Sharnbasva University, Kalaburagi

Scheme of Teaching and Examination 2018-19

Outcome Based Education(OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2018-19)

III SEMESTER B.Tech (E & CE)

Sl.No	Course Code		Course Title	Teaching Department	Teaching Hours/week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	BSC	18MAT31	Engineering Mathematics-III	Mathematics	3	1		3	50	50	100	04
2	PCC	18EC32	Analog Circuits	ECE	3	1		3	50	50	100	04
3	PCC	18EC33	Digital System Design	ECE	3	1		3	50	50	100	04
4	PCC	18EC34	Network Analysis	ECE	3	1		3	50	50	100	04
5	PCC	18ECL35	Analog Circuits Lab	ECE			2	3	50	50	100	01
6	PCC	18ECL36	Digital System Design Lab	ECE			2	3	50	50	100	01
7	PCC	18ECL37	Network Analysis Lab	ECE			2	3	50	50	100	01
8	PRJ	18PRJ38	Project-III	ECE			2	3	50	50	100	01
9	HSMC	18KANKK310 /20KANAK310/ 18HSM39	Kannada Kali-III/ Aayda Kategalu / Yoga	Humanities	1			3	50	50	100	01
Total					**13**	**4**	**08**	**27**	**450**	**450**	**900**	**21**
BSC-Basic Science, PCC-Professional Core, HSMC-Humanity and Social Science, PR-Project, NCMC- Non-credit mandatory course.												
Courses prescribed to lateral entry and B.Sc degree holders admitted to III semester of Engineering programs												
10	NCMC	18MATDIP31	Additional Mathematics - I	Mathematics	3	1		3	50	50	100	00

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Outcome Based Education(OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2018-19)

IV SEMESTER B.Tech (E & CE)

Sl.No	Course Code		Course Title	Teaching Department	Teaching Hours/week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in Hours	CIE Marks	SEE Marks	Total Marks	
1	BSC	18MAT41	Engineering Mathematics-IV	Mathematics	3	1		3	50	50	100	04
2	PCC	18EC42	Analog and Digital Communication	ECE	3	1		3	50	50	100	04
3	PCC	18EC43	Microcontroller	ECE	3	1		3	50	50	100	04
4	PCC	18EC44	Signals and Systems	ECE	3	1		3	50	50	100	04
5	PCC	18ECL45	Analog and Digital Communication Lab	ECE			2	3	50	50	100	01
6	PCC	18ECL46	Microcontroller Lab	ECE			2	3	50	50	100	01
7	PCC	18ECL47	Signals and Systems Lab	ECE			2	3	50	50	100	01
8	PRJ	18PRJ48	Project-IV	ECE			2	3	50	50	100	01
9	HSMC	18KANKK410/ 20KANMD410/ 18AK16	Kannada kali-IV/ Mahadasohigalu / Adalita Kannada	Humanities	1			2	50	50	100	01
Total					**13**	**4**	**08**	**27**	**450**	**450**	**900**	**21**
BSC-Basic Science, PCC-Professional Core, HSMC-Humanity and Social Science, MP-Mini project												
Courses prescribed to lateral entry and B. Sc degree holders admitted to III semester of Engineering programs												
10	NCMC	18MATDIP41	Additional Mathematics – II	Mathematics	3	1		3	50	50	100	00
*EVERY STUDENT SHOULD UNDERGO MOOC SUBJECT ATLEAST ONCE, DURING THE ENTIRE COUSRE WITH CREDIT 4												

ENGINEERING MATHEMATICS –III [As per Choice Based Credit System (CBCS) Scheme] SEMESTER-III			
Subject Code	18MAT31	CIE Marks	50
Number of Lecture Hour/Week	3L+1T	SEE Marks	50
Number of Lecture Hours	50	Exam Hours	03
CREDITS-04			

Course Objectives: This course viz,Engineering mathematics-III(18MAT31) aims to prepare the students:

- Introduce most commonly used analytical and numerical methods in the different engineering
- Fields.
- Learn Laplace transform and Z-transforms, statistical methods, numerical methods.
- Solve the problem on Interpolation.
- To discuss the random variable and associated probability distributions.

Module -1	**Teaching Hours**
LAPLACE TRANSFORMS: Definition, Laplace transforms of Elementary functions, properties (without proof) periodic function, Unit step function, Unit impulse function. **INVERSE LAPLACE TRANSFORMS:** Definition, Convolution Theorem (without proof), Finding Inverse Laplace transform by convolution Theorem. Solution of Linear Differential equations using Laplace Transforms and Applications (5 Assignment Problem). **RBT Levels: L1, L2 and L3**	10 Hours
Module -2	
Z-TRANSFORMS: Difference Equations, Basic definitions, Damping rule, Shifting rule, Initial and Final Value theorems (without proof) and problems. Inverse Z-transforms. Applications of Z-transforms to solve difference equation (5 Assignment Problem). **RBT Levels: L1, L2 and L3**	10 Hours
Module -3	
STATISTICAL METHODS: Correlation-karl Pearson's co-efficient of correlation problems. Regression analysis lines of regression (without proof)-problems. **CURVE FITTING:** Curve fitting by the method of least square. Fitting of the curves of the form y=ax+b, y=ax^2+bx+c & y=ae^bx. **NUMERICAL METHODS:** Numerical solution of algebraic and transcendental equations by Regula - Falsi Method and Newton-Raphson method. **RBT Levels: L1, L2 and L3**	10 Hours
Module -4	
FINITE DIFFERENCE: Forward and Backward differences, Newton's forward and backward interpolation formulae. Divided difference-Newton's divided difference formulae. Lagrange's-interpolation formula and inverse interpolation formula(all formula without proof) problems. **NUMERICAL INTEGRATION:** Simpsons $[(1/3)]^{rd}$, $[(3/8)]^{th}$ rules, Weddle's rule (without proof) problems. **RBT Levels: L1, L2 and L3**	10 Hours

Module -5	
PROBABILITY DISTRIBUTION: Random variables (discrete and continuous) probability mass/density functions. Binomial distribution, Poisson distribution. Exponential and Normal distributions. Problems. **RBT Levels: L1, L2 and L3**	10 Hours

Course Outcomes(COs): After completion of course, the student will able to

CO1 - Apply the knowledge of Laplace transform from time domain to frequency domain in Signal and image processing and to find inverse Laplace transform.

CO2 - Apply the knowledge of Z-transforms in solving the difference equation arising in the time signals and digital processing.

CO3 - Apply the concept of correlation and regression lines for solving the problems and numerical techniques to solve engineering problems.

CO4 - Understanding the concepts of Finite differences to solve the problems on interpolation and numerical integration.

CO5 - Learn to solve the random variable in both discrete and continuous and their probability distribution, Mass on various engineering problems.

Text Books:

1. B.S. Grewal : Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. E. Kreyszig : Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference Books:

1. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers , 7th Ed., 2010.
2. B.V.Ramana: "Higher Engineering Mathematics" Tata McGraw-Hill, 2006.
3. H. K. Dass andEr. RajnishVerma: "Higher Engineering Mathematics", S. Chand publishing, 1st edition, 2011.

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):
Note:1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-

ANALOG CIRCUITS

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-III

Subject Code	18EC32	CIE Marks	50
Number of Lecture Hour/Week	3L+1T	SEE Marks	50
Number of Lecture Hours	50	Exam Hours	03

CREDITS-04

Course Objectives: This course will enable students to:

- Understand the operation of various diode clipping and clamping circuits.
- Understand the operation and design of zener regulator.
- Understand the operation and analyze the various bias circuits of BJT & FET.
- Analyze the amplifier circuits using BJT & JFET.
- Understand the operation of various feedback topologies and design the Oscillator circuits.

Module -1	**Teaching Hours**
DIODE CIRCUITS AND APPLICATIONS: DC load line, Clippers, Clampers, Zener diode as voltage regulator. **BJT BIASING:** Introduction, Operating point, Fixed bias configuration, Voltage divider bias configuration, Emitter bias configuration, Transistor switching networks, Bias stabilization. **RBT: L1,L2,L3**	10 Hours
Module -2	
BJT AC ANALYSIS: Introduction, BJT transistor modeling, The re transistor model: Common emitter fixed bias configuration, Voltage divider bias configuration. The Hybrid Equivalent model, Approximate hybrid equivalent circuit: Fixed bias configuration, Voltage divider bias configuration. **FIELD EFFECT TRANSISTORS:** Introduction, Construction and Characteristics of JFETs, Transfer characteristics, Depletion type MOSFET, Enhancement type MOSFET. **JFET BIASING:** Fixed bias configuration, Self bias configuration, Voltage divider bias configuration. **JFET SMALL SIGNAL MODEL**: Introduction, Fixed bias configuration, Voltage divider configuration. **RBT: L1,L2,L3**	10 Hours
Module -3	
BJT FREQUENCY RESPONSE: Introduction**,** Logarithms, Decibels, General frequency considerations, Low frequency response-BJT amplifier, Miller effect capacitance, High frequency response-BJT amplifier. **FEEDBACK AND OSCILLATOR CIRCUITS:** Feedback concepts, Feedback connection types, Oscillator operation, Phase shift oscillator, Tuned Oscillator Circuit, Crystal oscillator (BJT versions only). **POWER AMPLIFIERS:** Introduction-Definitions and amplifier types, Series fed class A amplifier, Transformer coupled Class A amplifier, Class B amplifier operation, Complementary symmetry circuits, Amplifier distortion, Class C and class D amplifiers **RBT: L1,L2,L3**	10 Hours

