3rd Semester

Course Code	Course Title	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
EC-14301	Engineering Mathematics-III	3	1	-	40	60	100	4
EC-14302	Object Oriented Programming Using C++ and Data Structures	3	1	-	40	60	100	4
EC-14303	Electronics Devices & Circuits - I	3	1	-	40	60	100	4
EC-14304	Electronic Measurement & Instrumentation	3	1	-	40	60	100	4
EC-14305	Network Analysis and Synthesis	3	1	-	40	60	100	4
EC-14306	Lab Electronics Devices & Circuits - I	-	-	2	30	20	50	1
EC-14307	Lab Electronic Measurement & Instrumentation	-	-	2	30	20	50	1
EC-14308	Lab Object Oriented Programming and Data Structures	-	-	2	30	20	50	1
TR-14301	Workshop Training*	-	-	-	60	40	100	2
TOTAL		**15**	**5**	**6**	**350**	**400**	**750**	**25**

***The marks will be awarded on the basis of 4 weeks workshop training conducted after 2nd Semester.**

COURSE NAME: Engineering Mathematics – III
COURSE CODE: EC-14301
Internal Marks: 40 **L T P**
External Marks: 60 **3 1 -**
Numerical & Design Problems Content: 70%-80%
Note: The Question paper shall have three sections:
Section A shall consist of one question with 10 sub-questions of two (02) marks each. **Section B** shall consist of five questions of five (05) marks each, out of which four questions are required to be attempted by the candidate. **Section C** shall consist of three questions of ten (10) marks each, out of which two questions are required to be attempted by the candidate. Any question of **Section C** may be sub–divided (if required) into two parts of five (05) marks each.

Course Outcomes
On successful completion of this course, the students should be able to:

CO	Definition	POs	PSOs
C01	Understand the use of periodic signals and Fourier series to analyze circuits.	1(M),2(M)	1(M)
C02	Identify the complex functions and separate real and imaginary parts of a complex function	1(H),2(M)	1(M)
CO3	Apply partial differential techniques to solve the physical engineering problems.	1(M)	1(L)
CO4	Analyze the concept of vector spaces and its sub-spaces.	1(M)	1(M)
CO5	Compute complex line integrals usingthe concept of analytic functions.	1(M)	1(M)
CO6	Demonstrate a firm understanding of the solution techniques for Linear ordinary differential equations of second order.	1(M)	1(M)

Syllabus: **[Total Contact Hours: 39+13(T) = 52]**

Unit 1. Fourier Series **[7+2=9]**
Periodic Functions, Euler formula, Even and Odd function with illustrated examples.

Unit 2. Complex Functions: **[8+3=11]**
Modulus amplitude form of a complex no., De-moivre's theorem and numerical questions, finding roots of a complex number, Real and imaginary parts of exponential , logarithmic, circular and hyperbolic functions of complex variables.

Unit 3. Partial Differential Equations and its applications: **[9+3=12]**
Formation of Partial differential equations, Equations solvable by direct integration, First order linear partial differential equations, homogeneous partial differential equations with constant coefficients, classification of linear second order partial differential equations, Wave equation in one dimension, Diffusion and its solution, Laplace equation, Greens Function.

Unit 4. Linear Algebra and Complex Analysis [9+3=12]

Vector spaces, Subspaces, basis, Dimension, Linear transformation. Analytic functions, Line integral, Cauchy integral theorem and formula, Taylor and Laurent Series (without Proof), Residue theorem and Application, Bilinear transformation

Unit 5. Special Functions [7+1=8]

Frobenius Method, Legendre and Bessel functions, Bessel functions of first and second kind, Recurrence relations.

Text Books:

1. N.P.Bali, Manish Goyal, "A Text book of Engineering Mathematics III",Laxmi Publications.

Recommended Books and References:

1. C. W. Curits, "Linear Algebra: An Introductory Approach", Springer.
2. A. D. Belegunder, T. R. Chandrupatla, "Optimization Concepts and Application in Engineering", Pearson Education Asia.
3. Ian Sneddon, "Elements of Partial Differential Equations", McGraw-Hill.
4. Rule V. Churchle, James Ward Brown, "Complex Variable and its Applications", McGraw Hills.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill,New Delhi, 11th Reprint,2008
6. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition ,John Wiley & sons, 2006

Ebook and other online study material:

1. https://lecturenotes.in/subject/19/mathematics-3-m-3
2. file:///C:/Users/COMP%20LAB/AppData/Local/Packages/Microsoft.MicrosoftEdge_8wekyb3d8bbwe/TempState/Downloads/EngineeringMathematics_by_H.D.Block_Vol1.pdf

MOOCS and videos course:

1. https://www.youtube.com/watch?v=P7gVp333B6M&list=PLC183993246C4F397
2. https://www.youtube.com/watch?v=Pu3tEorDyes&list=PLm_MSClsnwm8GcUuLM5ER3VD0UEZqBWcv

COURSE NAME: OBJECT ORIENTED PROGRAMMING USING C++ AND DATA STRUCTURES
COURSE CODE: EC-14302
Internal Marks: 40 **L T P**
External Marks: 60 **3 1 -**
Numerical & Design Problems Content: 50%-60%
Note: The Question paper shall have three sections:
Section A shall consist of one question with 10 sub-questions of two (02) marks each. **Section B** shall consist of five questions of five (05) marks each, out of which four questions are required to be attempted by the candidate. **Section C** shall consist of three questions of ten (10) marks each, out of which two questions are required to be attempted by the candidate. Any question of **Section C** may be sub–divided (if required) into two parts of five (05) marks each.

Course Outcomes
On successful completion of this course, the students should be able to:

CO	Definition	POs	PSOs
C01	Demonstrate the basic concepts of object oriented programming and comprehend encapsulation.	1(M), 2(H)	2(H)
C02	Apply the knowledge of C++ to access data through pointers and understand memory allocation.	1(M)	2(M)
CO3	Illustrate how to apply the major object-oriented concepts to implement inheritance and polymorphism.	1(H),6(M)	1(L),2(H) 3(L)
CO4	Identify the need of constructor and destructor to implement features of object oriented programming.	3(M),9(M)	1(L),2(H) 3(L)
CO5	Understand advanced features of C++ specifically templates, exception handling and operator overloading.	1(M),5(H)	2(H)
CO6	Explain fundamentals of data structures and distinguish various data structures according to their use and implementation.	5(H),10(H)	2(H)

Syllabus: **[Total Contact Hours: 39+13(T) = 52]**

Unit 1. Principles of Objected Oriented Programming [7+2=9]
Basic concepts of object oriented programming-data types, variables, strings, functions, arrays, structures, standard input/output, classes and objects.

Unit 2. Pointers and Dynamic Memory Management [5+1=6]
Declaring and initializing pointers, accessing data through pointers, pointer arithmetic, memory allocation (static and dynamic), dynamic memory management using new and delete operators, pointer to an object, this pointer, pointer related problems - dangling/wild pointers, null pointer assignment, memory leak and allocation failures.

Unit 3. Inheritance and Polymorphism [7+2=9]

Types of inheritance, base classes and derived classes, public, private and protected inheritance, object slicing, overriding member functions, object composition and delegation, order of execution of constructors and destructors, virtual functions and polymorphism, dynamic binding, pure virtual functions, abstract base classes.

Unit 4. Constructors and Destructors [6+2=8]

Need for constructors and destructors, copy constructor, constructors and destructors in derived classes, constructors and destructors with static members, virtual destructors, initializer lists, operator overloading and type conversion.

Unit 5. Exception Handling and Templates [3+2=5]

Exception handling, templates and generic programming.

Unit 6. Introduction to Data Structures [3+2=5]

Introduction to data structures, introduction to algorithms complexity.

Unit 7. Arrays, Stacks & Queues [8+2=10]

Concepts; basic operations & their algorithms: transverse, insert, delete, sorting of data in these data structures, prefix, infix, postfix notations.

Text Books:

1. E. Balagurusamy, "Object Oriented Programming with C++", Tata McGraw Hill, 3rd edition,2007.
2. Ashok N.Kamthane, "Object Oriented Programming with ANSI & Turbo C++",pearson education, Fourth impression, 2008.
3. B. Stroustrup, "The C++ Programming Language", Addison Wesley, Reading Mass, USA, 4th Edition, May 2013.
4. Seymour Lipschutz, "Data Structures", Schaum's Outline Series,Tata McGraw-Hill, Special Indian edition, 2006.

