SECOND SEMESTER SYLLABUS

2020

(Autonomous)

B. Tech
Electrical and Electronics Engineering

MAR BASELIOS COLLEGE OF ENGINEERING AND TECHNOLOGY

Mar Ivanios Vidyanagar, Nalanchira, Thiruvananthapuram – 695 015

November 2020

SEMESTER II SYLLABUS

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
MA0U10B	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	BSC	3	1	0	4	2020

i) COURSE OVERVIEW:

The objective of this course is to familiarize the prospective engineers with some advanced concepts and methods in Mathematics which include the Calculus of vector valued functions, ordinary differential equations and basic transforms such as Laplace and Fourier Transforms which are invaluable for any engineer's mathematical tool box. The topics treated in this course have applications in all branches of engineering.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Compute the derivatives and line integrals of vector functions and learn their applications.	Evaluate
CO 2	Evaluate surface and volume integrals and learn their inter-relations and applications.	Evaluate
CO 3	Solve linear ordinary differential equations.	Apply
CO 4	Apply Laplace transform to solve ODEs arising in engineering.	Apply
CO 5	Apply Fourier transforms of functions to solve problems arising in engineering.	Apply

iii) SYLLABUS

Vector Calculus – Derivative of vector function, Gradient, Divergence, Curl, Line integral, conservative fields, Green's theorem, surface integral, Gauss divergence theorem, Stokes' theorem.

Ordinary Differential Equations- Homogeneous and Non-Homogeneous linear differential Equations, Euler-Cauchy equations. Method of undetermined coefficients and Method of variation of parameters.

Laplace transforms: Laplace Transform and its inverse, shifting theorems, Laplace transform of derivatives and integrals, solution of differential equations using Laplace transform, Unit step function. Dirac delta function, Convolution theorem and its applications.

Fourier Transforms: Fourier integral representation, Fourier sine and cosine integrals. Fourier transform and inverse Fourier transform. Fourier sine and cosine transforms, inverse sine and cosine transform, Convolution theorem.

iv) **(a) TEXT BOOKS**

1) H. Anton, I. Biven S. Davis, *Calculus*, Wiley, 10thEdition, 2015.

2) Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley &Sons, 10th Edition, 2016.

(b) REFERENCES

1) George F Simmons*: Differential Equation with Applications and its historical Notes*, McGraw Hill Education India, 2nd Edition, 2002.

2) Hemen Dutta, *Mathematical Methods for Science and Engineering*, Cengage Learning, 1stEdition, 2020.

3) B.S. Grewal, *Higher Engineering Mathematics*, Khanna Publishers, 44th Edition, 2018.

v) **COURSE PLAN**

Module	Contents	No. of hours
I	Calculus of vector functions: Vector valued function of single variable, derivative of vector function and geometrical interpretation, motion along a curve-velocity, speed and acceleration. Concept of scalar and vector fields, Gradient and its properties, directional derivative, divergence and curl, Line integrals of vector fields, work as line integral, Conservative vector fields, independence of path and potential function (results without proof).	12
II	Vector integral theorems: Green's theorem (for simply connected domains, without proof) and applications to evaluating line integrals and finding areas. Surface integrals over surfaces of the form z = g(x, y), y = g(x, z) or x = g(y, z) , Flux integrals over surfaces of the form z = g(x, y), y = g(x, z) or x = g(y, z), divergence theorem (without proof) and its applications to finding flux integrals, Stokes' theorem (without proof) and its applications to finding line integrals of vector fields and work done.	12
III	Ordinary differential equations: Homogenous linear differential equation of second order, superposition principle, general solution, homogenous linear ODEs with constant coefficients-general solution. Solution of Euler-Cauchy equations (second order only). Existence and uniqueness (without proof). Non homogenous linear ODEs-general solution, solution by the method of undetermined coefficients (for the right-hand side of the form xn, e^{kx}, $sinax$, $cosax$, $e^{kx}sinax$, e^{kx}cosax and their linear combinations), methods of variation of parameters. Solution of higher order equations-homogeneous and non-homogeneous with constant coefficient using method of undetermined coefficient.	12
IV	Laplace transforms: Laplace Transform and its inverse ,Existence theorem (without proof) , linearity, Laplace transform of basic functions, first shifting theorem, Laplace transform of derivatives and integrals, solution of differential equations using Laplace transform,	12