Module -4	
OPERATIONAL AMPLIFIER PARAMETERS AND PERFORMANCE: Basic Op-Amp internal circuitry, Input, output & supply voltages, Offset voltages and currents, Input and output impedances, Slew rate and Frequency limitations. **OP-AMPS AS DC AMPLIFIERS:** Biasing Op-Amps, Direct coupled voltage follower, Non-inverting amplifiers, inverting amplifiers, Summing amplifiers and Difference amplifier, Instrumentation amplifier. **OP-AMP APPLICATIONS:** Zero Crossing detector**,** Inverting Schmitt trigger circuit, Differentiating Circuit, Integrator Circuit, Precision rectifiers. **ACTIVE FILTERS:** First order and Second order active Low-pass and High pass filters, Band-pass filters and Notch filters. **RBT: L1,L2,L3**	10 Hours
Module -5	
VOLTAGE REGULATOR: Introduction, Series Op-Amp regulator, IC voltage regulators, 723 general purpose regulators. **555 TIMERS**: Introduction, Description of functional diagram, Mono stableoperation and Astable operation. **PHASE LOCKED LOOP:** Basic Principles, Phase detector/comparator, Voltage Controlled Oscillator (VCO). **D-A AND A-D CONVERTERS**: Introduction, Weighted resistor DAC, R-2R ladder DAC, ADC using Successive approximation. **RBT: L1,L2,L3**	10 Hours

Course Outcomes: After studying this course, students will be able to:

CO1- Build diode Clippers, Clampers and Zener diode voltage regulator and apply BJT DC biasing analysis in circuit design.

CO2- Apply AC analysis of BJT & JFET DC biasing analysis in circuit designing.

CO3- Analyze the BJT amplifier frequency response and design the Oscillator circuits, Power amplifiers.

CO4- Develop and analyze the linear and non-linear applications of Op-Amp.

CO5 Build voltage regulator, 555 timers, phase locked loop and data converters.

Text Books:

1. Robert L. Boylestad and Louis Nashelsky, "Electronics Devices and Circuit Theory", Pearson, 10th Edition, 2012, ISBN: 978-81-317-6459-6.
2. David A. Bell, "Operational Amplifiers and Linear ICs", Oxford University Press, 3rd Edition, 2011.
3. D. Roy Choudhury and Shail B. Jain, "Linear Integrated Circuits", New Age International Publishers, 4th Edition, 2010, ISBN 978-81-224-3098-1.

Reference Books:

1. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition, 2008.
2. Jacob Millman, Christos C Halkias, SatyabrataJit, "Electronic Devices and Circuits", McGraw-Hill Education, 2nd Edition, 2007.
3. Ramakant A Gayakwad, "Op-Amps and Linear Integrated Circuits", Pearson, 4th Edition, 2015.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):
Note:1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	3	2	-	-	-	1	-	-	-	-	-	3	-	-
CO2	3	3	3	-	-	-	1	-	-	-	-	-	3	-	-
CO3	2	3	2	-	-	-	1	-	-	-	-	-	3	-	-
CO4	2	2	3	-	-	-	1	-	-	-	-	-	3	-	-
CO5	3	2	3	-	-	-	1	-	-	-	-	-	3	-	-

DIGITAL SYSTEM DESIGN [As per Choice Based Credit System (CBCS) Scheme] SEMESTER-III			
Subject Code	18EC33	CIE Marks	50
Number of Lecture Hour/Week	3L+1T	SEE Marks	50
Number of Lecture Hours	50	Exam Hours	03
CREDITS-04			

Course Objectives: This course will enable students to:

- Illustrate simplification of Algebraic equations using Karnaugh Maps Technique.
- Design combinational logic circuits, Decoders, Encoders, Digital Multiplexer, Adders, Subtractors and Binary Comparators.
- Describe Latches and Flip-flops, Registers and Counters.
- Develop state diagrams for Synchronous Sequential Circuits.
- Analyze Mealy and Moore Models, State machine notation and Analysis Sequential circuit.

Module -1	**Teaching Hours**
Principles of combination logic: Introduction, Generation of switching equations from truth tables, Karnaugh maps-3,4,5 variables, Incompletely specified functions (Don‘t care terms) Simplifying Max term equations. **RBT: L1,L2,L3**	10 Hours
Module -2	
Applications of Combination logic: General approach to combinational logic design, Decoders, BCD decoders, Encoders, digital multiplexers, De-multiplexer, Using multiplexers as Boolean function generators, Adders and subtractors, Cascading full adders, Look ahead carry, Comparators. **RBT: L1,L2,L3**	10 Hours
Module -3	
Principles of Sequential Circuits: Introduction, Basic Bi-stable elements, Latches, Timing considerations, The master-slave flip-flops (pulse-triggered flip-flops): SR flip-flops, JK flip-flops, Edge triggered flip-flops, Characteristic equations. **RBT: L1,L2**	10 Hours
Module -4	
Applications of Flip-Flops: Registers, Binary ripple counters, Synchronous binary counters, Counters based on shift registers, Design of synchronous counters, Design of a synchronous mod-n counter using clocked T, JK, D and SR flip-flops. **RBT: L1,L2,L3**	10 Hours
Module -5	
Sequential Circuit Design: Mealy and Moore models, State machine notation, Synchronous Sequential circuit analysis, Construction of state diagrams, Counter design. **RBT: L1,L2,L3**	10 Hours

Course Outcomes: After studying this course, students will be able to:

CO1- Apply the Karnaugh map method to derive minimal forms of Boolean expressions in digital systems.

CO2- Design and implement various combinational circuits.

CO3-Analyze the various latches and flip-flops using their characteristic equations.

CO4- Design and develop sequential counters and shift registers using flip-flops.

CO5- Design Mealy and Moore models along with state diagrams to analyze clocked sequential circuit

Text Books:

1. Digital Logic Applications and Design, John M Yarbrough, Thomson Learning, 2001. ISBN 981-240-062-1.
2. Donald D. Givone, ―Digital Principles and Design‖, McGraw Hill, 2002. ISBN 978-0- 07-052906-9.

Reference Books:

1. D. P. Kothari and J. S Dhillon, - Digital Circuits and Design‖, Pearson, 2016, ISBN: 9789332543539
2. Morris Mano, ―Digital Design, Prentice Hall of India, Third Edition.
3. Charles H Roth, Jr., ―Fundamentals of logic design‖, Cengage Learning.
4. K. A. Navas, ―Electronics Lab Manual‖, Volume I, PHI, 5thEdition, 2015, ISBN: 9788120351424.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):
Note:1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	3	3	-	-	-	2	-	-	-	-	-	3	-	-
CO2	3	3	2	-	-	-	2	-	-	-	-	-	3	-	-
CO3	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-

NETWORK ANALYSIS

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-III

Subject Code	18EC34	CIE Marks	50
Number of Lecture Hour/Week	3L+1T	SEE Marks	50
Number of Lecture Hours	50	Exam Hours	03

CREDITS-04

Course Objectives: This course will enable students to:

- To familiarize the basic laws, source transformations, theorems and the methods of analysing electrical circuits.
- To appreciate concept of network theorems and the concept of resonance.
- To explain importance of initial conditions and transient analysis of R-L and R-C circuits.
- To impart the basic knowledge of network analysis using Laplace transforms.
- To understand the basic knowledge of two port networks.

Module -1	**Teaching Hours**
Basic Concepts: Sources and its types, Source Transformation and Source Shifting, Network Reduction using Star Delta Transformation, Mesh Analysis, Node Analysis, Concept of Super mesh and Super node. (For AC and DC circuits with independent and dependent sources) **RBT: L1,L2,L3**	10 Hours
Module -2	
Network Theorems: Superposition Theorem, Reciprocity Theorem, Milliam's Theorem, Thevenin's Theorem, Norton's Theorem, and Maximum Power Transfer Theorem. **RBT: L1,L2,L3**	10 Hours
Module -3	
Resonant Circuit: Series and Parallel Resonance, Problems on Resonant Frequency, Bandwidth and Quality Factor at Resonance. **RBT: L1,L2**	10 Hours
Module -4	
Transient Analysis: Behavior of Circuit Elements under Switching Condition, Representation, Evaluation of Initial and Final Conditions in RL and RC circuits for AC and DC Excitations. **Laplace Transform:** Solution of Networks, Step, Ramp and Impulse Responses, Waveform Synthesis **RBT: L1,L2,L3,L4**	10 Hours
Module -5	
Two Port Network: Definition of Z, Y, h and Transmission Parameters, Modeling with these Parameters, Relationship between Parameters sets. **RBT: L1,L2,L3**	10 Hours

Course Outcomes: After studying this course, students will be able to:

CO1- Analyze the basic concepts, laws, and methods for DC and AC network analysis. Simplify the network using transformation and shifting techniques.

CO2- Apply network theorems to solve complex electrical circuits.

CO3- Design series and parallel resonance circuits, incorporating phase relationships.

CO4- Analyze and design the importance of initial conditions and their evaluation in R-L-C circuits, and synthesize typical waveforms using the Laplace transform.

CO5- Determine the performance parameters of a two-port network.

Text Books:

1. M.E. Van Valkenberg (2000), ―Network analysis, Prentice Hall of India, 3rd edition, 2000.
2. Roy Choudhury, ― Networks and systems, 2nd edition, New Age International Publications, 2006.

