R.V.COLLEGE OF ENGINEERING

(Autonomous Institution Affiliated to VTU, Belagavi)

R.V. Vidyaniketan Post, Mysore Road

Bengaluru – 560 059

Bachelor of Engineering (B.E.)

Scheme and Syllabus for III & IV Semesters

2016 SCHEME

TELECOMMUNICATION ENGINEERING

Department Vision

Imparting quality education in Electronics and Telecommunication Engineering through focus on fundamentals, research and innovation for sustainable development

Department Mission

- Provide comprehensive education that prepares students to contribute effectively to the profession and society in the field of Telecommunication.
- Create state-of-the–art infrastructure to integrate a culture of research with a focus on Telecommunication Engineering Education
- Encourage students to be innovators to meet local and global needs with ethical practice
- Create an environment for faculty to carry out research and contribute in their field of specialization, leading to Center of Excellence with focus on affordable innovation.
- Establish a strong and wide base linkage with industries, R&D organization and academic Institutions.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO	Description
PEO1	Acquire appropriate knowledge of the fundamentals of basic sciences, mathematics, engineering sciences, Electronics & Telecommunication engineering so as to adapt to rapidly changing technology
PEO2	Think critically to analyze, evaluate, design and solve complex technical and managerial problems through research and innovation.
PEO3	Function and communicate effectively demonstrating team spirit, ethics, respectful and professional behavior.
PEO4	To face challenges through lifelong learning for global acceptance.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO	Description
PSO1	Analyze, design and implement emerging Telecommunications systems using devices, sub-systems, propagation models, networking of Wireless and Wire line communication systems.
PSO2	Exhibit Technical skills necessary to choose careers in the design, installation, testing, management and operation of Telecommunication systems.

Lead Society: Institute of Electrical and Electronics Engineers (IEEE)

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2016 SCHEME

TELECOMMUNICATION ENGINEERING

Sl. No.	Abbreviation	Meaning
1.	**VTU**	Visvesvaraya Technological University
2.	**BS**	Basic Sciences
3.	**CIE**	Continuous Internal Evaluation
4.	**CS**	Computer Science and Engineering
5.	**CV**	Civil Engineering
6.	**CHY**	Chemistry
7.	**EC**	Electronics and Communication Engineering
8.	**EE**	Electrical and Electronics Engineering
9.	**ES**	Engineering Science
10.	**HSS**	Humanities and Social Sciences
11.	**ME**	Mechanical Engineering
12.	**TE**	Telecommunication Engineering
13.	**PHY**	Engineering Physics
14.	**SEE**	Semester End Examination
15.	**MAT**	Engineering Mathematics

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R V COLLEGE OF ENGINEERNG, BENGALURU-560 059
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THIRD SEMESTER CREDIT SCHEME								
Sl. No.	**Course Code**	**Course Title**	**BoS**	**CREDIT ALLOCATION**				
				L	**T**	**P**	**S**	**Total Credits**
1.	16MA31B	Discrete and Integral Transforms	Maths	3	1	0	0	4
2.	16ET32	Environmental Technology	BT	2	0	0	0	2
3.	16TE33	Analog Electronic Circuits	TE	3	0	1	1	5
4.	16TE34	Digital Electronics Circuits	TE	3	0	1	1	5
5.	16TE35	Network Analysis	TE	3	1	0	1	5
6.	16TE36	Fields and Waves	TE	3	1	0	0	4
7.	16DCS37	Bridge Course C Programming *	CSE	2	0	0	0	0
Total number of Credits								**25**
Total Number of Hours / Week				**17+2***	**6**	**4**	**12****	**29**

FOURTH SEMESTER CREDIT SCHEME								
Sl. No.	Course Code	Course Title	BoS	**CREDIT ALLOCATION**				
				L	**T**	**P**	**S**	**Total Credits**
1.	16MA41B	Linear Algebra & Probability Theory	Maths	3	1	0	0	4
2.	16EM42B	Engineering Materials	EC	2	0	0	0	2
3.	16TE43	Analog Communication	TE	3	0	1	1	5
4.	16TE44	Signals and Systems	TE	3	1	0	0	4
5.	16TE45	Microprocessor and Microcontrollers	TE	3	0	1	1	5
6.	16TE46	Data Structures Using C++	TE	3	0	0	1	4
7.	16HS47	Professional Practice-II (Communication Skills and Professional Ethics)	HSS	0	0	1	0	1
8.	16DMA48	Bridge Course Mathematics*	Maths	2	0	0	0	0
Total number of Credits								**25**
Total Number of Hours / Week				**17+2***	**4**	**4**	**12****	**27**

* Mandatory Audit course for lateral entry diploma students

**Non contact hours

Semester: III		
DISCRETE AND INTEGRAL TRANSFORMS (COMMON TO EC, EE, EI, TC) (Theory)		
Course Code: 16MA31B		**CIE Marks: 100**
Credits: L:T:P:S: 3:1:0:0		**SEE Marks: 100**
Hours: 36L+12T		**SEE Duration: 03Hrs**

Course Learning Objectives: The students will be able to	
1	Comprehend the existence and the role of transforms, inverse transforms and Fourier series in engineering problems.
2	Learn to find transform and inverse transform of continuous, discontinuous and discrete functions.
3	Develop the knowledge of periodic functions as a Fourier series subject to Dirichlet's conditions and derive the Fourier series using Euler's formulae.
4	Identify and solve initial and boundary value problems, interpret the physical significance of solutions using transform methods.

UNIT-I	
Laplace transform: Existence and uniqueness of Laplace Transform (LT), Transform of elementary functions, RoC. Properties of LT - Linearity, change of scale and first shifting. Transform of function - multiplied by t^n, division by t, derivatives and integral. LT of periodic function, Heaviside unit step function, Unit impulse function. Heaviside shift (second shift) theorem.	**07 Hrs**
UNIT-II	
Inverse Laplace Transform: Definition, properties of inverse Laplace transform, evaluation using different methods. Convolution theorem, problems. Application to solve ordinary linear differential equations and simultaneous differential equations.	**07 Hrs**
UNIT-III	
Fourier Series: Introduction, periodic function, even and odd functions, properties. Special waveforms - square wave, half wave rectifier, saw-tooth wave and triangular wave. Dirichlet's conditions, Euler's formula for Fourier series, Fourier series for functions of period 2L (particular cases) - problems. Half Range Fourier series- Construction of Half range cosine and sine series. Parseval's theorem for Root mean square value of a function (without proof). Complex form of Fourier series.	**08 Hrs**
UNIT-IV	
Fourier Transform: Fourier Integral theorem, Complex Fourier transform, Fourier sine transform, Fourier cosine transform, Properties of FT, Convolution theorem, Parseval's identity, Applications of FT.	**07 Hrs**
UNIT-V	
Z – Transform: Introduction, Z transform of standard functions, Linearity property, damping rule, shifting theorem, initial and final value theorems, convergence of Z transform, RoC, inverse Z transform using power series and partial fraction methods, convolution theorem, application to difference equations.	**07 Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1:	Understand - the significance of fundamental concepts of transforms and inverse transforms, even & odd functions, periodic phenomena.
CO2:	Demonstrate - the properties of transforms and inverse transforms, graphical representation of various wave forms.
CO3:	Evaluate - transforms of periodic, discontinuous and discrete functions, develop Fourier series of various type of functions.
CO4:	Apply - transform techniques to solve Differential equations and Difference equations in engineering problems.

Reference Books	
1.	Higher Engineering Mathematics, B.S. Grewal, 40th Edition, Khanna Publishers, 2007, ISBN: 81-7409-195-5.
2.	A Text Book of Engineering Mathematics, N.P Bali & Manish Goyal, 7th Edition, Lakshmi Publications, 2010, ISBN: 978-81-7008-992-6.
3.	Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2007, ISBN: 978-81-265-3135-6.
4.	Higher Engineering Mathematics, B. V. Ramana, Tata McGraw-Hill, 2008, ISBN: 13-978-07-063419-0.

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Self-Study(S). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Self-study is 20. The total marks of CIE are 100.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	-	-	-	-	-	1	-	1
CO2	3	2	2	1	-	-	-	-	-	1	-	1
CO3	3	3	2	2	2	-	-	-	-	1	-	1
CO4	3	3	3	3	2	-	-	-	-	1	-	1

Low-1 Medium-2 High-3

Semester: III/IV		
ENVIRONMENTAL TECHNOLOGY (Theory)		
Course Code:16ET32/16ET42		**CIE Marks: 50**
Credits: L:T:P:S: 2:0:0:0		**SEE Marks: 50**
Hours: 25L		**SEE Duration: 02Hrs**

Course Learning Objectives: The students will be able to	
1	Understand the various components of environment and the significance of the sustainability of healthy environment.
2	Recognize the implications of different types of the wastes produced by natural and anthropogenic activity.
3	Learn the strategies to recover the energy from the waste.
4	Design the models that help mitigate or prevent the negative impact of proposed activity on the environment

UNIT-I	
Introduction: Ecosystem – Types and structure of ecosystem. Components of environment,Environmental education, Environmental act & regulations. Global environmental issues, ISO 14000, Environmental Impact Assessment and Challenges.	**05 Hrs**
UNIT II	
Environmental pollution: Causes, effects and control measures of Air, noise and land pollution. Air Pollution. Clean air act, Pollution standard index. Indoor air quality. Global atmospheric change - Global warming, Acid rain &Ozone depletion and their controlling measures.	**05 Hrs**
UNIT III	
Water pollution and management: Pollutants in surface & ground water, water borne diseases. Water purification systems: physical & chemical treatment - aeration, solids separation, settling operations, coagulation, softening, filtration, disinfection, The common technologies for purification of drinking water - Ultraviolet radiation treatment, Reverse Osmosis. Rain water harvesting, water recycling, STP plant.	**05 Hrs**
UNIT IV	
Renewable energy sources and technology for generation of energy: Different types of energy, conventional sources &non conventional sources of energy, solar energy, wind energy, hydro electric energy, Geothermal Energy, Nuclear energy, Fossil Fuels & Biomass energy.	**05 Hrs**
UNIT V	
Solid waste management: Types, causes, control and processing. Typical generation rates, estimation of solid waste quantities, factors that affect generation rates. Management - On site handling, collection, storage and processing techniques, ultimate disposal, landfills. Reduction and recycling of waste – waste to composite, energy.	**05 Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Identify the components of environment and exemplify the detrimental impact of anthropogenic activities on the environment.
CO2	Differentiate the various types of wastes and suggest appropriate safe technological methods to manage the waste.
CO3	Aware of different renewable energy resources and can analyse the nature of waste and propose methods to extract clean energy.
CO4	Adopt the appropriate recovering methods to recover the essential resources from the wastes for reuse or recycling.