	Unit step function, Second shifting theorems. Dirac delta function and its Laplace transform, Solution of ordinary differential equation involving unit step function and Dirac delta functions. Convolution theorem (without proof) and its application to finding inverse Laplace transform of products of functions.	
V	Fourier Transforms: Fourier integral representation, Fourier sine and cosine integrals. Fourier sine and cosine transforms, inverse sine and cosine transform. Fourier transform and inverse Fourier transform, basic properties. The Fourier transform of derivatives. Convolution theorem (without proof).	**12**
	Total hours	**60**

vi) ASSESSMENT PATTERN

Bloom's Taxonomy Level	Continuous Assessment Exams (Marks)		End Semester Exam (Marks)
	CA Exam I	CA Exam II	
Remember	10	10	20
Understand	20	20	40
Apply	20	20	40
Analyse			
Evaluate			
Create			

vii) CONTINUOUS ASSESSMENT EVALUATION PATTERN

Attendance	:	**10 marks**
CA Exams (2 numbers)	:	**25 marks**
Assignment/Project/Case study etc.	:	**15 marks**
Total	:	**50 marks**

viii) CONTINUOUS ASSESSMENT EXAMINATION PATTERN
- **Two tests of 50 marks** each (half the syllabus to be covered in each exam – 2 ½ modules)
- Duration – **1 ½ hours**

ix) END SEMESTER EXAMINATION PATTERN
There will be two parts; Part A and Part B. Part A contain 10 questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which student should answer any one. Each question can have maximum 2 sub-divisions and carry 14 marks.

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
CY0U10A	ENGINEERING CHEMISTRY	BSC	3	1	0	4	2020

i) COURSE OVERVIEW:

The aim of the engineering chemistry program is to expose the students to basic concepts of chemistry and its industrial as well as engineering applications. It also let the students to familiarize with different topics such as new-generation engineering materials, storage-devices, different instrumental methods etc.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Explain the basic concepts of electrochemistry and corrosion to explore its industrial functions in various engineering fields.	Understand
CO 2	Explain the various spectroscopic techniques like UV-Visible, IR, NMR and its applications.	Understand
CO 3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials.	Apply
CO 4	Apply the knowledge of conducting polymers and advanced polymers in engineering.	Apply
CO 5	Explain various types of water treatment methods and to develop skills for treating industrial and domestic wastewater	Understand

iii) SYLLABUS

Electrochemistry – Cell prototypes, Nernst equation and its uses, different types of cells and applications of electrochemical series. Fundamentals of corrosion and its prevention.

Basics of Spectroscopy – Principles and applications of UV-Vis, IR and NMR spectroscopy, instrumentation of UV-Vis spectroscope, colorimetry, MRI technique.

Instrumental methods in chemistry and Engineering materials – TGA, DTA, and chromatography techniques; Basics of polymer chemistry, BS, ABS and Kevlar and conducting polymers, Classifications of nanomaterials, synthesis, SEM, CNT, graphene.

Stereochemistry and polymer chemistry– Different types of isomers with examples; Notations; Conformational analysis, Types of polymers, ABS, Kevlar and applications, Polyaniline and Poly pyrrole - preparation properties and applications, OLED.

Water Technology–Types of hard water and its elimination, DO, BOD and COD and its significance, disinfection of water, reverse osmosis, sewage water treatment.

iv) (a) TEXT BOOKS

1) D. Harvey, N. Rutledge, *Industrial Chemistry*, ETP,1stEdition, 2018. ISBN: 9781788820554
2) P. W. Atkins, J de Paula, *Atkins' Physical Chemistry*, Oxford University Press, 11thEdition 2014. ISBN: 9780199697403
3) M. Arif, A. Fernandez, K. P. Nair, *Engineering Chemistry*, Owl Books, 1st Edition, 2015.
4) S. Chawla, *A text book of Engineering Chemistry*, Dhanpat Rai& Co., 2nd Edition, 2013.