Reference books and other resources:

1. Lafore R., "Object Oriented Programming in C++", Indianapolis, Ind. :Sams Publ., 4th edition, 2005.
2. *Michael Goodrich*, Roberto Tamassia& David Mount "*Data structures* and *algorithms* in *C++", Copyright © 2004* by John *Wiley*& Sons, 2010.

E books and online learning materials.

1. http://fac.ksu.edu.sa/sites/default/files/ObjectOrientedProgramminginC4thEdition.pdf
2. https://archive.org/details/EBalagurusamyObjectOrientedProgrammingWithC

MOOCS and Video Course.

1. https://www.youtube.com/watch?v=WpJ_yiwbGyk&list=PL3wYxbt4yCi5WymYaVLSpCto_LNbVNNA
2. https://www.youtube.com/watch?v=xnh7ip5gpzc&list=PLfVsf4Bjg79DLA5K3GLbIwf3baNVFO2Lq

COURSE NAME: ELECTRONICS DEVICES & CIRCUITS - I
COURSE CODE: EC-14303
Internal Marks: 40 **L T P**
External Marks: 60 **3 1 -**
Numerical & Design Problems Content: 20%-30%
Note: The Question paper shall have three sections:
Section A shall consist of one question with 10 sub-questions of two (02) marks each. **Section B** shall consist of five questions of five (05) marks each, out of which four questions are required to be attempted by the candidate. **Section C** shall consist of three questions of ten (10) marks each, out of which two questions are required to be attempted by the candidate. Any question of **Section C** may be sub–divided (if required) into two parts of five (05) marks each.

Course Outcomes
On successful completion of this course, the students should be able to:

CO	Definition	POs	PSOs
CO1	Apply the basic mechanism of semiconductors in various types of diodes, bipolar junction transistors and field effect transistors.	1(H)	1(M)
CO2	Analyze the behavior of different electronic components in terms of V-I characteristics.	1(H), 2(H)	1(L)
CO3	Select suitable techniques to provide stabilization in electronic circuits against external factors like temperature and component variations.	1(H), 5(M)	1(M)
CO4	Design solutions for problems pertaining to electronic circuits under given operating conditions and specifications.	1(H), 3(H)	1(M)
CO5	Comprehend the operation of small signal transistors using h-parameters.	1(M)	1(L)
CO6	Illustrate the applications of electronic circuits by inspecting the function of each discrete electronic component.	1(H), 2(H), 3(L)	1(M)

Syllabus: **[Total Contact Hours: 39+13(T) = 52]**

Unit 1. Introduction **[4+2=6]**
Energy bands in silicon, intrinsic and extrinsic silicon, carrier transport in silicon: diffusion current, drift current, mobility, and resistivity, generation and recombination of carriers.

Unit 2. Diode Circuits **[9+3=12]**
Theory of PN junction diode, volt ampere characteristics, band structure of open circuited PN junction, small signal equivalent circuit of diode, temperature dependence of PN diode, rectifiers, filter circuits, special purpose diodes: zener diode as voltage regulator, tunnel diode, LED, LCD and photodiodes.

Unit 3. Transistor Biasing and Stabilization [13+3=16]

PNP & NPN transistor, construction and characteristics in CB, CE and CC modes, transistor as an amplifier, transistor series and shunt regulators, UJT, photo- transistors, operating point, bias stability, various biasing circuits, stabilization against I_{CO}, V_{BE} and beta, bias compensation methods, thermal resistance.

Unit 4. Field Effect Transistors [5+2=7]

Construction and characteristics of junction field effect transistor (JFET), MOSFETs, MOS capacitor, FET parameters, Biasing of FETs, applications of FETs.

Unit 5. Small Signal Low Frequency Transistor [8+3=11]

Determination of h parameters from transistor characteristics, h parameter equivalent circuit of transistor, conversion of h parameter from CB to CE and CC configuration,analysis of transistor amplifier using h-parameters in CB, CE and CC configuration, frequency response of amplifier, effect of an emitter bypass capacitor, coupling capacitor, emitter resistance and shunt capacitors on frequency response of amplifier, analysis of emitter follower using Miller's theorem.

Text Books:

1. J. Millman, C. C. Halkias, "Electronic Devices & Circuits", Tata McGraw Hill.
2. R. L. Boylestad, "Electronic Devices & Circuits Theory", Prentice Hall India.