Reference Books:

1. Hayt, Kemmerly and Durbin ―Engineering Circuit Analysis‖, TMH 7th Edition, 2010
2. J. David Irwin, R. Mark Nelms, ―Basic Engineering Circuit Analysis‖, John Wiley, 8thed, 2006.
3. Charles K Alexander and Mathew N O Sadiku, ― Fundamentals of Electric Circuits, Tata McGraw-Hill, 3rd Ed, 2009

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	3	-	-	-	-	2	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	2	-	-	-	-	-	3	-	-
CO3	2	3	3	-	-	-	2	-	-	-	-	-	3	-	-
CO4	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-

ANALOG CIRCUITS LAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-III

Subject Code	18ECL35	CIE Marks	50
Number of Lecture Hour/Week	2P	SEE Marks	50
Number of Lecture Hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This laboratory course will enable students to:

- Understand the working principle of Diode clipping and clamping circuits.
- Characterize the JFET and MOSFET.
- Design and evaluate the BJT and Class B push pull power amplifier.
- Realize the oscillator circuits such as RC phase shift oscillator, Colpitts, Hartley and Crystal oscillator.
- Design and realize the Adder, Differentiator, Integrator, R-2R ladder DAC, Precision full wave rectifier and Schmitt trigger circuit using Op-Amp.
- Design and realize Mono stable and Astable multivibrator using 555 Timer.

Note:

- The experiments are to be carried out using discrete components, out of which three experiments are to be carried out through simulation.

List of Experiments:

1. Design and testing of diode clipping and clamping circuits.
2. Verify JFET and MOSFET characteristics.
3. Design and test the BJT amplifier circuit and obtain the frequency response characteristics.
4. Design and testing of RC phase shift oscillator, Crystal oscillator using BJT.
5. Design and testing of Colpitts oscillator, Hartley oscillator using BJT.
6. Set up and study the class B push pull power amplifier and calculate the efficiency.
7. Design and verify the operation of Op – Amp as a (a) Adder (b) Integrator and (c) Differentiator.
8. Design and realize Schmitt trigger circuit using an Op – Amp for desired upper trigger point (UTP) and lower trigger point (LTP).
9. Design and verify a Precision full wave rectifier.
10. Design of Mono stable and Astable multivibrator using 555 Timer.
11. Design and realization of R – 2R ladder DAC.
12. Design of Fixed voltage power supply (voltage regulator) using IC regulator 78 series.

Course Outcomes: After studying this laboratory course, students will be able to:

CO1- Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2- Utilize laboratory instruments/simulation tools to build and test experiments.

CO3-Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4- Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5- Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):
Note: 1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

DIGITAL SYSTEM DESIGN LAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-III

Subject Code	18ECL36	CIE Marks	50
Number of Lecture Hour/Week	2P	SEE Marks	50
Number of Lecture Hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This laboratory course enables students to get practical experience in design, realization and verification of

- De-Morgan's Theorem, SOP, POS forms
- Full/Parallel Adders, Subtractors and Magnitude Comparator
- Multiplexer, De-multiplexers, encoder and Decoders applications
- Flip-Flops, Shift registers and Counters

Note:

- Use discrete components to test and verify the logic gates. The IC numbers given are suggestive. Any equivalent IC can be used.
- For experiment No. 11 any open source or licensed simulation tool may be used.

List of Experiments:

1. Verify
   (a) Demorgan's Theorem for 2 variables.
   (b) The sum-of product and product-of-sum expressions using universal gates.
2. Design and implement
   (a) Half Adder.
   (b) Full Adder.
   (c) Full subtractor.
3. Design and implement 4-bit Parallel Adder/ Subtractor using IC 7483.
4. Design and Implementation of 4-bit Magnitude Comparator using IC 7485.
5. Realize 4:1 Multiplexer and 1:4 Demultiplexer using gates.
6. Realize 3:8 decoders and 8:3 encoders.
7. Realize JK, D & T Flip-Flops using NAND Gates
8. Realize the following shift registers using IC7474/IC 7495
   (a) SISO (b) SIPO (c) PISO (d) PIPO
9. Realize Ring and Johnson counter.
10. Realize Mod-N Asynchronous and Mod-N Synchronous counter.
11. Simulate Full- Adder and Mod-8 Synchronous UP/DOWN Counter using simulation tool.

Course Outcomes: After studying this course, the students will be able to:

CO1- Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2-Utilize laboratory instruments/simulation tools to build and test experiments.

CO3-Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4- Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5- Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):
Note: 1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

NETWORK ANALYSIS LAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-III

Subject Code	18ECL37	CIE Marks	50
Number of Lecture Hour/Week	2P	SEE Marks	50
Number of Lecture Hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This course will enable students to:

- Realize the basic laws, KVL and KCL.
- Realize the network theorems.
- Calculation of frequency response, Quality, bandwidth for both series & parallel circuits.
- Analysis of Resonant Circuits.
- Calculate of networks parameters for different two port networks.

Note:

- The experiments are to be carried out using discrete components, out of which three experiments are to be carried out through simulation

List of Experiments:

1. Measurements of DC circuits.
2. Study of Mesh Analysis & Node Analysis.
3. Realization & verification of Superposition theorem
4. Realization &verification of Reciprocity theorem
5. Realization & verification of Thevenin 's & Norton's theorem
6. Realization &verification of Maximum power transfer theorem
7. Analysis of series resonance.
8. Analysis of parallel resonance.
9. Determination transient behavior of RC circuits.
10. Determination transient behavior of RL circuits.
11. Determination of transient behavior of RLC circuits.
12. Study of Z & Y parameters of two port network parameters.

Course Outcomes: After studying this course, students will be able to:

CO1-Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2-Utilize laboratory instruments/simulation tools to build and test experiments.

CO3-Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4-Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5-Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):
Note: 1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

PROJECT-III [As per, Outcome Based Education (OBE) and Choice Based Credit System (CBCS) Scheme] SEMESTER-III			
Subject Code	18PRJ38	CIE Marks	50
Number Lecture Hour/Week	2P	SEE Marks	50
Total Number of Hours	20	Exam Hours	03

CREDITS-01

Course Objectives: Students will be taught to:

- Get exposure about the electronics hardware and various software tools.
- Design the working model of the open-ended problem.
- Understand concepts of Packaging.
- Understand the latest technology trends in the PCB design.
- Prepare technical documentation of the project.

STUDENTS WILL BE GIVEN AN OPEN-ENDED PROBLEM OF THE SOCIETY AND ASKED TO SOLVE BY DESIGNING AND IMPLEMENTING THE SYSTEM IN TEAM.

Course outcomes: After studying this course, students will be able to:

CO1-Apply the knowledge of electronics hardware and software components to solve the real time problems of the society.

CO2-Analyze the various existing solutions available to solve the real time problem and propose the best solution.

CO3- Design and implement the system to solve the real time problem of the society.

CO4-Conduct investigations on the output and prepare the technical documentation of the designed system in a team.

CO5-Use the modern tool available like advanced hardware and software tools.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):
Note:1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	**3**	**2**	**-**	**-**	**2**	**2**	**-**	**-**	**3**	3	**-**	**3**	**-**	**3**	**-**
CO2	**3**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	-	**-**	**3**	**-**	**3**	**-**
CO3	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**-**	**3**	**3**	**2**	**3**	**-**	**3**	**-**
CO4	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**3**	**3**	**3**	**3**	**3**	**-**	**3**	**-**
CO5	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**3**	**3**	**3**	**3**	**3**	**-**	**3**	**-**

KANNADA KALI-III [As per Choice Based Credit System (CBCS) Scheme] SEMESTER-III			
Subject Code	18KANKK310	CIE Marks	50
Number of Lecture Hour/Week	1L	SEE Marks	50
Number of Lecture Hours	14	Exam Hours	03
CREDITS-01			

Course Objectives:

- C£Àå¨sÁ¶PÀ «zÁåyðUÀ½UÉ PÀ£ÀßqÀ ªÀiÁvÀ£ÁqÀÄªÀÅzÀÄ §gÉAiÀÄÄªÀ PË±À®å PÀ°¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ ¨sÁµÁeÁÕ£ÀzÀ CjªÀÅ ªÀÄÆr¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ §gÀªÀtÂUÉ PÀÄjvÀÄ w¼ÀÄªÀ½PÉ ªÀÄÆr¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ £ÁqÀÄ £ÀÄr, ¸ÀA¸ÀÌøwAiÀÄ §UÉÎ w½¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ ¨sÁµÁ ¥ÉæÃªÀÄªÀ£ÀÄß ¨É¼É¸ÀÄªÀÅªÀÅzÀÄ.

Module -1	Teaching Hours
Lesson 1: Conversation 1, Conversation 2, Conversation 3,Vocabulary,Exercises. **Lesson 2:**Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises.	03 Hours
Module -2	
Lesson 3: Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises. **Lesson 4:** Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises.	03 Hours
Module -3	
Lesson 5: Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises. **Lesson 6:** Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises..	03 Hours
Module -4	
Lesson 7: Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises. **Lesson8:** Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises.	03 Hours
Module -5	
Lesson 9: Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises. **Lesson 10:** Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises.	02 Hours

§¼ÀPÉ PÀ£ÀßqÀ ¥ÀoÀå, PÀ°PÉ¬ÄAzÀ «zÁåyðUÀ½UÉ DUÀÄªÀ C£ÀÄPÀÆ®UÀ¼ÀÄ ªÀÄvÀÄÛ ¥sÀ°vÁA±ÀUÀ¼ÀÄ:

Course outcome : At the end of the course the student will be able to:

CO1-To understand the necessity of local language for comfortable life.

CO2-To speak, read write kannada language as per requirement.

CO3-To communicate [converse] in kannada language in their daily life with kannada speakers.

CO4-To listen and understand the kannada language properly.

CO5-To speak in polite conservation.