Reference Books	
1.	Introduction to environmental engineering and science, Gilbert, M.M.,Pearson Education. 2nd Edition, 2004, ISBN: 8129072770.
2.	Environmental Engineering, Howard S. Peavy, Donald R. Rowe and George Tchobanoglous, 2000, McGraw Hill Series in water resources and Environmental Engg., ISBN: 0070491348
3.	Environmental Science – 15th edition, G. Tyler Miller, Scott Spoolman, 2012,Publisher: Brooks Cole, ISBN-13: 978-1305090446 ISBN-10: 130509044
4.	Environment Management, Vijay Kulkarni and T. V. Ramachandra, 2009, TERI Press, ISBN: 8179931846, 9788179931844

Continuous Internal Evaluation (CIE); Theory (50 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Assignment. A minimum of three quizzes are conducted and each quiz is evaluated for 05 marks adding up to 15 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 25 marks each and the sum of the marks scored from three tests is reduced to 30. The marks component for Assignment is 05. The total marks of CIE are 50.

Semester End Evaluation (SEE); Theory (50 Marks)

SEE for 50 marksis executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 10 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 8 marks adding up to 40 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	-	-	-	-	-	3	-	2	-		-
CO2	2	3	3	2	1	-	3	3	2	-	2	1
CO3	-	3	1	3	-	2	3	3	2	-	1	2
CO4	1	-	2	1	3	-	2	-	2	-	-	2

Low-1 Medium-2 High-3

Semester: III		
ANALOG ELECTRONIC CIRCUITS (Theory & Practice)		
Course Code: 16TE33		**CIE Marks: 100+50**
Credits: L:T:P:S: 3:0:1:1		**SEE Marks: 100+50**
Hours: 40L		**SEE Duration: 03Hrs+03Hrs**

Course Learning Objectives: The students will be able to	
1	Design and characterize differential amplifiers using BJT and MOSFET.
2	Study different parameters and basic circuits of op-amps.
3	Design signal generation and wave shaping circuits using op- Amp.
4	Design active filters using Op-amp.
5	Design analog circuits using IC 555 and IC565.
6	Realize voltage regulators using IC`s.
7	Realize basic ADC and DAC circuits.

UNIT-I	
Differential amplifiers: Review of BJT, JFET and MOSFET with their characteristics and equivalent circuits. Internal structure of differential amplifiers using MOSFET and BJT with and without active loads. **Characteristics of Practical Op-Amp:** Introduction to Op-amps, Equivalent circuit and symbol of op-amp. Internal structure of Op-amp and its stages. Parameters of Practical Op-amps. Op-amp parameters like Input resistance, output resistance, input capacitance, Common mode rejection ratio, input voltage limits and output voltage limits, Parameters like Large signal voltage gain, rise time, open loop voltage gain and bandwidth. Effects of slew rate, input offset voltage, input biasing current, input offset current, power supply rejection ratio, Thermal drift and offset voltage adjustment.	**08 Hrs**
UNIT-II	
Basic Op-Amp circuits: Analysis of ideal Op-Amp circuits, non inverting amplifier, inverting amplifier, Integrator and differentiator. **Circuits with OP-AMPS and Diodes:** Positive signal detectors, precision peak voltage detectors ,precision Half-wave rectifiers, Precision Full-wave rectifiers, Precision clamping circuits and fixed voltage limiters, adjustable voltage limiters, comparators, Threshold comparators, Inverting and Non-inverting Schmitt trigger, Schmitt trigger with reference voltage, effects on hysteresis on the output voltage. **Wave from generator:** Square wave generator, Triangular wave generator and saw tooth-wave generator.	**08 Hrs**
UNIT-III	
Active Filters: Comparison of Active and Passive filters. Butterworth filters(Butterworth function for n=2 and n=3), First order low and high pass filter, Second order Low and high pass filters, Butterworth second order low pass filters. Band pass filter (wide-band and narrow band), Band reject filters (wide-band and narrow band) and All-pass filter. **Voltage regulator**: Basic characteristics, Positive low voltage (2v to 7v) regulator, High voltage regulator, current limiting and current fold back, current boosting and negative voltage regulator. Fixed voltage regulator, Adjustable positive voltage regulator.	**08 Hrs**
UNIT-IV	
Power Amplifier using Transistors and Op-Amps: Classification of power amplifier, class A Amplifier, Class B push-pull Amplifiers, complementary Class AB push-pull Amplifier, Quasi-complementary push-pull amplifier and Transformer coupled Class AB push pull Amplifier, Power amplifier IC LM 580, LM 384.	**08 Hrs**
UNIT-V	
Analog system design using Linear IC's: Voltage Controlled Oscillator NE/SE566and its applications, 555Timer IC- Functional block diagram and its applications, Phase locked loops and Applications of IC 565. Sample and Hold circuit, Digital to Analog converter, Analog to Digital Converter.	**08 Hrs**

LABORATORY EXPERIMENTS	
1. Design of inverting amplifier, non inverting amplifier, integrator using IC 741. 2. Design and implementation of half wave and full wave Precision Rectifiers using operational amplifier IC741. 3. Design and implementation of peak detector, clamping circuit & Schmitt trigger circuit. 4. Design and implementation square and ramp wave generators using operational amplifier IC 741. 5. Design and implement First order High pass filter, Low pass filter, Wide Band Pass filter and Wide Band reject filter. 6. Design and implement Astable multivibrator & Monostable multivibrator using NE555 timer. 7. Realize 2 bit flash ADC using LM 324 comparator and priority encoder using IC 74148. 8. Realize a 4 bit DAC using R-2R ladder network and asynchronous decade counter IC 7490. 9. Design and implementation of Class A Amplifiers & Class AB Push- Pull Amplifiers. 10. a. Design and implement VCO using IC NE/SE 566. b. Design and implement PLL using IC NE/SE 565. c. Design and implementation of voltage regulator using IC 723. 11. Design of Analog circuits using PSPICE a. Schmitt trigger circuit for given UTP & LTP. b. First order High pass filter, Low pass filter, Wide Band Pass filter and Wide Band reject filter. c. Ramp wave form generation using NE555 timer. d. Class AB Push- Pull Amplifiers.	

Course Outcomes: After completing the course, the students will be able to	
CO1	Understand the various parameters, characteristics and specifications of devices, amplifier, data converters and timers.
CO2	Analyze the performance of subsystems.
CO3	Design electronic subsystems for various applications.
CO4	Implement and demonstrate various analog electronic circuits.

Reference Books	
1.	Microelectronics circuits Analysis and Design, M.H Rashid, 2nd Edition, 2011, Thomson, ISBN: 0-534-95174-0.
2.	Microelectronics, Millman & Grabel, 2nd Edition, 2008, TMH, ISBN*:* 9780074637364.
3.	Microelectronics circuit, Sedra & Smith, 5th Edition, 2013, Oxford, ISBN: 978-0195338836.

Continuous Internal Evaluation (CIE): Total marks: 100+50=150

Theory – 100 Marks

CIE is executed by way of Quizzes (Q), Tests (T) and Self-Study(S). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Self-study is 20. The total CIE for theory is 100.

Laboratory- 50 Marks

The Laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average of marks over number of weeks is considered for 40 marks. At the end of the semester a test is conducted for 10 marks. Total marks for the laboratory is 50.

Semester End Evaluation (SEE): Total marks: 100+50=150

Theory – 100 Marks

SEE for 100 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

Laboratory- 50 Marks

Experiment Conduction with proper results is evaluated for 40 marks and Viva is for 10 marks. Total SEE for laboratory is 50 marks.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	2	1	1	---	---	3	---	---	---
CO2	3	3	3	1	1	---	---	---	3	---	2	1
CO3	3	3	3	2	1	1	---	---	3	---	2	---
CO4	3	3	3	2	1	1	---	2	3	---	2	1

Low-1 Medium-2 High-3

Semester: III		
DIGITAL ELECTRONIC CIRCUITS (Theory & Practice)		
Course Code: 16TE34		**CIE Marks: 100+50**
Credits: L:T:P:S: 3:0:1:1		**SEE Marks: 100+50**
Hours: 40L		**SEE Duration: 03Hrs+03Hrs**

Course Learning Objectives: The students will be able to	
1	Optimize logic expressions using Karnaugh map and Tabular method.
2	Simplify Boolean equation and design combinational circuits with optimal gates.
3	Analyze the working principles of Flip-Flops and design of asynchronous sequential circuits.
4	Design simple synchronous digital circuits based on finite state machine algorithm.
5	Design, simulate and implement digital systems using Verilog.

UNIT-I	
Simplification of Boolean Expressions: Using K-Map and VEM Technique (up to 4 variables). **Basic Concepts of Verilog:** Lexical conventions, data types, system tasks, compiler directives. **Modules and Ports:** Module definition, port declaration, connecting ports, hierarchical name referencing. **Dataflow Modelling:** Continuous assignments, delay specification, expressions, operators, operands, operator types.	**08 Hrs**
UNIT-II	
Behavioural Modeling in Verilog: Structured procedures, initial and always, blocking and nonblocking statements, multiway branching. **Logic Design for Combinational circuits and modeling in Verilog:** Binary Adders and Substractors, Decoders, Encoders.	**08 Hrs**
UNIT-III	
Logic Design for Combinational circuits and modeling in Verilog: Comparators, Multiplexers, Demultiplexers, Parity Generators and Parity Checking Circuits. **Sequential logic Circuits**: Bistable Elements, Latches, Master-Slave Flip-Flops, Edge–Triggerred Flip-Flops along with Characteristics Equations and timing diagrams.	**08 Hrs**
UNIT-IV	
Modeling of Flip flops in Verilog: SR, JK, Master slave JK, D and T Flip flops. **Sequential Logic Circuits:** Counters, Design of Synchronous and asynchronous Counters, Shift Registers.	**08 Hrs**
UNIT-V	
Synchronous Sequential Networks: Structure and operation of Clocked synchronous Sequential Networks, Analysis of Clocked Synchronous Sequential Networks, Modeling clocked synchronous sequential network behaviour, State Table Deduction, Completing the design of clocked synchronous sequential networks.	**08 Hrs**

LABORATORY EXPERIMENTS

PART A

1. Realization of combinational circuits using basic gates and ICs.
2. Realization of sequential circuits using universal gates and ICs.
3. To study the working of arithmetic logic unit using IC 74181.