(b)REFERENCES

1) C. N. Banwell, E. M. Mc Cash, *Fundamentals of Molecular Spectroscopy*, McGraw-Hill, 4thEdition, 2001. ISBN: 9780074620250
2) H. H. Willard, L. L. Merritt, *Instrumental Methods of Analysis*, CBS Publishers, 7thEdition, 2005. ISBN: 9788123909431
3) A. J. Peacock, A. Calhoun, C. Hanser, *Polymer Chemistry: Properties and Application*, Verlag GmbH & Company KG, 2012. ISBN: 9783446433434
4) C. Binns, *Introduction to Nanoscience and Nanotechnology*, Wiley, 2010. ISBN:9780471776475
5) Roy K. Varghese, *Engineering Chemistry*, 1stEdition, Crownplus Publishers, 2019.

v) COURSE PLAN

Module	Contents	No. of hours
I	**Electrochemistry and corrosion:** Introduction - Differences between electrolytic and electrochemical cells- Daniel cell - redox reactions - cell representation. Different types of electrodes (brief) - Reference electrodes- SHE - Calomel electrode - Glass Electrode – Construction and Working. Single electrode potential – definition - Helmholtz electrical double layer - Determination of E^0 using calomel electrode. Determination of pH using glass electrode. Electrochemical series and its applications. Free energy and EMF-Nernst Equation – Derivation - single electrode and cell (Numericals) –Application-Variation of EMF with temperature. Potentiometric titration - Introduction -Redox titration only. Lithium ion cell - construction and working. Conductivity- Measurement of conductivity of a solution (Numericals). Corrosion-Electro chemical corrosion – mechanism. Galvanic series- cathodic protection - electroless plating –Copper and Nickel plating.	12
	Spectroscopic Techniques and applications: Introduction- Types of spectrum - electromagnetic spectrum - molecular energy levels - Beer Lambert's law (Numericals).	

II	UV-Visible Spectroscopy – Principle - Types of electronic transitions – Energy level diagram of ethane, butadiene, benzene and hexatriene. Instrumentation of UV-Visible spectrometer and applications. IR-Spectroscopy – Principle - Number of vibrational modes - Vibrational energy states of a diatomic molecule and -Determination of force constant of diatomic molecule (Numericals) –Applications. 1H NMR spectroscopy – Principle - Relation between field strength and frequency- chemical shift - spin-spin splitting (spectral problems) - coupling constant(definition) - applications of NMR- including MRI (brief).	**12**
III	**Instrumental Methods and Nanomaterials:** Thermal analysis –TGA-Principle, instrumentation (block diagram) and applications – TGA of $CaC_2O_4.H_2O$ and polymers. DTA-Principle, instrumentation (block diagram) and applications - DTA of $CaC_2O_4.H_2O$. Chromatographic methods - Basic principles and applications of column and TLC- Retention factor. GC and HPLC-Principle, instrumentation (block diagram) - retention time and applications. Nanomaterials - Definition - Classification - Chemical methods of preparation -Hydrolysis and Reduction - Applications of nanomaterials – Surface characterisation -SEM – Principle and instrumentation (block diagram).	**12**
IV	**Stereochemistry and Polymer Chemistry**: Isomerism-Structural, chain, position, functional, tautomerism and matamerism- Definition with examples - Representation of 3D structures-Newman, Sawhorse, Wedge and Fischer projection of substituted methane and ethane. Stereoisomerism - Geometrical isomerism in double bonds and cycloalkanes (cis-trans and E-Z notations). R-S Notation – Rules and examples - Optical isomerism, Chirality, Enantiomers and Diastereoisomers-Definition with examples. Conformational analysis of ethane, butane, cyclohexane, mono and di methyl substituted cyclohexane. Copolymers - Definition - Types - Random, Alternating, Block and Graft copolymers - ABS - preparation, properties and applications. Kevlar-preparation, properties and applications. Conducting polymers - Doping -Polyaniline and Polypyrrole - preparation properties and applications. OLED - Principle, construction and advantages.	**12**
	Water Chemistry and Sewage Water Treatment: Water characteristics - Hardness - Types of hardness- Temporary and Permanent	