DzsÁgÀ UÀæAxÀUÀ¼ÀÄ:

1) PÀ£ÀßqÀ PÀ° - ¥ÉÆæ.£Á£Á¸ÁºÉÃ§ ºÀZÀÑqÀzÀ ¥Àæ¸ÁgÁAUÀ ±ÀgÀt§¸ÀªÀ «±Àé«zÁå®AiÀÄ PÀ®§ÄgÀV
2) ªÀiÁvÁqÀÄPÀ£ÀßqÀ - PÀ£ÀßqÀ ¸Á»vÀå ¥ÀjµÀvÀÄÛ - ¨ÉAUÀ¼ÀÆgÀÄ

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COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note:1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3
CO3	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3
CO4	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3
CO5	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3

AAYDAKATEGALU [As per Choice Based Credit System (CBCS) Scheme] SEMESTER-III			
Subject Code	20KANKK310	CIE Marks	50
Number of Lecture Hour/Week	1L	SEE Marks	50
Number of Lecture Hours	14	Exam Hours	03
CREDITS-01			

Course Objectives:

- PÀ£ÀßqÀ ¨sÁµÁeÁÕ£ÀzÀ CjªÀÅ ªÀÄÆr¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ §gÀªÀtÂUÉ PÀÄjvÀÄ w¼ÀÄªÀ½PÉ ªÀÄÆr¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ £ÁqÀÄ £ÀÄr, ¸ÀA¸ÀÌøwAiÀÄ §UÉÎ w½¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ ¨sÁµÁ ¥ÉæÃªÀÄªÀ£ÀÄß ¨É¼É¸ÀÄªÀÅªÀÅzÀÄ.

WÀlPÀ1 (Module 1)	**G¥À£Áå¸À CªÀ¢ü Teaching Hours**
1) ªÉÆ¸Àj£À ªÀÄÄAUÀªÀÄä- ªÀiÁ¹Û ªÉAPÀmÉÃ±ÀLAiÀÄåAUÁgÀ (²æÃ¤ªÁ¸À) 2) PÉÆ£ÉAiÀÄVgÁQ - ¤gÀAd£À	03 Hours
WÀlPÀ2 (Module 2)	
1) zÁj–avÀæ±ÉÃRgÀPÀAp 2) ªÀiÁV– PÉÃ±ÀªÀ ªÀÄ¼ÀV.	03 Hours
WÀlPÀ3 (Module 3)	
3) PÁqÀÄ - ¹zÀÝgÁªÀÄ ºÉÆ£ÀÌ¯ï 4) D¸ÉAiÉÄA§ vÀxÁUÀvÀ£À ªÉÊj–azÁ£ÀAzÀ ¸Á°	03 Hours
WÀlPÀ4 (Module 4)	
5) vÀ§â°UÀ¼ÀÄ –gÁWÀªÉÃAzÀæ SÁ¸À¤Ã¸À 6) ¤ªÀÈvÀÛgÀÄ - ¦.®APÉÃ±À	03 Hours
WÀlPÀ5 (Module 5)	
7) C§ZÀÆj£À ¥ÉÆÃ¸ÁÖ¦üÃ¸ÀÄ–PÉ.¦ ¥ÀÆtðZÀAzÀæ vÉÃd¹é 8) ºÀAV£ÀgÀªÀÄ£ÉAiÀÄ ºÉÆgÀUÉ–gÁd±ÉÃRgÀ ¤ÃgÀªÀiÁ¤é	02 Hours

Course Outcome

1) PÀ£ÀßqÀ ¸Á»vÀå §UÉÎ CjvÀÄPÉÆ¼ÀÄîvÁÛgÉ.
2) PÀ£ÀßqÀ ¨sÁµÁeÁÕ£ÀzÀ ªÀÄºÀvÀéªÀ£ÀÄß w½zÀÄPÉÆ¼ÀÄîvÁÛgÉ.
3) ¨sÁµÁ©üªÀiÁ£ÀªÀ£ÀÄß ¨É¼É¹PÉÆ¼ÀÄîvÁÛgÉ.
4) PÀ£ÀßqÀ ¸Á»vÀå PÀÈwUÀ¼À §UÉÎ D¸ÀQÛ ªÀÄÆqÀÄvÀÛzÉ.
5) PÀ£ÀßqÀ PÀxÉUÀ¼À §UÉÎ CjvÀÄPÉÆ¼ÀÄvÁÛgÉ

¥ÀgÁªÀÄ±Àð£À UÀæAxÀUÀ¼ÀÄ :

1) DAiÀÄÝ PÀxÉUÀ¼ÀÄ : ¥ÉÆæ. £Á£Á¸ÁºÉÃ§ J¸ï, ºÀZÀÑqÀzÀ ¥Àæ¸ÁgÁAUÀ ±ÀgÀt§¸ÀªÀ «±Àé«zÁå®AiÀÄ PÀ®§ÄgÀV

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note:1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
CO4	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3

YOGA

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-III

Subject Code	18HSM39	CIE Marks	50
Number of Lecture Hour/Week	1L	SEE Marks	50
Number of Lecture Hours	14	Exam Hours	03

CREDITS-01

Course Objectives: This course will enable students to:

- To enable the student to have good health
- To practice mental hygiene.
- To possess emotional stability
- To integrate moral values

Module -1	**Teaching Hours**
Etymology meaning and misconceptions of yoga, objectives / importance and aims of yoga, importance of time, place and season. Helping and disturbing elements of yoga. Ethics of yoga: yama –S and Niyama-s according to patanjali yoga sutara.	03 Hours
Module -2	
Yoga in Vedas, Upanishad-S, Puranas, Yoga In Smrits Srimadbhavadgeeta, Karmayoga, Bhaktiyoga, Jainyoga, Rajyoga, Hathyyoga, Astangayoga, Kundalini Yoga.	03 Hours
Module -3	
Patanjali yogasutra, gheanda samhita, harhayoga pradeepika, gorakshak padati, siddha sidhantpadati, hatha ratnavali, shiv samhita	03 Hours
Module -4	
Massendranath, Gorakshanatha, Parmahansa Ramkrishna, Swami Vivekanand, Paramhansa Yoganandji, Shri. Arvind, Swami Shivvanand, Swami Satyanand Saraswati.	03 Hours
Module -5	
Pranayams (According to Hath yoga Pradipika). Mudra- bandha (According to Hath yoga Pradipika) Dhyana (Meditative Practices)Yoga Nidra	02 Hours

Course Outcomes: After studying this course, students will be able to:

CO1- It relieves physical and mental pain.

CO2- Self evaluation of our brain function and its response

CO3- Knowledge about vedas and Upanishads

CO4- Teach us self discipline and social discipline

CO5- knowledge about Pranayams

Text Books:

1. Sharnbasva university study materials.
2. Acharya, Shri ram Sharma 108 Upanishads in three volumes (Hindi) Shanti kunj, haridwar, 1978
3. Patanjali Yoga sutra, Hata yoga Pradipika

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):
Note: 1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	-	-	-	-	-	2	-	-	-	-	-	-	-	-	3
CO2	-	-	-	-	-	2	-	-	-	-	-	-	-	-	3
CO3	-	-	-	-	-	2	-	-	-	-	-	-	-	-	3
CO4	-	-	-	-	-	2	-	-	-	-	-	-	-	-	3
CO5	-	-	-	-	-	2	-	-	-	-	-	-	-	-	3

ADDITIONAL MATHEMATICS – I

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-III

Subject Code	18MATDIP31	CIE Marks	00
Number of Lecture Hour/Week	3L+1T	SEE Marks	100
Number of Lecture Hours	40	Exam Hours	03

CREDITS-00

Course Objectives: This course will enable students to:

- Acquire basic concepts of complex trigonometry, vector algebra, differential & integral calculus and vector differentiation.
- Evaluation of double and triple integrals.
- Know the basic concepts of partial differential equations.
- To develop the knowledge of matrices and linear algebra in compressive manner.
- To understand the essential concept of linear algebra.

Module -1	**Teaching Hours**
Complex Trigonometry-1: Complex Numbers: Definition and Properties. Modulus and Amplitude of complex number, Argand's diagram , De-Moivre's theorem (without proof) Vector Analysis: Scalar and Vectors. Vector addition and subtraction. Multiplication of vectors (Dot and Cross products) Scalar and vector triple products- simple problems, Vector Differentiation : Gradient, Divergence and Curl.	08 Hours
Module -2	
Differential Calculus: Review of successive differentiation. Formulae of N^{th} derivatives of standard functions- Leibnitz's theorem (without proof). Polar Curves: Expression for Angle between radius vector and tangent, length of perpendicular from pole to the tangent, angle between two polar curves, Pedal Equation of polar curves and problems. Taylor' and Maclaurin'sseires expansions.	08 Hours
Module -3	
Partial Differentiation : Definitions of Partial Differentiation, Direct and Indirect partial derivatives, Symmetric functions, Homogeneous function and Euler's theorem on homogeneous function. Total Derivative of composite and implicit function. Jacobian.	08 Hours
Module -4	
Integral Calculus: Reduction Formulae of $\int_0^{\pi/2} Sin^n x dx$, $\int_0^{\pi/2} Cos^n x dx$, and Statement of Reduction formulae $\int_0^{\pi/2} Sin^m x Cos^n x dx$ and Problems. Double and Triple integral- simple problems.	08 Hours
Module -5	
Linear Algebra: Basic concepts of matrices- Rank of matrix by elementary row transformations- Echelon form. Consistency of system of Linear equations. Solution of system linear equations by Gauss Elimination method, Linear Transformation, Cayley-Hamilton theorem to compute inverse of matrix. Eigen values and Eigen vector, Largest Eigen value and corresponding Eigen vector by Reyleigh's Power method.	08 Hours

Course Outcomes: After studying this course, students will be able to:

CO1-Apply derivatives and partial derivatives to calculate rates of change of multivariate functions.