PART B

1. Design a Verilog module to simulate combination and sequential digital circuits.

Course Outcomes: After completing the course, the students will be able to	
CO1	Simplify Boolean expressions and implement optimal Logic circuits.
CO2	Design and implement combinational and sequential digital systems.
CO3	Design and implement synchronous digital systems using state machines.
CO4	Modeling the digital circuits using Verilog.

Reference Books	
1.	Digital Principles and Design, Donald D. Givone, 2007, Tata McGraw-Hill, ISBN-13:978-0-07-052906-9.
2.	Verilog HDL A guide to digital design and synthesis, Samir Palnitkar, 2nd Edition, 1998, Pearson Education Asia, ISBN: 81-7758-918-0.
3.	Fundamentals of Digital Logic Design with verilog, Stephen Brown, 2nd Edition, 2008, Tata McGraw Hill, ISBN: 00-70-667241.
4.	Digital Design, M Morris Mano and Michael D.Ciletti, 4th Edition, 2007, Pearson, ISBN-978-81-317-1450-8.

Continuous Internal Evaluation (CIE): Total marks: 100+50=150

Theory – 100 Marks

CIE is executed by way of Quizzes (Q), Tests (T) and Self-Study(S). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Self-study is 20. The total CIE for theory is 100.

Laboratory- 50 Marks

The Laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average of marks over number of weeks is considered for 40 marks. At the end of the semester a test is conducted for 10 marks. Total marks for the laboratory is 50.

Semester End Evaluation (SEE): Total marks: 100+50=150

Theory – 100 Marks

SEE for 100 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

Laboratory- 50 Marks

Experiment Conduction with proper results is evaluated for 40 marks and Viva is for 10 marks. Total SEE for laboratory is 50 marks.

CO-PO Mapping												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	2	2	---	---	---	1	---	---	---
CO2	3	3	2	2	2	---	---	---	1	---	---	---
CO3	3	3	2	1	2	---	---	---	1	---	---	---
CO4	3	3	3	2	2	---	---	---	1	---	---	---

Low-1 Medium-2 High-3

Semester: III		
Network Analysis (Theory)		
Course Code: 16TE35		**CIE Marks: 100**
Credits: L:T:P:S: 3:1:0:1		**SEE Marks: 100**
Hours: 45L+24T		**SEE Duration: 03Hrs**

Course Learning Objectives: The students will be able to	
1	Use mesh and nodal analysis for formulating the transfer function of electrical networks.
2	Apply network theorems for reduction.
3	Evaluate the behaviour of networks for transient analysis of first order and second order.
4	Analyze and synthesize networks using Laplace transforms.

UNIT-I	
Basic Concepts: Basic Electrical Elements, Classification of Network Elements, Energy and Power in Network elements. **Mesh and Node Analysis:** Loop and Node Analysis with Dependent and Independent Sources for DC and AC Networks including Concepts of Super Mesh and Super Node.	**09 Hrs**
UNIT-II	
Network Theorems: Principle of Dual Networks, Analysis of Networks using Superposition, Tellegen's and Reciprocity Theorem, Thevenin's & Norton's, Millman's & Maximum Power Transfer Theorem.	**09 Hrs**
UNIT-III	
Transient Analysis in Networks: Behaviour of R, L, C components under switching conditions in time domain.(Only initial and final conditions for 2nd order circuits). **Application Laplace Transforms for transient Analysis:** Introduction, properties (No Derivations), initial & final value theorem, step, ramp and impulse functions as network sources, Laplace transforms of periodic functions, solution of a network using Laplace transform.	**09 Hrs**
UNIT-IV	
Two port network: Two port networks (z, y, T and h only) parameters, interrelationship between parameters, cascade connection of two port networks, conditions for symmetry and reciprocity.	**09 Hrs**
UNIT-V	
Scattering Matrix: Incident and reflected power flow, Scattering matrix for one port network, Scattering matrix for two port network, Properties of Scattering matrix & their proof, calculation of network losses.	**09 Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Distinguish the networks and explain various circuit analysis techniques.
CO2	Illustrate the usage of network theorems.
CO3	Analyze the circuit parameters during switching in time domain and frequency domain.
CO4	Evaluate the network parameters and scattering matrix for two port networks.

Reference Books	
1.	Engineering Circuit Analysis, W. H. Hyatt Jr. and J. E. Kemmerly, S. M. Durbin, 8th Edition, 2013, Tata McGraw Hill.
2.	Network Analysis, M. E.Van Valkenburg, 3rd Edition, 2006, PHI, ISBN-13: 978-8131701584.
3.	Microwave Engineering, David Pozar, 4th Edition, 2011, Wiley, ISBN-13: 978-0470631553.
4.	Network Analysis and Synthesi, F. F. Kuo, 2nd Edition, Reprint 2006, Wiley, ISBN-13: 978-8126510016.

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of Quizzes (Q), Tests (T) and Self-Study(S). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Self-study is 20. The total marks of CIE are 100.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	---	1	---	---	---	---	---	---	---	---	---
CO2	3	---	1	---	---	---	---	---	---	---	---	---
CO3	3	2	2	1	2	---	---	---	---	---	---	---
CO4	3	2	3	2	2	---	---	---	---	---	---	---

Low-1 Medium-2 High-3

Semester: III		
FIELDS AND WAVES (Theory)		
Course Code: 16TE36		**CIE Marks: 100**
Credits: L:T:P:S: 3:1:0:0		**SEE Marks: 100**
Hours: 45L+24T		**SEE Duration: 03Hrs**

Course Learning Objectives: The students will be able to	
1	Apply knowledge of mathematics, to find the force and related electric and Magnetic field Intensity.
2	Evaluate using various postulates static electric field and magnetic field.
3	Appreciate the changes in Maxwell's equation for time varying fields.
4	Describe the wave equations using Maxwell's equation.
5	Calculate various parameters in wave equations.

UNIT-I	
Electro statics I: Coulomb's law, Electric Field Intensity, Applications (field due to Line charge distribution, Surface charge distribution- sheet, Circular ring and disk), Electric Flux, density Gauss' Law, Divergence Theorem(qualitative treatment), Application of Gauss's Law (Field due to Continuous Volume Charge, Line Charge, Sheet Charge, Metal sphere, spherical shell).	**09 Hrs**
UNIT-II	
Electro statics II: Electric potential, Relation between E and V, Applications (field and potential due to Line charge distribution, Surface charge distribution- sheet, Circular ring), Energy Density in an Electric Field, Illustrative examples. Boundary Conditions (dielectric-dielectric, dielectric-conductor), Poisson's and Laplace's Equations to evaluate electric field.	**09 Hrs**
UNIT-III	
Magneto Static Fields: Current, Current density**,** Biot -Savart Law, Applications (Infinite linear conductor, current carrying in loop, solenoid), Magnetic Flux and Flux Density, Ampere's Circuital Law, Stoke's theorem (qualitative treatment), Applications (Infinite line current, sheet current, coaxial transmission line), Magnetic Potential.	**09 Hrs**
UNIT-IV	
Maxwell's Equations: Introduction, Faraday's Law, Transformer and Motional EMFs, Displacement Current, Maxwell's Equations in Final Forms, Time-Varying Potentials, Time-Harmonic Fields.	**09 Hrs**
UNIT-V	
Electromagnetic Waves: Wave equations, Wave Propagation in Lossy Dielectrics, Plane Waves in Lossless Dielectrics, Plane Waves in Free Space, Plane Waves in Good Conductors, Power and the Poynting Vector, Reflection of a Plane Wave at Normal Incidence, Reflection of a Plane Wave at Oblique Incidence.	**09 Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Understand the basic concepts of electric fields, magnetic fields and electromagnetic waves.
CO2	Apply the basic concepts to solve complex problems in electric fields, magnetic fields and electromagnetic waves.
CO3	Analyze different charge and current configurations to derive the electromagnetic fields.
CO4	Illustrate the applications of Maxwell equations & wave equations in communication systems.

Reference Books	
1.	Elements of Electromagnetic, Matthew N O Sadiku, 6th Edition, 2015, Oxford University Press, ISBN-13: 978-0199461851.
2.	Engineering Electromagnetic, William H. Hayt Jr. and John A. Buck, 8th Edition, 2014, Tata McGraw Hill, ISBN-978-0-07-338066-7.
3.	Electromagnetics Waves and Radiating Systems, Edward C. Jordan and Keith G. Balmain, 2nd Edition, 1968, Reprint 2002, Prentice Hall of India, ISBN-9788120300545.

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of Quizzes (Q), Tests (T) and Assignment. A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 60. The marks component for assignment is 10. The total marks of CIE are 100.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	---	---	---	---	---	---	---	---	---	---
CO2	3	1	---	---	---	---	---	---	---	---	---	---
CO3	2	1	1	---	---	---	---	---	---	---	---	---
CO4	2	2	1	1	1	---	---	---	---	---	---	---

Low-1 Medium-2 High-3

III/IV Semester		
C PROGRAMMING (BRIDGE COURSE) (Theory)		
Course Code: 16DCS37		**CIE Marks: 100**
Credits: L:T:P:S : 2:0:0:0 (Audit Course)		**SEE Marks: 100**
Hours: 24L		**SEE : 03 Hrs**
Course Learning Objectives: The students will be able to		
1	Develop arithmetic reasoning and analytical skills to apply knowledge of basic concepts of programming in C.	
2	Learn basic principles of problem solving through programming.	
3	Write C programs using appropriate programming constructs adopted in programming.	
4	Solve complex problems using C programming.	