Reference books and other resources:

1. A. Mottorshead, "Electronic Devices & Circuits", Prentice Hall India.
2. A. Malvino, D. J. Bates, "Electronics Principles", Tata McGraw Hill, 2007.
3. J. Millman, C. C. Halkias, "Integrated Electronics: Analog & Digital Circuits and Systems", Tata McGraw Hill.

E-books and other online Material:

1. http://www.rtna.ac.th/departments/elect/Data/EE304/Electronic%20Devices%20and%20Circuit%20Theory.pdf
2. http://nptel.ac.in/courses/114103063/1
3. https://www.scribd.com/doc/281044230/EDC-BAKSHI-pdf

MOOCS and online videos:

1. https://www.youtube.com/playlist?list=PL-b2akM-9CLjRGEcR-Zg01-2DM3hH5F-t
2. http://freevideolectures.com/Course/2261/Basic-Electronics-and-Lab/2

COURSE NAME: ELECTRONIC MEASUREMENT & INSTRUMENTATION
COURSE CODE: EC-14304

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**-**

Numerical & Design Problems Content: 20%-30%

Note: The Question paper shall have three sections:

Section A shall consist of one question with 10 sub-questions of two (02) marks each. **Section B** shall consist of five questions of five (05) marks each, out of which four questions are required to be attempted by the candidate. **Section C** shall consist of three questions of ten (10) marks each, out of which two questions are required to be attempted by the candidate. Any question of **Section C** may be sub–divided (if required) into two parts of five (05) marks each.

Course Outcomes

On successful completion of this course, the students should be able to:

CO	Definition	POs	PSOs
C01	Define generalized instrumentation system and characterize electronic measuring instruments.	1(L)	(1L)
C02	Measure the parameters of signal using different electronic meters and measuring instruments.	4(H),5(M)	1(M)
CO3	Design the bridges for calculations of resistance, inductance and capacitance.	1(H),3(H)	1(H)
CO4	Examine and analyze various waveforms using different electronic devices.	4(M)	1(L)
CO5	Explain the working of various recorders and display devices.	1(L)	(1L)
CO6	Illustrate the working and application of transducers, telemetry system and data	1(L)	(1L)

Syllabus: **[Total Contact Hours: 42+13(T) = 55]**

Unit 1. Fundamentals: Generalized Instrumentation System [6+2=8]

Units and standards, calibration methods, standards of measurements, classification of errors, error analysis, static characteristics- accuracy, precision, sensitivity, linearity, resolution, hysteresis, threshold, input impedance, loading effects etc. dynamic characteristics.

Unit 2. Electronic Meters and Electronic Analog Voltmeter [8+3=11]

DC voltmeters-choppers type-DC amplifier, solid state voltmeter, differential voltmeter, peak responding voltmeter, true RMS voltmeter, calibration of DC voltmeters. digital voltmeter introduction, ramp techniques, dual slope, integrating type DVM, successive approximation type DVM, resolution and sensitivity of digital meters, general specification of a DVM. CRO‟ s study

of various stages in brief, measurement of voltage, current phase and frequency, special purpose oscilloscope.

Unit 3. Measuring Instruments [8+3=11]

Principle of operation of galvanometer, PMMC, potentiometer, moving iron instruments, resistance measurements using Wheatstone bridge, Kelvin double bridge, Ohm meter, AC bridges: Maxwell bridge, Maxwell wein bridge, Hey's bridge, Schering bridge, Anderson bridge, Campbell bridge.

Unit 4. Instrumentation for Generation and Analysis of Waveforms [7+2=9]

Signal generators: fixed and variable AF oscillators, AF sine and square wave generator, function generator: square and pulse generator, sweep generator, wave analyzer, harmonic distortion analyzer, spectrum analyzer, spectrum analysis.

Unit 5. Storage and Display Devices [7+2=9]

Necessity of recorders, recording requirements, graphic recorders, strip chart recorders, magnetic tape recorders, digital tape recorders, electronic indicating instruments, seven segment display, fourteen segmental display Nixie tube.

Unit 6. Transducers and DATA Acquisition Systems [6+1=7]

Strain gauge, LVDT, thermocouple, piezoelectric crystal and photoelectric transducers and their applications, data acquisition systems, introduction to telemetry system

Text Books:

1. K. Sawhney, "Electrical and Electronic Measurements and Instrumentation", DanpatRai Publication.
2. D. Cooper, "Electronic Instrumentation and Measurement Techniques", Prentice Hall.

