO PO Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	1		2						2
CO2	3	3	3	3	2							
CO3	3	3	3	3	2							
CO4	3	3	3	3	2						2	

UNITs	Descriptions	Hrs.	CO's
I	**Semiconductor diodes**: Introduction to PN junction diode and its applications, Rectifiers, Clipping and Clamping circuits, Zener diode and its applications, Regulators.	8	CO1, CO4

	Special Purpose Diodes: Tunnel diode, Schottky diode, Varactor diode and their applications, Optoelectronic devices: PIN diode,Light Emitting Diode (LED), Laser diode.		
II	**Bipolar Junction Transistors (BJTs):** Physical structure and operation modes of PNP and NPN Transistors, Biasing the BJT: fixed bias, emitter feedback bias, collector feedback bias and voltage divider bias.	10	CO2, CO4
III	**Transistor as an amplifier**, Basic BJT amplifier configuration: common emitter, common base and common collector amplifiers, , Transistor as a switch: cut-off and saturation modes.	12	CO3
IV	**Multistage Amplifiers**: Multistage or Cascade amplifier: classification of multi-stage amplifier, coupling and frequency response of cascaded systems, effect of cascading on voltage gain, current gain, phase, input and output impedances and bandwidth of cascaded or multistage amplifiers. Types of coupling, cascade and cascode circuits, Darlington pair, bootstrap circuit.	8	CO2
V	**Power Amplifiers**: Class A large signal amplifiers, second-harmonic distortion, Transformer coupled audio power amplifier, Class B amplifier, Class AB operation push pull and Class C power amplifiers, Comparison of their efficiencies, types of distortion, Tuned Amplifiers.	7	CO2
Guest Lectures (if any)		Nil	
Total Hours		45	

Text Book-

1. Integrated Electronics – Millman Halkias, TMH
2. Electronic Devices & Circuits – Boyelstad & Nashelsky – PHI
3. Electronic Devices & Circuits – David A. Bell – PHI
4. Principles of Electronic Devices – Malvino TMH

Reference Books-

1. Microelectronic Circuits- Sedra, Smith.
2. Electronics Circuits And Systems- Owen Bishop
3. Intuitive Analog Circuit Design- Marc T. Thompson
4. Starting Electronics (Fourth Edition)-Keith Brindley

List and Links of e-learning resources:

1. https://nptel.ac.in/courses/117103063/
2. https://www.electronics-tutorials.ws/

Modes of Evaluation and Rubric

The evaluation modes consist of performance in Two mid-semester Tests, Quiz/ Assignments, end-semester examinations.

Recommendation by Board of studies on	05.06.2023
Approval by Academic council on	
Compiled and designed by	

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Department of Electronics Engineering
Syllabus applicable to July 2022 admitted and later batches

Name of the course:	B. Tech in Electronics & Instrumentation Engineering
Semester and Year of study	B. Tech 2nd Year 3rd Semester
Subject Category	Open Elective (OE-I)
SubjectCode:OE-305(B)	Subject Name: Instrumentation-I

Maximum Marks Allotted								Contact Hours			Total Credits
Theory				Practical			**Total Marks**				
End Sem	Mid-Sem	Assignment	Quiz	End Sem	Lab-Work	Quiz		L	T	P	
60	20	10	10	-	-	-	100	3	0	0	3

Prerequisites:

Basic Electrical Concepts, Mathematics (Matrices, Laplace Transform, Differential Equations and Complex Variables).

Course Objective:

The course aims at providing the fundamental concepts of the Instrumentation and Measurement, static and dynamic characteristics of instruments and their error analysis, provides an overview of the laboratory instruments such as CRO, function generators, multimeters etc. It also includes the measurement of passive electrical elements like R, L,C.

Course Outcomes:

Upon completion of the course, student will be able to

- CO1: Identify, conceptualize, demonstrate and apply the fundamentals of measurement science, measuring instruments and their characteristics.
- CO2: Investigate and analyze the working of electrical measuring instruments.
- CO3: Analyze the working of Cathode Ray Oscilloscope (CRO) and other laboratory equipments.
- CO4: Analyze DC bridges used for measurement of Resistance.
- CO5: Analyze AC bridges used for measurement of Capacitance and Inductance.

CO PO Mapping

POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	1								
CO2	3	3	2	2								
CO3	3	3	2	2								
CO4	3	3	2	2								
CO5	3	3	2	2								

UNITs	Descriptions	Hrs.	CO's
I	**Basic concept of Instrumentation**: Functional elements of an instrument, classification of measuring instruments, static and dynamic characteristics of the instruments, Standards & Calibrations of Instruments, Errors in measurement, uncertainty analysis.	12	CO1

II	**Analog Instruments:** Classification of analog instruments, D' Arsonval type Galvanometer, Principle of operation and construction of various analog indicating types of instruments, sources of error, extension of ranges and calibration of ammeters & voltmeters.	10	CO3
III	**Laboratory Instruments**: Cathode Ray Oscilloscope - types, construction and operation, measurement of amplitude, phase and frequency with CRO, Lissajous patterns, Digital Storage Oscilloscope (DSO), Spectrum Analyzers, Harmonic Distortion Measurement, Function Generators, Digital Multimeter, Digital frequency meter.	08	CO2
IV	**Measurement of Resistance:** Measurement of resistance (Low, Medium and High): voltmeter-ammeter method, ohmmeter, DC Bridges: Wheatstone bridge-design, arrangement of ratio arms, bridge sensitivity, errors in bridge circuits, Sensitivity and Calibration adjustments of Wheatstone bridge, Kelvin bridge, Various application of DC bridges, milli ohmmeter, mega ohmmeter, Meggar, Wagner earthing device	08	CO4
V	**Measurement of Inductance and Capacitance (A. C. Bridges):** Measurement of inductance using A. C. Bridges: Maxwell's bridge, Various applications of Maxwell Bridges, Hay's Bridge, Anderson's Bridge, vector impedance meter, Q factor measurement. Measurement of Capacitance using A. C. Bridges: Schering bridge, Wien's Bridge, storage and dissipation factors.	07	CO4
Guest Lectures (if any)		Nil	
Total Hours		45	

Text Books -

1. Cooper W.D., Helfrick A.D. "Modern Electronic Instrumentation Measurement", Prentice Hall.
2. Sawhney A.K. "Electrical and Electronics Measurements & Instrumentation", Dhanpat Rai& sons.
3. Doeblin E.D., Measurement system, Tata McGraw Hill., 4th ed.
4. Kalsi, Electronic Instrumentation, Tata McGraw Hill

Reference Books

1. Terman & Petit, Electronic Measurement.
2. Carr, Instrumentation, Pearson Education

List and Links of e-learning resources: MCET – http://sgsmcet.co.in/eie .

Modes of Evaluation and Rubric

The evaluation modes consist of performance in Two mid-semester Tests, Quiz/ Assignments, end-semester examinations.

Recommendation by Board of studies on	05.06.2023
Approval by Academic council on	
Compiled and designed by	