UNIT-I	
Introduction to Reasoning, Algorithms and Flowcharts: Skill development – Examples related to Arithmetical Reasoning and Analytical Reasoning. Fundamentals of algorithms and flowcharts.	**02 Hrs**
Introduction to C programming: Basic structure of C program, Features of C language, Character set, C tokens, Keywords and Identifiers, Constants, Variables, Data types.	**01 Hrs**
Handling Input and Output operations: Reading a character, Writing a character, Formatted input/output functions, Unformatted input/output functions.	**02 Hrs**
UNIT-II	
Operators and Expressions: Arithmetic operators, Relational operators, Logical Operators, Assignment operators, Increment and decrement operators, Conditional operators, Bit-wise operators, Arithmetic expressions, evaluation of expressions, Precedence of arithmetic operators, Type conversion in expressions, Operator precedence and associativity.	**02 Hrs**
Programming Constructs: Decision Making and Branching: Decision making with 'if' statement, Simple 'if' statement, the 'if…else' statement, nesting of 'if…else' statements, The 'else if' ladder, The 'switch' statement, The '*?:*' operator, The '*goto*' statement. **Decision making and looping:** The while statement, the do statement, The 'for' statement, Jumps in loops**.**	**03 Hrs**
UNIT-III	
Arrays: one dimensional array, Declaration of one dimensional arrays. Initialization of one dimensional arrays, Two dimensional arrays, Initializing two dimensional arrays.	**02 Hrs**
Character Arrays and Strings: Declaring and Initializing String Variables, Reading Strings from Terminal, Writing strings to screen, Arithmetic Operations on characters, String operations using with and without String handling functions.	**02 Hrs**
UNIT-IV	
User-defined functions: Need for User Defined Functions, Definition of functions, Return values and their types, Function calls, Function declaration, Category of functions, Nesting of functions, Functions with arrays, Storage classes.	**03 Hrs**
Structures and Unions: Introduction, Structure definition, Declaring structure variables, Accessing structure members, Structure initialization, Copying and comparing structure variables, Arrays of structure, Arrays within structures, Structures and functions, Unions.	**03 Hrs**
UNIT-V	
Pointers : Introduction , Accessing the address of a variable, Declaring and initializing of pointer variables, Accessing a variable using pointers, Chain of pointers, Pointer expressions, Pointer increments and scale factor, Pointers and arrays, Pointers and character strings.	**03 Hrs**
File Managements in C: Basic concepts of files, Defining and opening a file, closing of a file, Input/Output operations on files.	**01 Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Understand and explore the fundamental computer concepts and basic programming principles like data types, input/output functions, operators, programming constructs and user defined functions.
CO2	Analyze and Develop algorithmic solutions to problems.
CO3	Implement and Demonstrate capabilities of writing 'C' programs in optimized, robust and reusable code.
CO4	Apply appropriate concepts of data structures like arrays, structures, and files to implement programs for various applications.

Reference Books:	
1.	Programming in C, P. Dey, M. Ghosh, 1st Edition, 2007, Oxford University press, ISBN -13: 9780195687910.
2.	The C Programming Language, Kernighan B.W and Dennis M. Ritchie, 2nd Edition, 2005, Prentice Hall, ISBN -13: 9780131101630.
3.	Turbo C: The Complete Reference, H. Schildt, 4th Edition, 2000, Mcgraw Hill Education, ISBN-13: 9780070411838.
4.	Understanding Pointers in C, Yashavant P. Kanetkar, 4th Edition, 2003, BPB publications, ISBN-13: 978-8176563581.

Scheme of Continuous Internal Evaluation:

CIE is executed by way of quizzes (Q), tests (T) and Assignment. A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. Faculty may adopt innovative methods for conducting quizzes effectively. The two tests are conducted and each test is evaluated for 30 marks adding up to 60 marks The marks component for assignment is 10. The total marks of CIE are 100.

Scheme of Semester End Examination:

SEE for 100 marksis executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	2	2	1	-	-	-	-	2	-	1
CO2	3	2	2	2	2	-	-	-	2	1	-	1
CO3	3	2	2	2	2	1	1	-	2	2	1	2
CO4	3	3	3	2	2	1	1	-	2	2	1	2

Low-1 Medium-2 High-3

Semester: IV		
LINEAR ALGEBRA AND PROBABILITY THEORY (COMMON TO EC, EI, TC) (Theory)		
Course Code: 16MA41B		**CIE Marks: 100**
Credits: L:T:P:S: 3:1:0:0		**SEE Marks: 100**
Hours: 36L+12T		**SEE Duration: 03Hrs**

Course Learning Objectives: The students will be able to	
1	Understand the basics of matrix theory, Eigen values, Eigen vectors, solution of system of linear equations.
2	View the concepts of vector spaces, linear transformation and orthogonality of matrices.
3	Apply the knowledge of the theory of probability in the study of uncertainties.
4	Use probability and sampling theory to solve random physical phenomena and implement proper distribution models.

UNIT-I	
Linear Algebra – I: Elementary transformations, Rank of matrix using Echelon form, geometry and consistency of system of linear equations, solution of system of linear equations using Gauss elimination method, Eigen values and Eigen vectors.	**07 Hrs**
UNIT-II	
Linear Algebra – II: Basic definition of Groups, Rings, Fields, Vector spaces, subspaces, Linear independence, Basis and Dimension, Linear transformation, matrix representation, Kernel and image of a linear transformation, Rank- Nullity theorem.	**07 Hrs**
UNIT-III	
Linear Algebra – III: Orthogonal Vectors , Orthogonal Projections, Orthogonal and orthonrmal Bases, Orthogonal and Orthonormal Matrices, Gram-Schmidt Orthogonalization, QR Factorizations, Least Square Problems, Diagonalization of a Matrix, Singular Value Decomposition.	**07 Hrs**
UNIT-IV	
Probability: Baye's rule, Random Variables: Discrete and continuous, probability mass function, probability density function, cumulative density function, mean, variance, standard deviation-problems. Joint probability distributive function- Discrete and continuous, mean, covariance and correlation.	**08 Hrs**
UNIT-V	
Probability Distributions: Some standard discrete and continuous Distribution- Binomial, Poisson, Normal, Exponential and Geometric distributions. Sampling Theory: Sampling, sampling distributions, standard errors, student's t-distribution, chi-square distribution as a test of goodness of fit.	**07 Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Understand - the fundamental concepts of Linear Algebra and Probability theory.
CO2	Demonstrate - the properties of Eigen values and Eigen vectors, linear dependency of vectors, orthogonality of vectors and matrices, random variables to describe probability functions.
CO3	Apply - matrix theory to solve system of linear equations, linear transformations, orthogonal-ity and probability & distribution to nondeterministic situations.
CO4	Estimate and interpret - Rank-Nullity, Diagonalisation, SVD, central tendency and sampling theory occurring in engineering problems.

Reference Books	
1.	Linear Algebra and Its Applications, Gilbert Strang, 4th Edition, Cengage Learning India Edition, 2006, ISBN: 81-315-0172-8.
2.	Higher Engineering Mathematics, B.S. Grewal, 40th Edition, Khanna Publishers, 2007, ISBN: 81-7409-195-5.
3.	Schaum's Outline of Linear Algebra, S. Lipschutz and M. L. Lipson, 5th Edition, McGraw-Hill, ISBN: 978-0-07-179456-5.
4.	Theory and Problems of Probability - Schaum's Outline Series, Seymour Lipschutz & Marc Lars Lipson, 2nd Edition, McGraw-Hill, ISBN: 0-07-118356-6.

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Self-Study(S). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Self-study is 20. The total marks of CIE are 100.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	-	-	-	-	-	-	-	1
CO2	3	2	-	-	-	-	-	-	-	-	-	1
CO3	1	2	2	-	-	-	-	-	-	-	-	1
CO4	-	1	1	3	-	-	-	-	-	-	-	1

Low-1 Medium-2 High-3

Semester: IV		
ENGINEERING MATERIALS (COMMON TO EC, EE, EI & TE) (Theory)		
Course Code:16EM42B		**CIE Marks: 50**
Credits: L:T:P:S 2:0:0:0		**SEE Marks: 50**
Hours: 24L		**SEE Duration: 2 Hrs**

Course Learning Objectives: The students will be able to	
1.	Understand electrical conduction (transport) in solids based on quantum mechanics and modern band theory.
2.	Understand lattice vibration and thermal conduction (transport) in solids.
3.	Understand major properties of bulk and nano structured semiconductors & effects of dopant impurities and defects in semiconductors.
4.	Understand the principles of light-solid interactions.

UNIT-I	
Introduction: Classification and Properties of Materials, Materials Used in Electrical and Electronic Industries, Requirements and Future Developments of Electronic Materials.	**04 Hrs**
UNIT-II	
Classical Theory of Electrical Conduction and Conducting Materials: Resistivity, TCR (Temperature Coefficient of Resistivity) and Matthiessen's Rule, Traditional Classification of Metals, Insulators and Semiconductors, Drude's Free Electron Theory, Hall Effect, Wiedemann–Franz Law, Resistivity of Alloys, Nordheim's Rule, Resistivity of Alloys and Multiphase Solids, Materials for Electricity Transmission.	**05 Hrs**
UNIT-III	
Thin Film Electronic Materials: Techniques for Preparation of Thin Films, Thin Film Conducting Materials, Thin Film Resistors, Transparent and Conductive Thin Films, Thin Film Magnetic Materials.	**05 Hrs**
UNIT-IV	
Organic Electronic Materials: Conducting Polymers, Semiconducting Organic Materials, Organic Superconductors, Organic Piezoelectric Materials.	**05 Hrs**
UNIT-V	
Nanomaterials for Electronic Device Applications: Techniques for Preparation of Nanomaterials, Micro-/nano-devices Using Nanostructured Materials, graphene, carbon nano tubes.	**05Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Define different electronics materials properties, devices and its preparation techniques
CO2	Classify & summarize different materials based on its function properties and its preparation for real time devices
CO3	Identify electronics materials based on functional properties and preparation techniques
CO4	Analyze the significance of emerging materials from appraising the existing materials properties and preparation techniques for devices and applications

Reference Books	
1.	Introduction to Electronic Materials for Engineers, Wei Gao & Zhengwei Li, Nigel Sammes, 2nd Edition, World Scientific Publishing Co. Pvt. Ltd, ISBN:9789814293693
2.	Flexible Electronics: Materials and Applications: William S, Wong and Alberto Salleo, ISBN 978-0-387-74362-2,2009

Continuous Internal Evaluation (CIE); Theory (50 Marks)

CIE is executed by way of quizzes (Q), tests (T) and Assignment. A minimum of three quizzes are conducted and each quiz is evaluated for 05 marks adding up to 15 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 25 marks each and the sum of the marks scored from three tests is reduced to 30. The marks component for Assignment is 05. The total marks of CIE are 50.