V	- Disadvantages of hard water -Units of hardness- ppm and mg/L - Degree of hardness (Numericals) - Estimation of hardness-EDTA method (Numerical). Water softening methods-Ion exchange process-Principle, procedure and advantages. Reverse osmosis – principle, process and advantages. Municipal water treatment (brief) - Disinfection methods - chlorination, ozone and UV irradiation. Dissolved oxygen (DO) -Estimation (only brief procedure-Winkler's method), BOD and COD-definition, estimation (only brief procedure) and significance (Numericals). Sewage water treatment - Primary, Secondary and Tertiary - Flow diagram - Trickling filter and UASB process.	12
	Total hours	**60**

vi) ASSESSMENT PATTERN

Bloom's Taxonomy Level	Continuous Assessment Exams (Marks)		End Semester Exam (Marks)
	CA Exam I	**CA Exam II**	
Remember	15	15	30
Understand	25	25	50
Apply	10	10	20
Analyse			
Evaluate			
Create			

vii) CONTINUOUS ASSESSMENT EVALUATION PATTERN

Attendance : **10marks**
CA Exams (2 numbers) : **25 marks**
Assignment : **15 marks**
Total : **50 marks**

viii) CONTINUOUS ASSESSMENT EXAMINATION PATTERN

- **Two tests of 50 marks** each (half the syllabus to be covered in each exam – 2 ½ modules)

- Duration – **1 ½ hours**

ix)   END SEMESTER EXAMINATION PATTERN

- There will be **Two** parts- Part A and Part B – with a total of **100 marks**. Part A contains 10 questions (2 questions from each module), having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module, of which student should answer any one. Each question can have maximum 2 subdivisions and carries 14 marks

- Duration – **3 hours**

Course Code	Course Name	Category	L	T	P	Credit
ES0U10B	ENGINEERING GRAPHICS	ESC	2	0	2	3

i) COURSE OVERVIEW:

Aim of the course is to enable the student to effectively perform technical communication through graphical representation as per global standards. The student will be able to apply the principles of projection and will be introduced to the fundamentals of Computer Aided Drawing (CAD).

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Construct the orthographic projection of points and lines located in different quadrants.	Apply
CO 2	Prepare multiview orthographic projection of solids by visualizing them in different positions.	Apply
CO 3	Construct sectional views and develop surfaces of a given solid.	Apply
CO 4	Prepare pictorial drawings using the principles of isometric and perspective projection to visualize objects in three dimensions.	Apply
CO 5	Convert pictorial views into orthographic views.	Apply
CO 6	Prepare multiview projection and solid models of objects using CAD tools.	Apply

iii) SYLLABUS

Introduction - Relevance of technical drawing in engineering field, BIS code of practice for technical drawing.

Orthographic projection - Projection of points and lines in different quadrants, traces of line. Projection of solids in simple position, axis inclined to one reference plane and axis inclined to both reference planes.

Sections of Solids - Sections of solids cut by different section planes, true shape of the sections

Development of Surfaces - Development of surfaces of solids and solids cut by different section planes.

Isometric Projection - Isometric view and projection of solids and their combinations.

Perspective Projection - Perspective projection of solids with axis perpendicular to the ground plane and axis perpendicular to picture plane.

Conversion of Pictorial Views - Conversion of pictorial views into orthographic

views.

Introduction to Computer Aided Drawing - Creating 2D drawing and 3D models of various components using suitable modelling software.

iv) (a) TEXT BOOKS

1) Bhatt N.D, *Engineering Drawing*, Charotar Publishing House Pvt. Ltd, 53rd Edition, 2019.
2) John K.C., *Engineering Graphics*, Prentice Hall India Publishers, 1st Edition, 2009.
3) C. M.Agrawal, Basant Agrawal, *Engineering Graphics*, Tata McGraw-Hill, 1[st]Edition, 2012.

(b) REFERENCES

1) G. S. Phull, H. S.Sandhu, *Engineering Graphics*, John Wiley & Sons Inc Pvt. Ltd, 1[st]Edition, 2014.
2) P. I.Varghese, *Engineering Graphics*, V.I.P. Publishers,21st Edition, 2010.
3) Anil Kumar K.N., *Engineering Graphics*, Adhyuth Narayan Publishers, 4th Edition, 2009.