Reference books and other resources:

1. H. S. Kalsi, "Electronic Instrumentation", Tata McGraw Hill.
2. D. Buchla, Wayne Melachlan, "Applied Electronics Instrumentation and Measurement", Prentice Hall.
3. B. H Oliver, J. M. Cag, "Electronics Measurement and Instrumentation", McGraw Hill.
4. Carr, "Element of Electronic Instrumentation &Measurment", Pearson Education.
5. Kishore, "Electronic Measurments& Instrumentation", Pearson Education.
6. Terry L. Bartelt, "Process Control Systems and Instrumentation", Cengage Learning.

Ebooks and other online material:

1. http://www.mlrinstitutions.ac.in/sites/default/files/lecture_notes/a5c7f6f7cb405bd2f20c0eefa2cb2551-EMI-1-UNIT.pdf
2. https://www.scribd.com/doc/141456001/Instrumentation-H-S-KALSI

MOOCS and online video course:

1. https://www.youtube.com/watch?v=xLjk5DrScEU&list=PL_V7oErzqHVN8VqnMUps8lCSHgD4pCrAZ
2. https://www.youtube.com/watch?v=QaNDC44ADHY&list=PLZ4xobG3heC__o1hIRzTlQI58c0ERlyui

COURSE NAME: NETWORK ANALYSIS AND SYNTHESIS
COURSE CODE: EC-14305

	L	T	P
Internal Marks: 40			
External Marks: 60	**3**	**1**	**-**

Numerical & Design Problems Content: 30%-40%

Note: The Question paper shall have three sections:

Section A shall consist of one question with 10 sub-questions of two (02) marks each. **Section B** shall consist of five questions of five (05) marks each, out of which four questions are required to be attempted by the candidate. **Section C** shall consist of three questions of ten (10) marks each, out of which two questions are required to be attempted by the candidate. Any question of **Section C** may be sub–divided (if required) into two parts of five (05) marks each.

Course Outcomes

On successful completion of this course, the students should be able to:

CO	Definition	POs	PSOs
CO1	Comprehend different types of signals used in electrical systems	1(H), 3(H)	1(L)
CO2	Analyze the circuits using various network theorems	1(H),2(H),3(H)	1(H)
CO3	Analyze the transient and steady state response of networks using Laplace transforms	1(H),2(H),3(H)	1(H)
CO4	Synthesizetwo terminal networks	1(H), 3(H)	1(H)
CO5	Design basic cut set and tie set matrices for planar networks.	1(H), 3(H)	1(L)
CO6	Formulate and design filter networks for different systems	2(H), 3(H)	1(L)

Syllabus: **[Total Contact Hours: 39+13(T) = 52]**

Unit 1. Circuit Concepts **[9+2=11]**

Independent and dependent sources, signals and wave forms, periodic and singularity voltages, step, ramp, impulse, doublet, loop currents and loop equations, node voltage and node equations, network theorems, superposition, Thevenin's, Norton's, maximum power transfer, and reciprocity.

Unit 2. Time and Frequency Domain Analysis **[8+3=11]**

Representation of basic circuits in terms of generalized frequency and their response, Laplace transform of shifted functions, transient and steady response, time domain behaviors from poles and zeros, convolution theorem

Unit 3. Network Synthesis **[10+4=14]**

Network functions, impedance and admittance function, transfer functions, relationship between transfer and impulse response, poles and zeros and restrictions, network function for two terminal pair network, sinusoidal network in terms of poles and zeros, real liability condition for impedance synthesis of RL and RC circuits, network synthesis techniques for 2-terminal

network, Foster and Cauer forms.

Unit 4. Filters **[8+3=11]**

Classification of filters, characteristics impedance and propagation constant of pure reactive network, ladder network, T-section, π-section, terminating half section, pass bands and stop bands, design of constant-K, m-derived filters, composite filters.

Unit5. Network Topology **[4+1=5]**

Definitions, graph, tree, twigs, basic cut-set and basic tie set matrices for planar network.

Text Books:

1. A. Chakraborty, "Circuit Theory", DhanpatRai.
2. A. Sudhakar, Shyammohan S. Pali, "Circuits and Networks: Analysis and Synthesis", Tata McGraw Hill.