Semester End Evaluation (SEE); Theory (50 Marks)

SEE for 50 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 10 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 8 marks adding up to 40 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	2	-	-	-	1	2	-	-	-	-	2
CO2	3	2	-	-	-	1	2	-	-	-	-	2
CO3	3	3	2	-	-	1	2	-	-	-	-	2
CO4	3	3	2	2	-	2	2	-	-	-	-	2

Low-1 Medium-2 High-3

Semester: IV		
ANALOG COMMUNICATION (Theory & Practice)		
Course Code: 16TE43		**CIE Marks: 100+50**
Credits: L:T:P:S: 3:0:1:1		**SEE Marks: 100+50**
Hours: 40L		**SEE Duration: 03Hrs+03Hrs**

Course Learning Objectives: The students will be able to	
1	Understand the functioning of a Communication system.
2	Analyze various analog modulation and demodulation schemes with its performance parameters.
3	Classify different types of noise and its effect on communication systems.
4	Describe the working of the radio communication systems and Pulse modulation techniques.
5	Design and build the analog modulation and demodulation circuits for different applications.

UNIT-I	
Introduction: Elements of Communication systems, Transmission of Message signals, Limitations & Resources of Communication systems. **Filtering & Signal Distortion:** Linear Distortion & Equalization, Ideal Low-pass filters, Band pass transmission, Phase delay and Group delay. **Amplitude Modulation:** Time domain and frequency domain descriptions, AM generation and AM detection. Envelope detector.	**08 Hrs**
UNIT-II	
Suppressed Carrier Modulation Techniques: DSBSC: Time domain and frequency domain descriptions, generation, coherent detection, Costas loop. Quadrature Carrier multiplexing. **SSBSC:** Time domain and frequency domain descriptions, generation – Filtering method, Phase discrimination method. Coherent detection. **VSB:** Generation and Detection. Comparison of AM techniques; Frequency Translation, Frequency Division Multiplexing, AM Radio.	**08 Hrs**
UNIT-III	
Angle Modulation Techniques: Basic concepts, Phase Modulation, Frequency Modulation – Direct and Indirect methods, Armstrong method. FM-Demodulation using PLL, Limiting of FM waves. **Applications:** FM Radio, FM Stereo Multiplexing.	**08 Hrs**
UNIT-IV	
System Noise: Introduction, Shot noise, Resistor noise, white noise; Spectral characteristics of Random signals and noise, Noise-equivalent Bandwidth; Noise figure and Noise temperature, cascade stages. **Noise in Analog Modulation:** Signal-to-Noise ratio, AM Receiver Model, SNR for Coherent reception, Noise in AM receivers, AM Threshold, FM receiver model, Noise in FM Reception, FM Threshold Effect, Pre-emphasis and De-emphasis in FM.	**08 Hrs**
UNIT-V	
Digital Coding of Analog Waveforms: Sampling, Sampling Theorem, Pulse Modulation, Quantization, Coding and Regeneration, Pulse code Modulation, DPCM, Delta modulation; Time division multiplexing, T-1 system.	**08 Hrs**

LABORATORY EXPERIMENTS	
I. The following experiments to be Conducted using hardware. 1. Design and conduct an experiment of Amplitude modulator and demodulator circuit. 2. Design and conduct an experiment of Frequency modulator and demodulator circuit. 3. Design and conduct an experiment for generation of DSBSC waveform using Ring Modulator. 4. Design and conduct an experiment for PAM generation & demodulation. 5. Design and conduct a suitable circuit for Pre-emphasis and De-emphasis. 6. Conduct an experiment to verify the sampling theorem. **II. The following experiments to be demonstrated using Virtual Instrumentation (NI Lab view).** 1. Design and Simulate AM & DSBSC modulator and demodulator circuits. 2. Design and Simulate SSBSC & VSB modulator and demodulator circuits. 3. Design and Simulate Pulse amplitude modulator and demodulator circuits. 4. Design and Simulate Low pass & High pass filters and plot its frequency responses. 5. Design and Simulate Band pass & Band elimination filters and plot its frequency responses. 6. Design and Simulate Frequency modulator & demodulator circuits.	

Course Outcomes: After completing the course, the students will be able to	
CO1	Explain the fundamental concepts and applications of analog communication.
CO2	Analyze the behavior of communication systems without and with noise.
CO3	Design various modulation and demodulation circuits.
CO4	Implement, demonstrate and Evaluate the performance parameters of different analog Communication circuits.

Reference Books	
1.	An Introduction to Analog & Digital Communications, Simon Haykin, 2nd Edition, 2002, John Wiley, ISBN-9788126536535.
2.	Communication Systems, Simon Haykin, 4th Edition, 2001, John Wiley, ISBN-0471178691 / 9780471178699.
3.	Analog and Digital Communications, H.P. Hsu, 2nd Edition, 2006, Tata McGraw Hill, ISBN-0071402284 / 9780071402286.

Continuous Internal Evaluation (CIE): Total marks: 100+50=150

Theory – 100 Marks

CIE is executed by way of Quizzes (Q), Tests (T) and Self-Study(S). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Self-study is 20. The total CIE for theory is 100.

Laboratory- 50 Marks

The Laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average of marks over number of weeks is considered for 40 marks. At the end of the semester a test is conducted for 10 marks. Total marks for the laboratory is 50.

Semester End Evaluation (SEE): Total marks: 100+50=150

Theory – 100 Marks

SEE for 100 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

Laboratory- 50 Marks

Experiment Conduction with proper results is evaluated for 40 marks and Viva is for 10 marks. Total SEE for laboratory is 50 marks.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	2	1	---	2	---	---	---	---	---	---	1
CO2	2	2	1	1	2	---	---	---	---	---	---	1
CO3	2	3	3	2	2	---	---	---	---	---	---	1
CO4	2	3	3	2	2	---	---	---	---	---	---	1

Low-1 Medium-2 High-3

Semester: IV		
SIGNALS AND SYSTEMS (Theory)		
Course Code: 16TE44		**CIE Marks: 100**
Credits: L:T:P:S: 3:1:0:0		**SEE Marks: 100**
Hours: 40L+24T		**SEE Duration: 03Hrs**

Course Learning Objectives: The students will be able to	
1	Analyze and recognize basic signals and its operations in electrical and communications.
2	Apply mathematical transforms to study the behaviour of various systems.
3	Develop systems with the knowledge of difference and differential equations and their responses.
4	Design a system and its characterization.

UNIT-I	
Signals: Definition of Signals, Classification of Signals, Basic Operations on Signals Operations Performed on the independent and dependent variable, Precedence rule, Elementary Signals. **Systems:** Definition of systems, system viewed as interconnection of operations, properties of systems.	**08 Hrs**
UNIT-II	
Linear Time Invariant Systems: Discrete Time Systems: Convolution sum, Convolution sum evaluation procedure. **Continuous Time Systems:** Convolution integrals, convolution integrals evaluation procedure, interconnections of LTI system, relations between LTI system properties and impulse response representation, difference equation representation of LTI system and solving difference equation & differential equation, block diagram representation of systems.	**08 Hrs**
UNIT-III	
Fourier Representation of Discrete-Time signals: Discrete Time Fourier series (DTFS): Computation of DTFS and Inverse DTFS, Properties. **Discrete time Fourier transform (DTFT):** Computation, Properties of DTFT, Inverse DTFT.	**08 Hrs**
UNIT-IV	
Applications of Fourier representations for Continuous-time and Discrete-time Systems: Fourier Transform representations of continuous-time/discrete-time Periodic Signals, Frequency response of Systems characterized by LCC differential/difference equation. Convolution and Multiplication with mixtures of periodic and Non-periodic Signals. **Sampling:** Sampling Continuous-Time Signals, Reconstruction of Continuous Time Signals from Samples, Sampling theorem, Ideal Reconstruction and Practical Reconstruction.	**08 Hrs**
UNIT-V	
Applications of Z Transforms: Introduction, Z Transforms, Properties of ROC, Poles and Zeros, Relation between Z Transform and Fourier Transform, Properties of Z- Transforms. Inverse of Z Transforms: Partial-Fraction Expansions, Power Series Expansion; Transfer Function, Causality and Stability, System Identification and Inverse Systems. Unilateral Z transform and its application to solve difference equation.	**08 Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Explain the representation of signals and systems in various domains.
CO2	Apply various mathematical operations on signals.
CO3	Analyze both continuous and discrete time systems in time, frequency domain and z-domain.
CO4	Evaluate the characteristics of systems

Reference Books	
1.	Signals and Systems, Simon Haykin and Barry Van Veen, 2nd Edition, 2008, John Wiley & Sons, ISBN: 0471138207.
2.	Signals and Systems, V Oppenheim, Alan Willsky and A Hamid Nawab, 2nd Edition, 2006, Pearson Education Asia/ PHI, ISBN: 9780138147570.
3.	Signals and Systems, H.P Hsu, R. Ranjan, Schaum's outline series, 2006, TMH, ISBN: 0070306419.

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of Quizzes (Q), Tests (T) and Assignment. A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 60. The marks component for assignment is 10. The total marks of CIE are 100.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	---	---	---	---	---	---	---	---	---	1	---
CO2	---	3	3	3	---	---	---	---	---	---	3	2
CO3	---	3	3	3	---	---	---	---	---	---	3	1
CO4	---	3	3	---	3	---	---	---	---	---	3	2

Low-1 Medium-2 High-3

Semester: IV		
MICROPROCESSOR AND MICROCONTROLLERS (Theory & Practice)		
Course Code: 16TE45		**CIE Marks: 100+50**
Credits: L:T:P:S: 3:0:1:1		**SEE Marks: 100+50**
Hours: 40L		**SEE Duration: 03Hrs+03Hrs**

Course Learning Objectives: The students will be able to	
1	Explain the architecture of 8051 microcontroller and its peripherals.
2	Use software development tools to assemble, test and debug the programs.
3	Apply assembler directives in programming concepts.
4	Develop Microprocessor/ Microcontroller based system for a given application.