CO2-Apply techniques of integration including double and triple integrals to find area, volume, mass and moment of inertia of plane and solid region.

CO3-Analyze position, velocity and acceleration in two or three dimensions using the calculus of vector valued functions.

CO4-Recognize and solve first-order ordinary differential equations occurring in different branches of engineering.

CO5-Solve systems of linear equations in the different areas of linear algebra.

Text Books:

4. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd Ed., 2015

Reference Books:

1. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed., 2015.

2. N.P.Bali and Manish Goyal: Engineering Mathematics, Laxmi Publishers, 7th Ed., 2007.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

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**
CO2	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO3	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO4	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
CO5	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**

ENGINEERING MATHEMATICS –IV

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-IV

Subject Code	18MAT41	CIE Marks	50
Number of Lecture Hour/Week	04	SEE Marks	50
Number of Lecture Hours	50	Exam Hours	03

CREDITS-04

Course Objectives: This course viz., Engineering mathematics-IV (18MAT41) aims to prepare the students:

- Learn Fourier series and Fourier transforms.
- Conversant with numerical methods to solve ordinary differential equations, complex analysis, joint probability distribution and stochastic processes arising in science and engineering

Module -1	**Teaching Hours**
Fourier Series: Periodic functions, Dirichlet's condition, Fourier Series of periodicfunctions with period 2π and with arbitrary period 2c. Fourier series of even and odd functions Half range Fourier Series, practical harmonic analysis . **RBT Levels: L1, L2 and L3**	10 Hours
Module -2	
Fourier Transforms : Infinite Fourier transforms, Fourier sine and cosine transforms. Inverse Fourier-transform Complex line Integrals: Cauchy's Integration theorem, Cauchy integral formula, Laurent's Series, types of singularities. Residue, Poles, Cauchy's Residue theorem (without proof) and Problems. Transformations: Bilinear transformations and problems **RBT Levels: L1, L2 and L3**	10 Hours
Module -3	
Numerical Methods: Numerical solution of ordinary differential equations of first order andfirst degree, Taylor's series method, modified Euler's-method Runge -Kutta method of fourth order. Milne's and Adams - Bashforth predictor and corrector methods (No derivations of formulae). **RBT Levels: L1, L2 and L3**	10 Hours
Module -4	
Numerical Methods: Numerical solution of second order ordinary differential equations, Runge-Kutta Method and Milne's Method, Numerical solution of P.D.E: Numerical solution of Heat equation, Wave equation, problems. **RBT Levels: L1, L2 and L3**	10 Hours
Module -5	
Joint probability distribution: Joint Probability distribution for two discrete random variables, expectation, covariance, correlation coefficient. Stochastic process: Stochastic processes, probability vector, stochastic matrices, fixed points, regular stochastic matrices, Markov chains, higher transition probability-simple problems. **RBT Levels: L1, L2 and L3**	10 Hours

Course Outcomes(COs): After completion of course, the student will able to

CO1 - Understanding the Periodic function and Fourier series expansion of different functions and its application to analyze circuits

CO2 - Apply the knowledge of Fourier transform and Understand the complex potentials in different engineering fields

CO3 - Solving the first order first degree ordinary differential equations arising in flow problems by numerical methods.

CO4 - Make the use of second order ordinary and partial differential equations arising in heat and wave equations by numerical methods.

CO5 - Learn to solve the problems on Joint probability distribution and to know the concept of stochastic processes and Markov's chains in discrete time.

Text Books:

1. B.S. Grewal : Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
2. E. Kreyszig : Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference Books:

1. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers , 7th Ed., 2010.
2. B.V.Ramana: "Higher Engineering Mathematics" Tata McGraw-Hill, 2006.
3. H. K. Dass andEr. RajnishVerma: "Higher Engineering Mathematics", S. Chand publishing, 1st edition, 2011.

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):
Note:1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO3	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	1	-	-	-

ANALOG AND DIGITAL COMMUNICATION

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-IV

Subject Code	18EC42	CIE Marks	50
Number Lecture Hour/Week	3L+1T	SEE Marks	50
Number of Lecture Hours	50	Exam Hours	03

CREDITS-04

Course Objectives The objectives of the course is to enable students to:

- Design simple systems for generating and demodulating AM, DSB, SSB and VSB signals. Understand the concepts in Angle modulation for the design of communication systems.
- Design simple systems for generating and demodulating frequency modulated signals.
- Analyze pulse modulation and sampling techniques. ·
- Understand the mathematical representation of signal, symbol, noise and channels.
- Compute performance parameters and mitigate for these parameters in corrupted and distorted channel conditions.

Module -1	**Teaching Hours**
Amplitude Modulation: Amplitude Modulation, Virtues, Limitations, and Modifications of Amplitude Modulation & Double Sideband-Suppressed Carrier Modulation(with derivation), Costas Receiver, Quadrature-Carrier Multiplexing, Single-Sideband Modulation and Vestigial Sideband Modulation (without derivation). (Text 1: 3.1 to 3.7), Signal to noise ratios, Noise in AM receivers using Envelope detection (Text 1: 9.2, 9.5). **Angle Modulation:** Basic Definitions, Narrowband frequency modulation, generation of FM waves, Demodulation of FM signal using frequency discriminator (Text 1: 4.1, 4.4, 4.7, 4.8), Detection of Frequency modulation, FM pre-emphasis and De-emphasis (Text 1: 9.7,9.8). **RBT: L1,L2**	10 Hours
Module -2	
Pulse Modulation-Transition From Analog To Digital Communications: Sampling process, Pulse Amplitude Modulation, Pulse position modulation, Completing the Transition from analog to digital, Quantization process, Pulse code modulation (PCM), Delta modulation, Differential pulse code modulation, Line codes(Text 1: 5.1to5.9). **RBT: L1,L2,L3**	10 Hours
Module -3	
Baseband Data Transmission: Baseband transmission of digital data, The inter symbol interference problem, The Nyquist channel, Baseband transmission of M-ary data, The eye pattern (Text 1: 6.1 to 6.6). **RBT: L1,L2,L3**	10 Hours
Module -4	
Digital Band pass Modulation Techniques: Binary amplitude shift keying, Phase shift Keying, Frequency shift keying, Summary of three binary signaling schemes, Non coherent digital modulation schemes, M-ary Digital modulation scheme, Mapping of digitally modulated waveform onto constellations of signal point(Text 1: 7.2 to 7.8), Bit Error Rate, Optimum Detection of BPSK, Optimum Detection of Binary FSK (Text 1: 10.1, 10.4, 10.6). **RBT: L1,L2,L3**	10 Hours

Module -5	
Principles of Spread Spectrum: Spread Spectrum Communication Systems: Model of a Spread Spectrum Digital Communication System, Direct Sequence Spread Spectrum Systems, Effect of De-spreading on a narrowband Interference, Probability of error (statement only), Some applications of DS Spread Spectrum Signals, Generation of PN Sequences, Frequency Hopped Spread Spectrum, CDMA based on IS-95 (Text 2: 11.3.1, 11.3.2, 11.3.3, 11.3.4, 11.3.5, 11.4.2). **RBT: L1,L2,L3**	10 Hours

Course Outcomes: At the end of this course students will demonstrate the ability to

CO1-Comprehend and analyze the basic principles of Amplitude Modulation (AM) and Angle Modulation.

CO2- Apply the knowledge of sampling and analyze modulation techniques used in communication systems.

CO3- Examine inter-symbol interference (ISI) and understand the role of the Nyquist channel in baseband transmission.

CO4- Generation and detection of signals using digital band pass modulation techniques

CO5- Comprehend the different types of spread spectrum communication systems.

Text Books

1. Simon Haykin, Michael Moher " Introduction to Analog And Digital Communications " 2nd Edition 2013.
2. Proakis J. G. and Salehi M., "Communication Systems Engineering", Pearson Education, 2002.
3. Haykin S., "Communications Systems", John Wiley and Sons, 2001.
4. Taub H. and Schilling D.L., "Principles of Communication Systems", Tata McGraw Hill, 2001.

Reference Books:

1. Wozencraft J. M. and Jacobs I. M., ``Principles of Communication Engineering",John Wiley, 1965.
2. Barry J. R., Lee E. A. and Messerschmitt D. G., ``Digital Communication", Kluwer Academic Publishers, 2004.
3. Proakis J.G., ``Digital Communications", 4th Edition, McGraw Hill, 2000.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	-	-	-	-	2	-	-	-	-	-	3	-	-

MICROCONTROLLER

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-IV

Subject Code	18EC43	CIE Marks	50
Number of LectureHours/Week	3L+1T	SEE Marks	50
Total Number ofLecture Hours	50	Exam Hours	03

CREDITS-04

Course objectives: This course will enable students to:

- Understand the difference between a microprocessor anda microcontroller and embedded microcontrollers.
- Familiarize the basic architecture of 8051microcontroller.
- Program8051microprocessorusingassembly level language and C.
- Understandtheinterruptsystemof8051andtheuseofinterrupts.
- Understand the operation and use of in-built timers/counters and serial port of8051.
- Interface 8051 to external memory and I/O devices using its I/O ports.