Reference books and other resources:

1. J. Bird, "Electrical Circuit Theory and Technology", Newnes.
2. D. Roy Chaudhury, "Networks and Synthesis", New Age International.
3. M. Nahvi, J. A. Edminister, "Electric Circuits (Schaum's outline series)", Tata McGraw Hill.
4. T. S. K. V. Iyer, "Circuit Theory", Tata McGraw Hill.
5. M. E. Van Valkenberg, "Network Analysis and Synthesis", PHI Learning.

E books and online learning materials.

1. https://bookstackweb.files.wordpress.com/2014/07/alexander-sadiku-fundamentals-of-electric-circuits.pdf
2. https://archive.org/details/NetworkAnalysisSynthesis

MOOCS and Video Course.

1. https://www.youtube.com/watch?v=UMhBgyK8F0U&list=PLByCtUEqH47zpwbHOog_UIItHmtMIT0FO
2. https://www.youtube.com/watch?v=5Zw8776D04A&list=PL-DyDJ8dpGDOZjYPFBL214EcvYBfE4tSW

COURSE NAME: LAB ELECTRONICS DEVICES & CIRCUITS - I
COURSE CODE: EC-14306

	L	T	P
Internal Marks: 30			
External Marks: 20	**-**	**-**	**2**

NOTE: Do all Experiments. Evaluation of the lab work shall be done as per the approved Rubric.

Course Outcomes

On successful completion of this course, the students should be able to:

CO	Definition	POs	PSOs
CO1	Examine the role of active and passive electronic components for different applications like rectification, filtering and amplification.	1(H), 2(H), 4(H), 5(M)	1(M)
CO2	Assess the behavior of special purpose zener diode and photodiode.	1(M), 2(M), 4(H), 5(M)	1(L)
CO3	Demonstrate the current-voltage characteristics of bipolar junction transistor and field effect transistor in different mode.	1(H), 2(M), 4(H), 5(M)	1(L)
CO4	Conduct experiments to deduce the stability of various transistor biasing circuits.	1(M), 2(M), 4(H), 5(M)	1(L)
CO5	Distinguish the response of electronic circuits for given specifications.	1(H), 2(H), 3(H), 4(H), 5(H)	1(M)
CO6	Work as an individual or in a team to demonstrate the applications of electronic components.	1(H), 2(H), 4(H), 5(H), 9(M), 12(M)	1(M)

Syllabus:

Experiment 1. To perform the operation of half wave rectifier.

Experiment 2. To perform full wave & bridge rectifiers and calculate efficiency and ripple factor.

Experiment 3. To study simple capacitive, T & π filters.

Experiment 4. To observe the application of Zener diode as voltage regulator.

Experiment 5. To implement any one application of photodiode.

Experiment 6. To plot the input and output characteristics of CE configuration.

Experiment 7. To plot the input and output characteristics of CB configuration.

Experiment 8.	To determine h- parameters of a transistor using output characteristics.
Experiment 9.	To design fixed bias circuit.
Experiment 10.	To design potential divider transistor biasing circuit.
Experiment 11.	To observe the operation of an emitter follower circuit.
Experiment 12.	To plot JFET characteristics in CS configuration.

Reference Books and Other Resources:

Lab manuals available in lab.

E-books and other online materials:

1. http://ece.anits.edu.in/EDC%20manual.pdf
2. http://www.sircrrengg.ac.in/images/Others/ECE/EDCLAB.pdf

MOOCS and Video Course.

1. https://www.youtube.com/watch?v=rHWzLrmwBCk&list=PLVWMpzyFYi-8HTzhgyThdpSmyg5ekL1zu
2. https://www.youtube.com/channel/UC7BL0zGAkS6-Amv9STOvdvw

COURSE NAME: LAB ELECTRONIC MEASUREMENT & INSTRUMENTATION
COURSE CODE: EC-14307

	L	T	P
Internal Marks: 30			
External Marks: 20	**-**	**-**	**2**

Note: The evaluation of the Lab work shall be done as per the approved Rubrics.