UNIT-I	
MPU Organization: CISC & RISC Design Philosophy, Harvard & Von-Neuman Architectures, Microprocessor & Microcontroller, Intel's 8086 architecture, Pin groups, Functioning, Segmentation, Maximum Mode, Minimum Mode, Address generation, Stack, Interrupts.	**08 Hrs**
UNIT-II	
8086 Assembly Language Programming: Addressing Modes of 8086, Instruction Formats, Program Development Tools, Assembler Directives, Instruction Set of 8086. Data Transfer Instructions, Arithmetic Instructions, Bit Manipulation Instructions, Branching Instructions, Processor Control Instructions and String Instructions, Macros, Modular Programs, Procedures, Assembly Language Programming Examples.	**08 Hrs**
UNIT-III	
8086 Assembly Language Programming: Assemble Level Programming examples for 8086. **Hardware of 8051 Microcontrollers:** Introduction of Intel MCS 51 family, Comparison of Microprocessor and Microcontroller, Architecture and Pin Functions of 8051 Microcontroller, CPU Organization, Program Counter, Timing and Machine Cycles, Internal Memory Organization, Registers, Stack.	**08 Hrs**
UNIT-IV	
8051 Microcontroller Based System Design: Input/output Port Programming, Programming timers, Asynchronous Serial Data Communication, Interrupt Service Routines.	**08 Hrs**
UNIT-V	
8051 Microcontroller Based System Design: Programming in C, Interfacing Matrix Keyboard and Seven Segment Displays, Interfacing ADC and DAC, Interfacing of LCD Display. **Advanced Processors & Controllers:** Parallel Architectures, Multicore Architectures, ARM. Architecture.	**08 Hrs**

LABORATORY EXPERIMENTS

ALP with 8086 using MASM

1. Data Transfer Programs: Block Moves & Exchange (With & Without Overlap) with &without String Instructions.
2. Arithmetic Operations: Addition, Subtraction, Multiplication & Division on 32-Bit Data.
3. Code Conversions: Use XLAT Instruction to Convert Binary to BCD, Binary to ASCII, Binary to Gray. Input from Keyboard & Display Result on the Console.
    a. Search for a Key in an Array of Elements using Linear Search, Binary Search.
    b. Sort An Array Using Bubble Sort & Selection Sort.
4. ASCII Operations: Addition, Subtraction, Multiplication & Division on 16-Bit Data
5. String Operations: Programs for String Concatenation, Reversing & Palindrome Checking.

Write and execute the following programs for 8051 in Embedded C

1. Interface stepper motor to rotate in clockwise/ anti clockwise directions & and to rotate the motor through predefined angle of rotation.
2. Interface DAC to generate sine wave.
3. Interface 4X4 keypad &display the key pressed on LCD
4. Interface ADC in polled mode, interrupt mode.
5. Speed control of DC motor.
6. Interfacing of mechanical relay to control AC device.

Course Outcomes: After completing the course, the students will be able to	
CO1	Explain the design principles of processor/controller based system.
CO2	Identify the different operational & non operational attributes to be satisfied while designing processor/controller based applications.
CO3	Analyze the execution of instructions/program and to write program for a given application.
CO4	Evaluate the performance of different architectures to meet data processing needs of real world applications

Reference Books	
1.	Micro-Processors and Interfacing-Programming & Hardware, Douglas Hall, 2nd Edition, 2002, TMH, ISBN: 0070257426.
2.	The Intel Micro-processors, Architecture, Programming and Interfacing, Barry B. Brey, 6th Edition, 2008, Pearson Education, ISBN: 978-81-317-2622-8.
3.	The 8051 Microcontroller and Embedded Systems, Muhammad A Mazidi, 2nd Edition, 2009, Pearson Education, ISBN: 978-81-317-1026-5.
4.	The 8051 Microcontroller, Kenneth J. Ayala, 3rd Edition, Learning, Thomson, ISBN: 978-1401861582.

Continuous Internal Evaluation (CIE): Total marks: 100+50=150

Theory – 100 Marks

CIE is executed by way of Quizzes (Q), Tests (T) and Self-Study(S). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Self-study is 20. The total CIE for theory is 100.

Laboratory- 50 Marks

The Laboratory session is held every week as per the time table and the performance of the student is evaluated in every session. The average of marks over number of weeks is considered for 40 marks. At the end of the semester a test is conducted for 10 marks. Total marks for the laboratory is 50.

Semester End Evaluation (SEE): Total marks: 100+50=150

Theory – 100 Marks

SEE for 100 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

Laboratory- 50 Marks

Experiment Conduction with proper results is evaluated for 40 marks and Viva is for 10 marks. Total SEE for laboratory is 50 marks.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	---	1	1	1	---	---	1	2
CO2	3	3	3	3	3	1	1	1	---	1	1	---
CO3	3	3	3	3	---	---	---	---	1	---	2	---
CO4	3	3	3	3	2	1	1	---	2	---	3	2

Low-1 Medium-2 High-3

Semester: IV		
DATA STRUCTURES USING C++ (Theory)		
Course Code: 16TE46		**CIE Marks: 100**
Credits: L:T:P:S: 3:0:0:1		**SEE Marks: 100**
Hours: 40L		**SEE Duration: 03Hrs**

Course Learning Objectives: The students will be able to	
1	Create classes of abstract data consisting of variables and functions.
2	Utilize Object Oriented Programming features to write reusable codes.
3	Identify elementary Data Structures using C++ programming languages.
4	Create and utilize dynamic data structures using linked lists.

UNIT-I	
Overview of C++: Principles of object oriented Programming, Tokens, Expressions and control structures, Classes and Objects, functions in C++, Constructors and Destructors.	**08 Hrs**
UNIT-II	
Features and Concepts of C++: Operator Overloading and Type Conversions, Inheritance: Extending Classes, Pointers, Virtual functions and polymorphism, Exception Handling, Templates.	**08 Hrs**
UNIT-III	
Data Representation: Introduction, Linear Lists, Formula-based Representation Linked Representation, Indirect Addressing Simulating Pointers. **Arrays and Matrices:** Arrays, Matrices, Special Matrices, Sparse Matrices.	**08 Hrs**
UNIT-IV	
Stacks: The Abstract Data Types, Derived Classes and Inheritance, Formula-based Representation, Linked Representation, Applications-Towers of Hanoi, Rearranging Railroad Cars. **Queues:** The Abstract Data Types, Derived Classes and Inheritance, Formula-based Representation, Linked Representation, Applications- Railroad Cars Rearrangement, wire routing.	**08 Hrs**
UNIT-V	
Binary and Other Trees: Trees, Binary Trees, Properties and Representation of Binary Trees, Common Binary Tree Operations, Binary Tree Traversal The ADT Binary Tree, ADT and Class Extensions. **Graphs:** Definitions, Applications, properties, The ADTs Graph and Digraph, Representation of Graphs and Digraphs, Representation of Networks, Class Definitions.	**08 Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Analyze basic C++ program, object oriented concepts in data structure design.
CO2	Apply data structures for data representations in stacks, queues, trees and graphs
CO3	Apply suitable data structures for various applications.
CO4	Implement the data structures and algorithms using C++.

Reference Books	
1.	Object Oriented Programming with C++, E. Balaguruswamy, 4th Edition, 2008, McGraw Hill Company Ltd, ISBN: 0070593620.
2.	Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2000, McGraw Hill, ISBN: 0-929306-33-3.
3.	Data Structure Using C and C++, Yedidyah Langsam, Moshe J. Augenstein, Aron M Tenebaum, 2004, Pearson Education, ISBN:81-203-1177-9.
4.	Programming with C++ and Data Structures, Maria Litvin and Gray Litvin, 2003, Vikas Publication ISBN: 0 – 13 –199204.

Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE is executed by way of Quizzes (Q), Tests (T) and Self-Study(S). A minimum of three quizzes are conducted and each quiz is evaluated for 10 marks adding up to 30 marks. All quizzes are conducted online. Faculty may adopt innovative methods for conducting quizzes effectively. The number of quizzes may be more than three also. The three tests are conducted for 50 marks each and the sum of the marks scored from three tests is reduced to 50. The marks component for Self-study is 20. The total marks of CIE are 100.

Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from Units I, IV and V have no internal choice. Units II and III have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	3	1	3	---	---	2	1	---	---	1
CO2	3	3	3	1	3	---	---	2	1	---	---	1
CO3	3	3	2	1	3	---	---	2	1	---	---	2
CO4	3	3	3	3	3	---	---	2	1	---	---	3

Low-1 Medium-2 High-3

III / IV Semester		
Professional Practice – II **COMMUNICATION SKILLS AND PROFESSIONAL ETHICS** **(Theory)**		
Course Code: 16HS47		**CIE Marks: 50**
Credits: L:T:P:S: 0:0:1:0		**SEE Marks: NA**
Hours: 18 Hrs		**CIE Duration: 02 Hrs**

Course Learning Objectives: The students will be able to	
1	Develop communication style, the essentials of good communication and confidence to communicate effectively.
2	Manage stress by applying stress management skills.
3	Ability to give contribution to the planning and coordinate Team work.
4	Ability to make problem solving decisions related to ethics.

III Semester	
UNIT-I	
Communication Skills: Basics, Method, Means, Process and Purpose, Basics of Business Communication, Written & Oral Communication, Listening. **Communication with Confidence & Clarity:** Interaction with people, the need the uses and the methods, Getting phonetically correct, using politically correct language, Debate & Extempore.	**06 Hrs**
UNIT-II	
Assertive Communication: Concept of Assertive communication, Importance and applicability of Assertive communication, Assertive Words, being assertive. **Presentation Skills:** Discussing the basic concepts of presentation skills, Articulation Skills, IQ & GK, How to make effective presentations, body language & Dress code in presentation, media of presentation.	**06 Hrs**
UNIT-III.A	
Team Work: Team Work and its important elements Clarifying the advantages and challenges of team work Understanding bargains in team building Defining behaviour to sync with team work Stages of Team Building Features of successful teams.	**06 Hrs**
IV Semester	
UNIT-III.B	
Body Language & Proxemics: Rapport Building - Gestures, postures, facial expression and body movements in different situations, Importance of Proxemics, Right personal space to maintain with different people.	**06 Hrs**
UNIT-IV	
Motivation and Stress Management: Self-motivation, group motivation, leadership abilities, Stress clauses and stress busters to handle stress and de-stress; Understanding stress - Concept of sound body and mind, Dealing with anxiety, tension, and relaxation techniques. Individual Counselling & Guidance, Career Orientation. Balancing Personal & Professional Life.	**06 Hrs**
UNIT-V	
Professional Practice: Professional Dress Code, Time Sense, Respecting People & their Space, Relevant Behaviour at different Hierarchical Levels. Positive Attitude, Self Analysis and Self-Management. **Professional Ethics:** Values to be practiced, standards and codes to be adopted as professional engineers in the society for various projects**.** Balancing Personal & Professional Life.	**06 Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Inculcate skills for life, such as problem solving, decision making, stress management.
CO2	Develop leadership and interpersonal working skills and professional ethics.
CO3	Apply verbal communication skills with appropriate body language.
CO4	Develop their potential and become self-confident to acquire a high degree of self.