Module -1	Teaching Hours
8051 Microcontroller: Microprocessor Vs Microcontroller, Embedded System, Embedded Microcontrollers (Text 1). 8051 Architecture- Registers, Pin diagram, I/O ports functions, Internal Memory Organization, External Memory (ROM & RAM) interfacing. (Text 2) **RBT: L1,L2**	10 Hours
Module -2	
8051Instruction Set: Addressing Modes, External Data Transfer Instructions, Logical Instructions, Arithmetic Instructions, Jump & Call Instruction. Time delay Calculation. Simple Assembly Language Program examples (without loops) to use these instructions.(Text 2 & Text 1) **RBT: L1,L2**	10 Hours
Module -3	
8051 Stack, I/O Port Interfacing and Programming:8051 Stack, Stack and Subroutine instructions. Assembly Language Program examples on Subroutine and Involving Loops - Delay Subroutine, Factorial of a number (result maximum 8bit), Block move without overlap ,Addition of numbers,Picking smallest/largest of N numbers (8 bit).Interfacing simple switch and LED to I/O ports to switch on/off LED with respect to switch status.(Text 1) **RBT: L1,L2,L3**	10 Hours
Module -4	
8051 Timers and Serial Port:8051 Timers and Counters–Operation and Assembly Language Programming to generate a pulse using Mode-1 and a square wave using Mode-2 on a port pin.8051 Serial Communication- Basics of Serial Data Communication, RS-232 Standard, 9 pin RS232 signals, Simple Serial Port Programming in Assembly and C to transmit a message and to receive data serially. (Text 1) **RBT: L1,L2,L3**	10 Hours

Module -5	
8051 Interrupts and Interfacing Applications: 8051 Interrupts basics, Programming Timer Interrupt, Programming External Interrupts, Programming Serial Communication Interrupt, Interrupt priority, 8051 C Programming to generate a square waveform on a port pin using a Timer Interrupt. Interfacing 8051 to LCD, Keyboard Interfacing, ADC-0804, DAC-0808 & Stepper motor and their 8051 Assembly Language Interfacing Programming. (Text 1) **RBT: L1,L2,L3**	10 Hours

Course outcomes: At the end of the course, students will be able to:

CO-1- Demonstrate the basics of microcontrollers and embedded systems, including the architecture of the 8051 microcontrollers.

CO-2- Develop assembly programs that utilize 8051 instructions without loops, focusing on basic operations.

CO-3- Explore the stack and subroutine instructions in the 8051 microcontroller and design applications for I/O interfacing.

CO-4-Demonstrate and develop programs for timers, counters and serial communication in 8051 microcontrollers.

CO-5- Develop programs for handling interrupts and various interfacing applications in the 8051 microcontrollers.

Text Books:

1. "The 8051 Microcontroller and Embedded Systems – using Assembly and C", Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; PHI, 2006 / Pearson, 2006.
2. "The 8051 Microcontroller", Kenneth J. Ayala, 3rdEdition, Thomson /Cengage Learning.

Reference Book:

1. " The 8051 Microcontroller Based Embedded Systems", Manish K Patel, McGraw Hill, 2014, ISBN:978-93-329-0125-4.
2. "Microcontrollers: Architecture, Programming, Interfacing and System Design", Raj Kamal, Pearson Education,2005.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	2	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-

SIGNALS AND SYSTEMS

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-IV

Subject Code	18EC44	CIE Marks	50
Number Lecture Hour/Week	3L+1T	SEE Marks	50
Number of Lecture Hours	50	Exam Hours	03

CREDITS-04

Course Objectives: This course will enable students to:

- Understand the classification of signals into different categories based on their properties. Explain basic operations on signals and properties of systems.
- Use convolution in both continuous and discrete domain for the analysis of systems given the impulse response of a system.
- Evaluate response of a given linear time invariant system and Fourier representation of Periodic Signals.
- Apply continuous time Fourier transform representation and discrete time Fourier transform representation to study signals and linear time invariant systems.
- Use Z-transform and properties of Z transform for the analysis of discrete time systems.

Module -1	**Teaching Hours**
Introduction and Classification of signals: Definition of signal and systems, communication and control systems as examples. Classification of signals. Basic Operations on signals: Amplitude scaling, addition, multiplication, differentiation, integration, time scaling, time shift and time reversal. Elementary signals/Functions: Exponential, sinusoidal, step, impulse and ramp functions. Expression of triangular, rectangular and other waveforms interms of elementary signals. **RBT: L1,L2,L3**	10 Hours
Module -2	
System Classification and properties: Linear-nonlinear, Time variant-invariant, causal-noncausal, static-dynamic, stable-unstable, invertible. **Time domain representation of LTI System:** Impulse response, convolution sum, convolution integral. Computation of convolution sum and convolution integral using graphical method for unit step and unit step, unit step and exponential, exponential and exponential, unit step and rectangular, and rectangular and rectangular. LTI system Properties interms of impulse response: System interconnection, Memory less, Causal, Stable, Invertible and Deconvolution, and step response. **RBT: L1,L2,L3**	10 Hours
Module -3	
Time domain representation of LTI System (Cont.): Differential & Difference Equation representation of LTI systems: Solution for Differential & Difference equations. Fourier Representation of Periodic Signals: Orthogonality of complex sinusoids, CTFS properties (No derivation)and basic problems. **RBT: L1,L2,L3**	10 Hours

Module -4	
Fourier Representation of aperiodic Signals: Introduction to Fourier Transform & DTFT, Definition and basic problems. Properties of Fourier Transform: Periodicity, Linearity, Symmetry, Time shift, Frequency shift, Scaling, Differentiation and Integration, Convolution and Modulation, Parsevals relationships and Duality. **RBT: L1,L2,L3**	10 Hours
Module -5	
Z-Transforms: Z transforms, properties of the region of convergence, properties of the Z-transform, Inverse Z-transform, Causality and stability, Transform analysis of LTI systems. **RBT: L1,L2,L3**	10 Hours

Course outcomes: After studying this course, students will be able to:

CO1-Analyze the fundamental concepts of signals, including their classifications and perform basic operations on signals.

CO2-Analyze the fundamental concepts of systems and apply the convolution integral and sum to compute the responses of continuous and discrete LTI systems.

CO3- Analyze LTI systems through differential and difference equations, and explore the Fourier representation of periodic signals.

CO4- Examine the spectral characteristics of continuous and discrete-time signals using Fourier analysis.

CO5- Analyze the region of convergence (ROC) and apply Z-transform properties to simplify discrete-time signals.

Text Book:

1. Simon Haykins and Barry Van Veen, "Signals and Systems", 2nd Edition, 2008, WileyIndia. ISBN 9971-51-239-4.

Reference Books:

1. Michael Roberts, "Fundamentals of Signals & Systems", 2nd edition, Tata McGraw-Hill, 2010, ISBN 978-0-07-070221-9.
2. Alan V Oppenheim, Alan S, Willsky and A Hamid Nawab, "Signals and Systems" Pearson Education Asia / PHI, 2nd edition, 1997. Indian Reprint 2002.
3. H. P Hsu, R. Ranjan, "Signals and Systems", Scham's outlines, TMH, 2006.
4. B. P. Lathi, "Linear Systems and Signals", Oxford University Press, 2005.
5. Ganesh Rao and Satish Tunga, "Signals and Systems", Pearson/Sanguine

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-

ANALOG AND DIGITAL COMMUNICATION LAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-IV

Subject Code	18ECL45	CIE Marks	50
Number Lecture Hour/Week	2P	SEE Marks	50
Total No. of Practical hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This laboratory course will enable students to:

- Design, Demonstrate and Analyze filters using op-amp.
- Design, Demonstrate and Analyze analog systems for AM, FM, PPM, PAM, PWM operations.
- Design and demonstrate the digital modulation techniques
- Model an optical communication system and study its characteristics.

List of Experiments:

1. Design active second order Butterworth low pass and high pass filters.
2. Amplitude modulation using transistor/FET (Generation and detection).
3. Frequency modulation using IC 8038/2206 and demodulation.
4. Pulse amplitude modulation and detection.
5. Pulse Width modulation and detection.
6. Pulse Position Modulation and detection.
7. Time Division Multiplexing and Demultiplexing of two band limited signals.
8. ASK generation and detection.
9. FSK generation and detection.
10. PSK generation and detection.
11. DPSK generation and detection.
10. PCM generation and detection.
11. Measurement of propagation loss, bending loss and numerical aperture of an optical fiber.

Course Outcomes: At the end of the course the student will be able to:

CO1: Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2:Utilize laboratory instruments/simulation tools to Build and test experiments.

CO3: Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4: Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5: Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):
Note: 1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

MICROCONTROLLERS LAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-IV

Subject Code	18ECL46	CIE Marks	50
Number of Lecture Hour/Week	2P	SEE Marks	50
Total No. of Practical hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This laboratory course enables students to :

- Write 8051 Assembly Language and C Programs for 8051.
- Interface hardware modules to Microcontroller board.
- Develop applications based on Microcontroller 8051

List of Experiments:

Software program using 8051 Microcontroller

Simple Assembly Language;

1. Program using 8051 in Block, Move, Exchange.
2. Program on Arithmetic Instructions - Addition/Subtraction, Multiplication and Division, Square, Cube
3. Program in sorting, finding largest and smallest element in an array.
4. Counters ---> For Hex and BCD up/ down count.
5. Boolean and Logical Instructions. (Bit Manipulation).
6. Subroutines using CALL and RETURN Instructions.
7. Code Conversions ---> ASCII to Decimal, Decimal to ASCII, BCD to ASCII

Hardware Programming (using 8051 With C Program)

1. Stepper Motor Interface to 8051 Microcontroller.
2. Seven Segment Displays to 8051 Microcontroller.
3. Hex Keyboard Interface to 8051.
4. DAC Interface for to generate Sine wave, Square wave, Triangular wave, Ramp wave through 8051Microcontroller.
5. ADC Interfacing to 8051 Microcontroller
6. LCD Interfacing to 8051 Microcontroller

Course Outcomes: After studying this laboratory course, students will be able to:

CO1- Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2-Utilize laboratory instruments/simulation tools to Build, and test experiments.