Course Outcomes

CO	Definition	POs	PSOs
CO1	Measure different electrical quantities using digital multimeter.	4(M)	1(M)
CO2	Measure inductance, resistance, capacitance and various parameters of signal using different bridges .	1(M),4(M)	1(M)
CO3	Calculate the value of Q of a coil using LCR-Q meter.	1(M),4(M)	1(M)
CO4	Determine the frequency & phase angle of signals using C.R.O	1(M),4(M)	1(M)
CO5	Explain the phenomenon of resonance.	1(L)	
CO6	Examine the characteristics and operate various transducers and potentiometer	1(M)	

Syllabus:

Experiment 1. To be familiar with the working of digital multimeter

Experiment 2. Measurement of inductance by Maxwell‟ sbridge.

Experiment 3. Measurement of small resistance by Kelvin‟ s bridge.

Experiment 4. Measurement of capacitance by Schering Bridge.

Experiment 5. Measurement of frequency by Wein Bridge

Experiment 6. Measurement of medium resistance by Wheat Stone's bridge

Experiment 7. Determination of frequency & phase angle using C.R.O

Experiment 8. To find the Q of a coil using LCR-Q meter

Experiment 9. Study of resonance

Experiment 10. To determine output characteristic of a VDT and determine its sensitivity.

Experiment 11. Study characteristics of temperature transducer like thermocouple, thermistor and RTD with implementation of small project using signal conditioning circuit.

Reference Books and Other Resources:

Lab manuals available in lab.

Online videos:

1. https://www.youtube.com/watch?v=GeET9Z1dbnA&index=8&list=PLv_Pw5IjPpkKm9RACkDUrzr4RnoE1YdKv
2. https://www.youtube.com/watch?v=_Z9ZKCQJhiU

COURSE NAME: LAB OBJECT ORIENTED PROGRAMMING AND DATA STRUCTURES
COURSE CODE: EC-14308

	L	T	P
Internal Marks: 30			
External Marks: 20	**-**	**-**	**2**

NOTE: Do all Experiments.Evaluation of the lab work shall be done as per the approved Rubric.

Course Outcomes

On successful completion of this course, the students should be able to:

CO	Definition	Pos	PSOs
C01	Create programs with basic object-oriented concepts and implement important features of C++.	1(M),5(H) 9(M)	2(H)
C02	Apply the knowledge of C++ to access data through constructors and initializer list.	1(H),6(H)	2(M)
CO3	Develop the object oriented skills like inheritance and polymorphism to solve real world problems.	3(H),4(M) 10(H)	2(H),3(M)
CO4	Compile codes with good coding practices on advanced features of C++.	2(H),4(H), 5(M)	1(L),2(H) 3(M)
CO5	Understand how several fundamental algorithms work particularly those concerned with Array, Stack and Queue.	1(H),2(H), 5(L)	2(H)
CO6	Work in a team to demonstrate an application of object oriented programming by engaging in self-learning.	4(M),9(H), 10(M),12(H)	1(L),2(H) 3(M)

Syllabus:

Write following programs in C++:

Experiment 1. Using basic statements like control statements, looping statements, various I/O statements and various data structures.

Experiment 2. To create classes in C++ for understanding of basic OOPS features.

Experiment 3. To demonstrate the use of static and const data members.

Experiment 4. To demonstrate the use of various types of constructors and destructors.

Experiment 5. To create programs in C++ for understanding initializer list.

Experiment 6. To demonstrate unary and binary operator overloading.

Experiment 7. To demonstrate the use of memory management operators.

Experiment 8. To create programs in C++ to understand various forms of inheritance.

Experiment 9. To demonstrate the use of virtual keyword.

Experiment 10. To create programs in C++ to understand exception handling and templates.

Experiment 11. To implement following operations (using separate functions) on a linear array:

- Insert a new element at end as well as at a given position
- Delete an element from a given whose value is given or whose position is given
- To find the location of a given element
- To display the elements of the linear array

Experiment 12. To demonstrate the use of stack (implemented using linear array) in converting arithmetic expression from infix notation to postfix notation.

Experiment 13. To demonstrate the use of stack (implemented using linear linked array) in evaluating arithmetic expression in postfix notation.

Experiment 14. To demonstration the implementation of various operations on a linear queue represented using a linear array.

Experiment 15. To demonstration the implementation of various operations on a circular queue represented using a linear array.

Reference Books and Other Resources:

Lab manuals available in lab.

Video Course

1. https://www.youtube.com/watch?v=Y00J1EE49Fg
2. https://www.youtube.com/watch?v=HGE0V2uQ--U