Reference Books	
1.	The 7 Habits of Highly Effective People, Stephen R Covey, Free Press, 2004 Edition, ISBN: 0743272455
2.	How to win friends and influence people, Dale Carnegie, General Press, 1st Edition, 2016, ISBN: 9789380914787
3.	Crucial Conversation: Tools for Talking When Stakes are High, Kerry Patterson, Joseph Grenny, Ron Mcmillan, 2012 Edition, McGraw-Hill Publication, ISBN: 9780071772204
4.	Best Aptitude Book , Ethnus, Aptimithra, 2014 Edition, Tata McGraw Hill ISBN: 9781259058738

Scheme of Continuous Internal Examination (CIE)
Evaluation of CIE will be carried out in TWO Phases.

Phase	Activity	Weightage
I	Test 1 is conducted in III Sem for 50 marks (15 Marks Quiz and 35 Marks Descriptive answers) after completion of Unit-1, Unit-2 and Unit -3.A for 18 hours of training sessions.	50%
II	Test 2 is conducted in IV Sem for 50 marks ((15 Marks Quiz and 35 Marks Descriptive answers) after completion of Unit -3B, Unit - 4 and Unit-5 for 18 hours of training sessions.	50%
	At the end of the IV sem Marks of Test 1 and Test 2 is consolidated for 50 marks (Average of Test1 and Test 2 (T1+T2/2). The grading is provided by the Coe. The final CIE marks is scrutinized by the committee comprising of HSS- Chairman, Training Co-ordinator, respective department Staff Placement co-ordinator before submitting to CoE.	

SEE: NA

CO-PO Mapping												
CO/PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	---	___	---	----	1	----	1	1	1	2	1
CO2	1	2	2	---	---	---	----	1	2	1	2	1
CO3	---	---	3	---	---	1	---	2	1	2	1	---
CO4	---	---	___	---	----	1	3	1	1	1	1	---

Low-1 Medium-2 High-3

Semester: III		
BRIDGE COURSE MATHEMATICS I / II		
Course Code: 16DMA37/48		**CIE Marks: 100**
Credits: L:T:P:S: 2:0:0:0		**SEE Marks: 100**
Audit Course		**SEE Duration: 03Hrs**

Course Learning Objectives: The students will be able to	
1	Understand the existence of polar coordinates as possible 2 - D geometry, approximate a function of single variable in terms of infinite series.
2	Gain knowledge of multivariate functions, types of derivatives involved with these functions and their applications.
3	Recognize linear differential equations, apply analytical techniques to compute solutions.
4	Acquire concepts of vector functions, vector fields and differential calculus of vector functions in Cartesian coordinates.
5	Explore the possibility of finding approximate solutions using numerical methods in the absence of analytical solutions of various systems of equations.

Prerequisites: Hyperbolic functions, Trigonometric formulas, methods of differentiation, methods of integration, reduction formulae, vector algebra.

UNIT-I	
Differential Calculus: Taylor and Maclaurin's series for function of single variable. Partial derivatives – Introduction, simple problems. Total derivative, Composite functions, Jacobian's- simple problems.	**05 Hrs**
UNIT-II	
Multiple Integrals: Evaluation of double and triple integrals – direct problems, change of order in double integral, change of variables to polar, cylindrical and spherical coordinate systems.	**05 Hrs**
UNIT-III	
Differential Equations: Higher order linear differential equations with constant coefficients, Complementary function and Particular integral, problems. Equations with variable coefficients – Cauchy and Legendre differential equations, problems.	**06 Hrs**
UNIT-IV	
Vector Differentiation: Introduction, simple problems in terms of velocity and acceleration. Concepts of Gradient, Divergence- solenoidal vector function, Curl- irrotational vector function and Laplacian, simple problems.	**05 Hrs**
UNIT-V	
Numerical Methods: Algebraic and transcendental equations – Regula-Falsi method, Newton-Raphson method. Ordinary Differential Equations – Taylor's, modified Euler's and 4^{th} order Runge-Kutta methods. Numerical Integration – Simpson's $1/3^{rd}$, $3/8^{th}$ and Weddle's rules.	**05 Hrs**

Course Outcomes: After completing the course, the students will be able to	
CO1	Demonstrate the understanding of the basics of polar coordinates, partial differentiation, multiple integrals, vector differentiation, classification and types of solutions of higher order linear differential equations, requirement of numerical methods and few basic definitions.
CO2	Solve problems on total derivatives of implicit functions, double integrals by changing order of integration, homogeneous linear differential equations, velocity and acceleration vectors.
CO3	Apply acquired knowledge to find infinite series form of functions, multiple integrals by changing order, solution of non-homogeneous linear differential equations, and numerical solution of equations.
CO4	Evaluate multiple integrals by changing variables, different operations using del operator and numerical solutions of differential equations and numerical integration.

Reference Books	
1.	Higher Engineering Mathematics, B.S. Grewal, 40th Edition, Khanna Publishers, 2007, ISBN: 81-7409-195-5.
2.	Advanced Engineering Mathematics, R. K. Jain & S.R.K. Iyengar, Narosa Publishing House, 2002, ISBN: 817-3-19-420-3. Chapters: 1, 2, 8, 15.
3.	Advanced Engineering Mathematics, Erwin Kreyszig, 9th Edition, John Wiley & Sons, 2007, ISBN: 978-81-265-3135-6. Chapters: 6, 10, 12.
4.	A Text Book of Engineering Mathematics, N.P Bali & Manish Goyal, 7th Edition, Lakshmi Publications, 2010, ISBN: 978-81-7008-992-6. Chapters: 6, 18, 16, 8, 26.

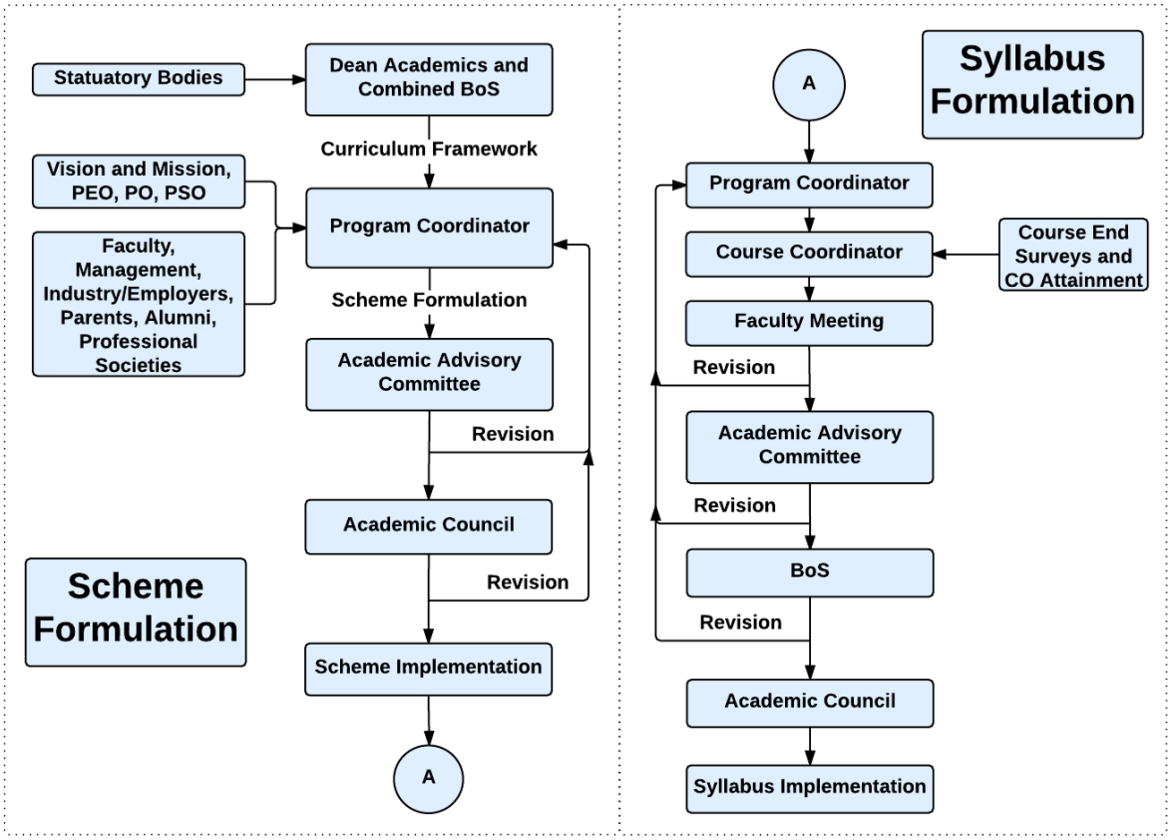
Continuous Internal Evaluation (CIE); Theory (100 Marks)

CIE consists of Two Tests each for 50 marks (20 marks for Quiz + 30 marks for descriptive questions)

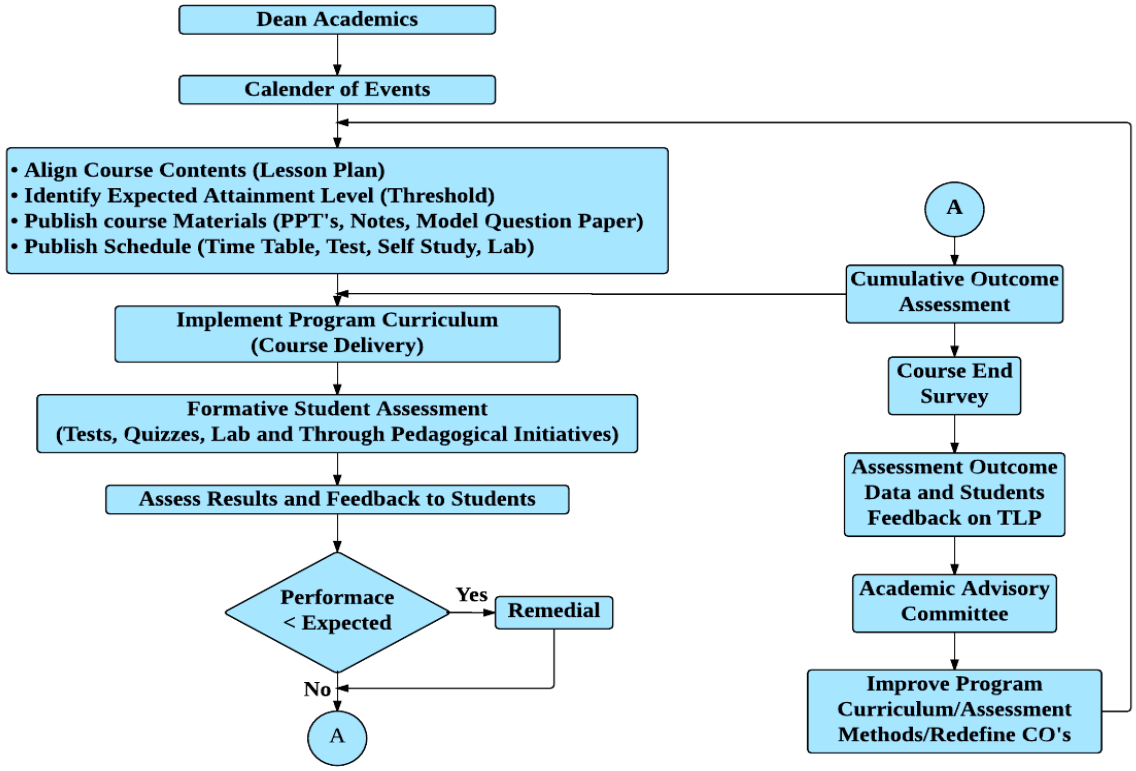
Semester End Evaluation (SEE); Theory (100 Marks)

SEE for 100 marks is executed by means of an examination. The Question paper for each course contains two parts, Part – A and Part – B. Part – A consists of objective type questions for 20 marks covering the complete syllabus. Part – B consists of five main questions, one from each unit for 16 marks adding up to 80 marks. Each main question may have sub questions. The question from each unit have internal choice in which both questions cover entire unit having same complexity in terms of COs and Bloom's taxonomy level.