CO3-Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4-Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5- Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

SIGNALS AND SYSTEMS LAB

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-IV

Subject Code	18ECL47	CIE Marks	50
Number of Lecture Hour/Week	2P	SEE Marks	50
Total No. of Practical hours	20	Exam Hours	03

CREDITS-01

Course Objectives: This laboratory course will enable students to:

- Simulate basic signals impulse, unit step, unit ramp, sinusoidal, cosine and exponential.
- Find the Even and Odd of the signal and Computation of Energy and Power of the signal.
- Find solution to the difference equations and computation of convolution
- Compute the DFT for a discrete signal

1. Evaluate Sampling theorem

Note: The experiments are to be carried using Matlab/ Scilab/ Octave or equivalent.

List of Experiments:

1. Representation of basic signals impulse, unit step, unit ramp, sinusoidal, cosine and exponential.
2. Finding Energy and power of signals.
3. Finding Even and Odd of the signal.
4. Write a program to perform Operations on signal time scaling, amplitude scaling.
5. Write a program to linear convolution of two sequences.
6. Find the Fourier transform, plot magnitude and phase.
7. Find the Inverse Fourier transform, plot magnitude and phase.
8. Find the solution of difference equation.
9. Evaluate Sampling Theorem.
10. Finding frequency response of LTI system.

Course Outcomes: On the completion of this laboratory course, the students will be able to:

CO1-Develop a strong foundation in applying theoretical concepts by designing /simulating the experiment.

CO2-Utilize laboratory instruments/simulation tools to Build, and test experiments.

CO3- Analyze experimental data/simulation results and interpret findings to draw meaningful conclusions.

CO4- Learn to work effectively in teams while identifying and correcting faults in electronic circuits/programs.

CO5- Manage time effectively in a simulation/laboratory environment, balancing experimental work, data collection, and report writing within specified deadlines.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	3	2	3	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	3	1	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	3	2	-	-	-	-	3	3	2	-	-	-	3	-
CO5	2	2	2	-	-	-	-	3	-	3	3	-	-	3	-

KANNADA KALI-4

[As per Choice Based Credit System (CBCS) Scheme]

SEMESTER-IV

Subject Code	18KANKK410	CIE Marks	50
Number of Lecture Hour/Week	1L	SEE Marks	50
Number of Lecture Hours	14	Exam Hours	03

CREDITS-01

Course Objectives:

- C£Àå¨sÁ¶PÀ «zÁåyðUÀ½UÉ PÀ£ÀßqÀ ªÀiÁvÀ£ÁqÀÄªÀÅzÀÄ §gÉAiÀÄÄªÀ PË±À®å PÀ°¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ ¨sÁµÁeÁÕ£ÀzÀ CjªÀÅ ªÀÄÆr¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ §gÀªÀtÂUÉ PÀÄjvÀÄ w¼ÀÄªÀ½PÉ ªÀÄÆr¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ £ÁqÀÄ £ÀÄr, ¸ÀA¸ÀÌøwAiÀÄ §UÉÎ w½¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ ¨sÁµÁ ¥ÉæÃªÀÄªÀ£ÀÄß ¨É¼É¸ÀÄªÀÅªÀÅzÀÄ.

Module -1	**Teaching Hours**
Lesson 1: Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises. **Lesson 2:** Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises.	03 Hours
Module -2	
Lesson 3: Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises. **Lesson 4:** Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises.	03 Hours
Module -3	
Lesson 5: Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises. **Lesson 6:** Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises.	03 Hours
Module -4	
Lesson 7: Conversation 1, Conversation 2, Conversation 3, Vocabulary, Exercises. **Lesson 8:** Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises.	03 Hours
Module -5	
Lesson 9: Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises. **Lesson 10:** Conversation 1, Conversation 2, Conversation 3,Vocabulary, Exercises.	02 Hours

§¼ÀPÉ PÀ£ÀßqÀ ¥ÀoÀå, PÀ°PÉ¬ÄAzÀ «zÁåyðUÀ½UÉ DUÀÄªÀ C£ÀÄPÀÆ®UÀ¼ÀÄ ªÀÄvÀÄÛ ¥sÀ°vÁA±ÀUÀ¼ÀÄ:

Course outcome : At the end of the course the student will be able to:

CO1-To understand the necessity of local language for comfortable life.

CO2-To speak, read write kannada language as per requirement.

CO3-To communicate [converse] in kannada language in their daily life with kannada speakers.

CO4-To listen and understand the kannada language properly.

CO5-To speak in polite conservation.

DzsÁgÀ UÀæAxÀUÀ¼ÀÄ:

1) **ªÀiÁvÁqÀÄPÀ£ÀßqÀ** - PÀ£ÀßqÀ ¸Á»vÅå ¥ÀjµÀvï- ¨ÉAUÀ¼ÀÆgÀÄ

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3
CO2	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3
CO3	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3
CO4	-	-	-	-	-	-	-	-	-	1	-	-	-	-	3
CO5	-	-	-	-	-	-	-	1	-	-	3	-	-	-	3

MAHADASOHIGALU (ªÀÄºÁZÁ¸ÉÆÃ»UÀ¼ÀÄ) [As per Choice Based Credit System (CBCS) Scheme] SEMESTER-IV			
Subject Code	20KANMD410	CIE Marks	50
Number of Lecture Hour/Week	1L	SEE Marks	50
Number of Lecture Hours	14	Exam Hours	03
CREDITS-01			

Course Objectives:

- PÀ£ÀßqÀ ¨sÁµÁeÁÕ£ÀzÀ CjªÀÅ ªÀÄÆr¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ §gÀªÀtÂUÉPÀÄjvÀÄ w¼ÀÄªÀ½PÉ ªÀÄÆr¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ £ÁqÀÄ £ÀÄr, ¸ÀA¸ÀÌøwAiÀÄ §UÉÎ w½¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ ¨sÁµÁ ¥ÉæÃªÀÄªÀ£ÀÄß ¨É¼É¸ÀÄªÀÅªÀÅzÀÄ.

WÀlPÀ1 (Module 1)	**Teaching Hours G¥À£Áå¸ÀCªÀ¢ü**
1)±ÀgÀt§¸ÀªÉÃ±ÀéªÀgÀgÀ §zÀÄPÀÄ (CgÀ¼ÀUÀÄArUÉAiÀÄ°è) 2)¸ÁzsÀ£ÁPÉëÃvÀæ (OgÁzÀ,¥ÀvÁð¨Ázï ªÀÄvÀÄÛ PÀ®§ÄgÀVAiÀÄ°è)	03 Hours
WÀlPÀ2 (Module 2)	
3)zÉÆqÀØ¥ÀàC¥Àà ºÁUÀÆ ±ÀgÀt§¸ÀªÀ¥ÀàCªÀgÀ ¸ÀA§AzsÀUÀ¼ÀÄ (1 jAzÀ6£ÉÃ ¦ÃoÁ¢ü¥ÀwUÀ¼ÀÄ) 4)ªÀÄgÀÄ¼À ±ÀgÀt§¸À¥Àà (zÉÃªÁ®AiÀÄ ¤ªÀiÁðt, zÁ¸ÉÆÃºÀ ªÀÄºÁªÀÄ£ÉAiÀÄ ¨É¼ÀªÀtÂUÉ)	03 Hours
WÀlPÀ3 (Module 3)	
5)¥ÀÆdåzÉÆqÀØ¥ÀàC¥Àà (zsÁ«ÄðPÀ ¸ÁzsÀ£É) 6)±ÉÊPÀëtÂPÀ ¸ÁzsÀ£ÉUÀ¼ÀÄ	03 Hours
WÀlPÀ4 (Module 4)	
7) ¥ÀÆdåqÁ. ±ÀgÀt§¸ÀªÀ¥ÀàC¥Àà (¸ÁªÀiÁfPÀ PÉÆqÀÄUÉUÀ¼ÀÄ) 8) ±ÉÊPÀëtÂPÀ PÉÆqÀÄUÉUÀ¼ÀÄ	03 Hours
WÀlPÀ5 (Module 5)	
9) ªÀÄºÁªÀÄ£ÉAiÀÄ ªÀÄºÁ ªÀiÁvÉAiÀÄgÀÄ ªÉÆzÀ® £Á®ÄÌ ¥ÀÄtå¹ÛçÃAiÀÄgÀÄ 10)LzÀ£ÉAiÀÄ ¦ÃoÁ¢ü¥ÀwUÀ½AzÀ 8£ÉÃ ¦ÃoÁ¢ü¥ÀwUÀ¼À ¥ÀÄtå¹ÛçÃAiÀÄgÀÄ	02 Hours

Course Outcomes:

1) PÀ£ÀßqÀ ¸Á»vÀå §UÉÎ CjvÀÄPÉÆ¼ÀÄîvÁÛgÉ.
2) PÀ£ÀßqÀ ¨sÁµÁeÁÕ£ÀzÀ ªÀÄºÀvÀéªÀ£ÀÄß w½zÀÄPÉÆ¼ÀÄîvÁÛgÉ.
3) ¨sÁµÁ©üªÀiÁ£ÀªÀ£ÀÄß ¨É¼É¹PÉÆ¼ÀÄîvÁÛgÉ.
4) PÀ£ÀßqÀ ¸Á»vÀå PÀÈwUÀ¼À §UÉÎ D¸ÀQÛ ªÀÄÆqÀÄvÀÛzÉ.
5) PÀ£ÀßqÀ PÀxÉUÀ¼À §UÉÎ CjvÀÄPÉÆ¼ÀÄvÁÛgÉ

DzsÁgÀ UÀæAxÀ:

1. ªÀÄºÁzÁ¸ÉÆÃ»UÀ¼ÀÄ :

¥ÀæzsÁ£À ¸ÀA¥ÁzÀPÀgÀÄ: ªÀiÁvÉÆÃ²æÃ qÁ. zÁPÁëAiÀÄtÂ J¸ï. C¥Àà ¸ÀA¥ÁzÀPÀgÀÄ. qÁ. JA. J¸ï. ¥ÁnÃ®

¥Àæ¸ÁgÁAUÀ ±ÀgÀt§¸ÀªÀ «±Àé«zÁå®AiÀÄ, PÀ®§ÄgÀV

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3
CO3	-	-	-	-	-	-	-	-	-	-	-	3	-	-	3
CO4	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3

(DqÀ½vÀPÀ£ÀßqÀ) **Adalit Kannada** [As per Choice Based Credit System (CBCS) Scheme] SEMESTER-IV			
Subject Code	18AK16	CIE Marks	50
Number of Lecture Hour/Week	1L	SEE Marks	50
Number of Lecture Hours	14	Exam Hours	03
CREDITS-01			

Course Objectives:

- PÀ£ÀßqÀ ¨sÁµÁ eÁÕ£ÀzÀ CjªÀÅ ªÀÄÆr¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ §gÀªÀtÂUÉ PÀÄjvÀÄ w¼ÀÄªÀ½PÉ ªÀÄÆr¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ £ÁqÀÄ £ÀÄr, ¸ÀA¸ÀÌøwAiÀÄ §UÉÎ w½¸ÀÄªÀÅzÀÄ.
- PÀ£ÀßqÀ ¨sÁµÁ ¥ÉæÃªÀÄªÀ£ÀÄß ¨É¼É¸ÀÄªÀÅªÀÅzÀÄ.

WÀlPÀ1(Module1)	**G¥À£Áå¸À CªÀ¢ü Teaching Hours**
PÀ£ÀßqÀ¨sÁµÉ-MAzÀÄ¹AºÁªÀ¯ÉÆÃPÀ£À ¨sÁµÁ ¥ÀæAiÉÆÃUÀzÀ¯ÁèUÀÄªÀ ¯ÉÆÃ¥ÀzÉÆÃµÀUÀ¼ÀÄ ªÀÄvÀÄÛ CªÀÅUÀ¼À ¤ªÁgÀuÉ	03 Hours
WÀlPÀ2 (Module 2)	
¯ÉÃR£À aºÉßUÀ¼ÀÄ ªÀÄvÀÄÛ CªÀÅUÀ¼À G¥ÀAiÉÆÃUÀ ¥ÀvÀæ ªÀåªÀºÁgÀ	03 Hours
WÀlPÀ3 (Module 3)	
DqÀ½vÀ¥ÀvÀæUÀ¼ÀÄ,¸ÀPÁðgÀzÀDzÉÃ±À ¥ÀvÀæUÀ¼ÀÄ	03 Hours
WÀlPÀ4(Module 4)	
¸ÀAQë¥ÀÛ ¥Àæ§AzsÀ gÀZÀ£É (¦üæÃ¸ÉÊ¸ï gÉÊnAUï), ¥Àæ§AzsÀ ªÀÄvÀÄÛ ¨sÁµÁAvÀgÀ/PÀ£ÀßqÀ ±À§Þ¸ÀAUÀæºÀ	03 Hours
WÀlPÀ 5 (Module 5)	
PÀ£ÀßqÀzÀ° èUÀtPÀAiÀÄAvÀæzÀ §¼ÀPÉ	02 Hours

Course Outcomes: After studying this course, students will be able to:

CO1-Solve first order differential equations in the different areas of Engineering.

CO2-Solve second and higher order differential equations occurring in of electrical circuits, damped/un-damped vibrations.

CO3-Solve second order partial differential equations in the different areas in the real world.

CO4-Recall basic concepts of elementary probability theory and, solve problems related to the decision theory, synthesis and optimization of digital circuits.

CO5-To find the surface area and volume of 3D objects.

Text Books:

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, New Delhi, 43rd Ed., 2015

Reference Books:

1. E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed., 2015.
2. N.P.Bali and Manish Goyal: Engineering Mathematics, Laxmi Publishers, 7th Ed., 2007.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3
CO2	-	-	-	-	-	-	-	-	-	3	-	-	-	-	3
CO3	-	-	-	-	-	-	-	-	-	-	-	3	-	-	3
CO4	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3

PROJECT-IV [As per, Outcome Based Education (OBE) and Choice Based Credit System (CBCS) Scheme] SEMESTER-IV			
Subject Code	18PRJ48	CIE Marks	50
Number Lecture Hour/Week	2P	SEE Marks	50
Total Number of Hours	20	Exam Hours	03
CREDITS-01			

Course Objectives: Students will be taught to:

- Get exposure about the electronics hardware and various software tools.
- Design the working model of the open-ended problem.
- Understand concepts of Packaging.
- Understand the latest technology trends in the PCB design.
- Prepare technical documentation of the project.

STUDENTS WILL BE GIVEN A OPEN ENDED PROBLEM OF THE SOCIETY AND ASKED TO SOLVE BY DESIGNING AND IMPLEMENTING THE SYSTEM IN TEAM.

Course outcomes: After studying this course, students will be able to:

CO1- Apply the knowledge of electronics hardware and software components to solve the real time problems of the society.

CO2- Analyze the various existing solutions available to solve the real time problem and propose the best solution.

CO3-Design and implement the system to solve the real time problem of the society.

CO4-Conduct investigations on the output and prepare the technical documentation of the designed system in a team.

CO5-Use the modern tool available like advanced hardware and software tools.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):
Note:1-Low, 2-Medium, 3-High

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	PSO.1	PSO.2	PSO.3
CO1	**3**	**2**	**-**	**-**	**2**	**2**	**-**	**-**	**3**	3	**-**	**3**	**-**	**3**	**-**
CO2	**3**	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**3**	**-**
CO3	**3**	**3**	**3**	**2**	**3**	**2**	**2**	**-**	**3**	**3**	**2**	**3**	**-**	**3**	**-**
CO4	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**3**	**3**	**3**	**3**	**3**	**-**	**3**	**-**
CO5	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**3**	**3**	**3**	**3**	**3**	**-**	**3**	**-**

ADDITIONAL MATHEMATICS – II [As per Choice Based Credit System (CBCS) Scheme] SEMESTER- IV			
Subject Code	18MATDIP41	CIE Marks	00
Number of Lecture Hour/Week	3L+1T	SEE Marks	100

Number of Lecture Hours	40	Exam Hours	03

CREDITS-00

Course Objectives: This course will enable students to:

- Solve first order differential equations. .
- Solve second and higher order differential equations.
- Understand and solve the partial differential equation.
- To acquire the knowledge of elementary probability theory.
- Know the basic concepts of evaluation of double and triple integrals.

Module -1	**Teaching Hours**
Differential Equation-1: Solution of first order and first degree differential equations: Variable separable, Homogeneous, Exact and Reducible to exact differential equation, Linear differential equation. Applications of first order first degree differential equations: Newton's law of cooling.	08 Hours
Module -2	
Differential Equations-2: Solution of second & higher order Ordinary linear differential equation with constant co-efficients. Method of variation of parameters. Solution of homogeneous LDE by Power series solution Method.	08 Hours
Module -3	
Partial Differential Equations(PDE's): Formation of PDE by eliminating arbitrary constant & functions, Solution of Non-homogeneous PDE by direct integration, solution of homogeneous PDE with respect to one independent variable only. Derivation of one dimensional wave equation and heat equation and Various possible solution of wave & heat equations by methods of separation of variables.	08 Hours
Module -4	
Improper Integrals: Beta and gamma functions and its properties and examples. Evaluation of double integral over a specific region, changing the order of integration , changing into polar form.	08 Hours
Module -5	
Probability: Introduction , Sample space and Events. Axioms of Probability, Addition & Multiplication theorems. Conditional probability- illustrative examples. Baye's theorem-examples.	08 Hours

Course Outcomes: After studying this course, students will be able to:

CO1-Solve first order differential equations in the different areas of Engineering.

CO2-Solve second and higher order differential equations occurring in of electrical circuits, damped/un-damped vibrations.

CO3-Solve second order partial differential equations in the different areas in the real world.

CO4-Recall basic concepts of elementary probability theory and, solve problems related to the decision theory, synthesis and optimization of digital circuits. CO5-To find the surface area and volume of 3D objects.

Text Books:

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Reference Books:

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4. N.P.Bali and Manish Goyal: Engineering Mathematics, Laxmi Publishers, 7th Ed., 2007.

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING (1/2/3):

Note: 1-Low, 2-Medium, 3-High

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
CO2	3	-	-	-	-	-	-	-	-	-	-	2
CO3	3	-	-	-	-	-	-	-	-	-	-	2
CO4	3	-	-	-	-	-	-	-	-	-	-	2
CO5	3	-	-	-	-	-	-	-	-	-	-	2