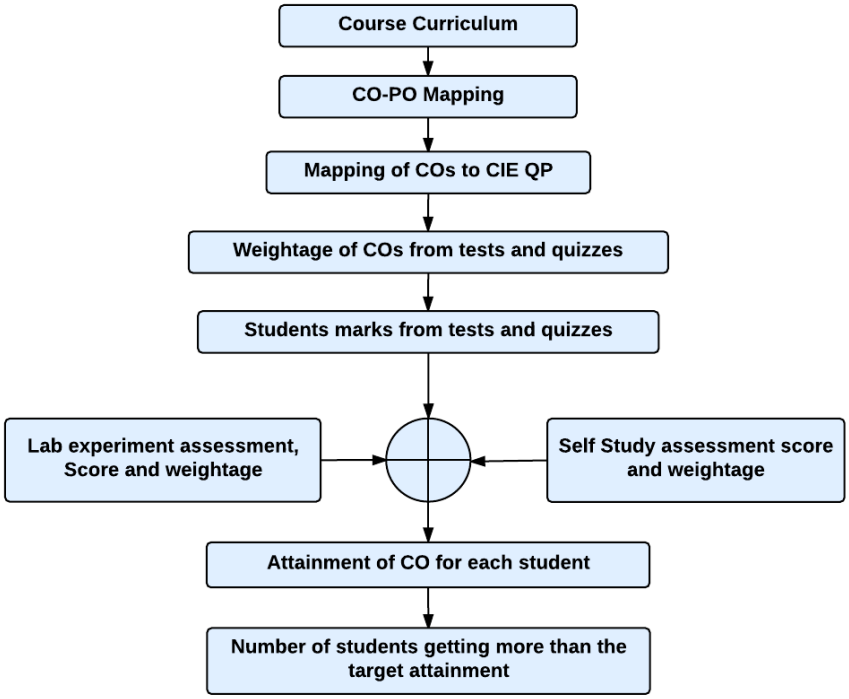
Curriculum Design Process



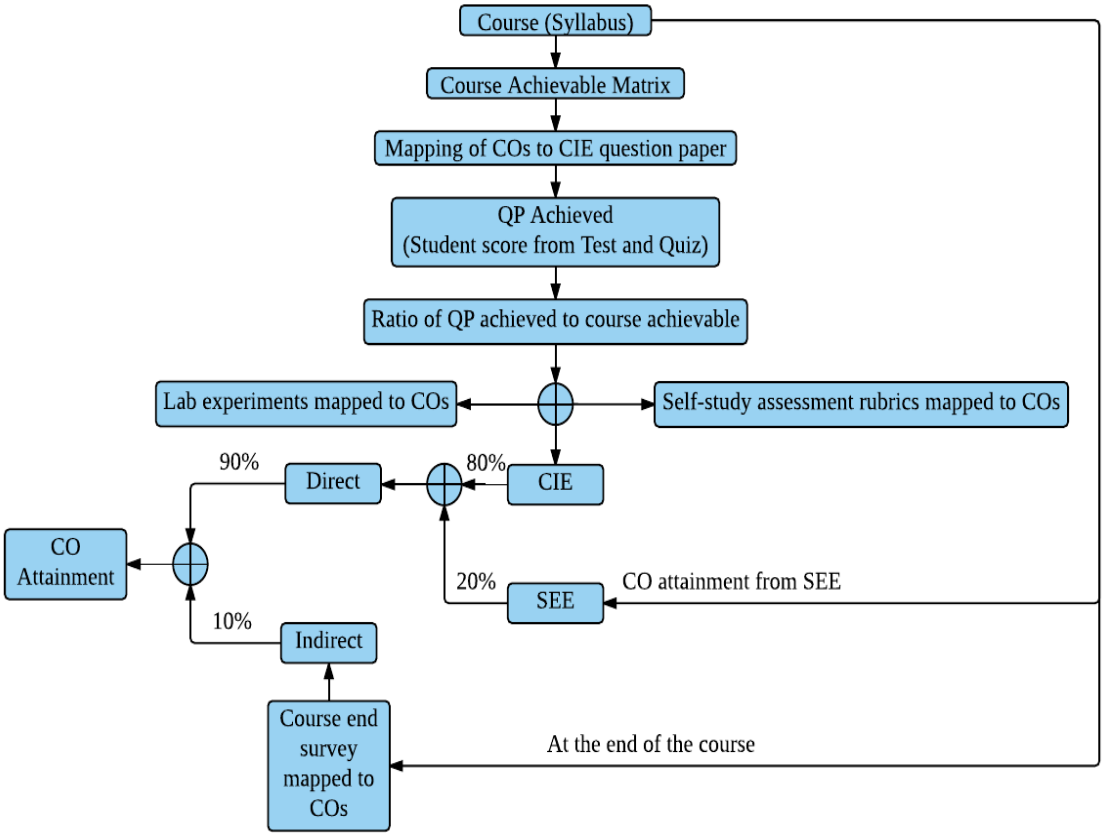
Academic Planning and Implementation



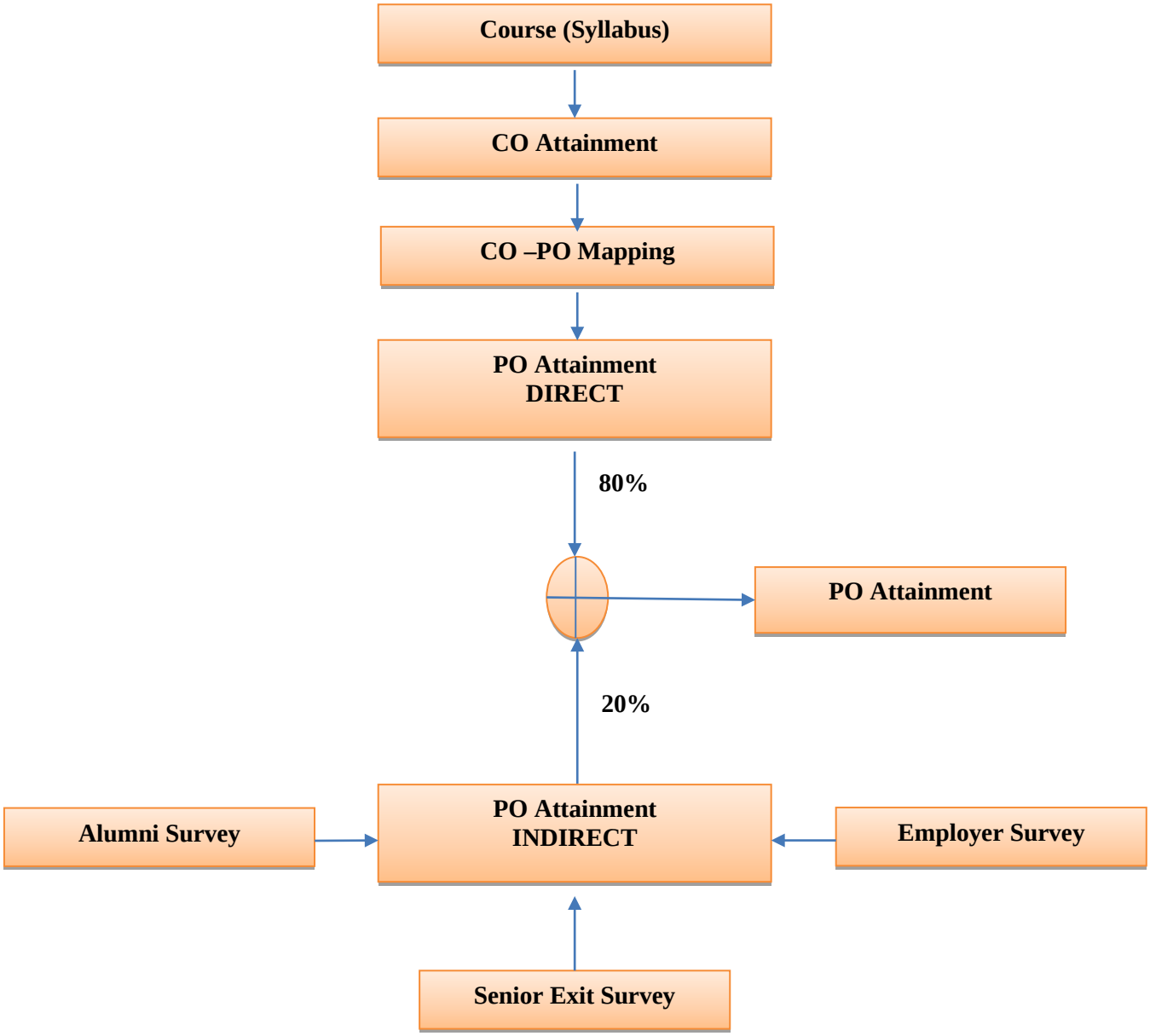
Process for Course Outcome Attainment



Final CO Attainment Process



Program Outcome Attainment Process



Guidelines for Fixing Targets

- The target may be fixed based on last 3 years' average attainment

PROGRAM OUTCOMES (POs)

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialisation for the solution of complex engineering problems.

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

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

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

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

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

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

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

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

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

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

12. Life-long learning: Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.