v) COURSE PLAN

Module	Contents	No. of hours
I	Introduction: Relevance of technical drawing in engineering field. Types of lines, dimensioning, BIS code of practice for technical drawing. Orthographic projection of points and lines: Projection of points in different quadrants, projection of straight lines inclined to one plane and inclined to both planes. Trace of line, inclination of lines with reference planes, true length of line inclined to both the reference planes.	8
II	Orthographic projection of solids: Projection of simple solids such as triangular, rectangle, square, pentagonal and hexagonal prisms, pyramids, cone and cylinder. Projection of solids in simple position including profile view. Projection of solids with axis inclined to one of the reference planes and with axis inclined to both reference planes.	9
III	Sections of Solids: Sections of prisms, pyramids, cone, cylinder with axis in vertical position and cut by different section planes. True shape of the sections. Locating the section plane when the true shape of the section is given. Development of surfaces: Development of surfaces of the above solids and solids cut by different section planes. Finding the shortest distance between two points on the surface.	9
IV	Isometric projection: Isometric view and projection of prisms, pyramids, cone, cylinder, frustum of pyramid, frustum of cone,	6

	sphere, hemisphere and their combinations.	
V	Perspective projection: Perspective projection of prisms and pyramids with axis perpendicular to the ground plane, axis perpendicular to picture plane. Conversion of pictorial view: Conversion of pictorial view into orthographic views.	5
	SECTION B *(To be conducted in CAD Lab)*	
	Introduction to Computer Aided Drawing: Role of CAD in design and development of new products, advantages of CAD. Creating two-dimensional drawing with dimensions using suitable software. (Minimum 2 exercises mandatory) Introduction to Solid Modelling: Creating 3D models of various components using suitable modelling software. (Minimum 2 exercises mandatory)	8
	Total hours	**45**

vi)   ASSESSMENT PATTERN

Bloom's Taxonomy Level	Continuous Assessment Exams (Marks)		End Semester Exam (Marks)
	CA Exam I	CA Exam II	
Remember			
Understand			
Apply	50	50	100
Analyse			
Evaluate			
Create			

vii)   CONTINUOUS ASSESSMENT EVALUATION PATTERN

Attendance	:	**10 marks**
CA Exams (2 numbers)	:	**Section A 15 marks**
		Section B 10 marks
Assignment/Project/Case study etc.	:	**Section A 10 marks**
		Section B 5 marks
Total	:	**50 marks**

viii)   CONTINUOUS ASSESSMENT EXAMINATION PATTERN
- **Two tests of 50 marks** each (half the syllabus to be covered in each exam – 2 ½ modules)

- Duration – **1 ½ hours**

ix)   END SEMESTER EXAMINATION PATTERN

ESE will be of 3hour duration on A4 size answer booklet and will be for 100 marks. The question paper shall contain two questions from each module of Section A only. Student has to answer any one question from each module. Each question carries 20 marks.

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
ES0U10D	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	ESC	4	0	0	4	2020

i)   COURSE OVERVIEW

This course aims to equip the students with an understanding of the fundamental principles of electrical, electronics and communication engineering.

ii)   COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Apply fundamental circuit laws and principles of electromagnetism to solve simple DC electric circuits and magnetic circuits respectively.	Apply
CO 2	Describe the fundamentals of AC generation to perform simple AC circuit analysis.	Understand
CO 3	Describe the principles of passive components, semiconductor devices and its characteristics.	Understand
CO 4	Explain the working of electronic circuits, instrumentation, radio and cellular communication systems.	Understand

iii)   SYLLABUS

Basic concepts of DC circuits: Ohm's Law and Kirchhoff's laws, Star-delta conversion, Analysis of DC circuits, Mesh analysis, Node analysis.

Magnetic Circuits: Basic Terminology, Simple Magnetic circuits, Electromagnetic Induction, Faraday's laws, Lenz's law, Self-inductance and mutual inductance.

Alternating Current fundamentals: Basic definitions, Average, RMS values, AC Circuits, Phasor representation, Analysis of simple AC circuits (R, L, C, RL, RC, RLC Series circuits) Three phase AC systems, Generation of three phase voltages, star and delta connections.

Introduction to Semiconductor devices: Evolution of electronics, Resistors, Capacitors, Inductors PN Junction diodes and Bipolar Junction Transistors.

Basic electronic circuits and instrumentation: DC power supply, Full wave bridge rectifier, Capacitor filter, Simple Zener voltage regulator, Amplifiers, Public Address system and Electronic Equipments.

Introduction to Communication Systems: Evolution of communication systems, Radio communication, Principle of antenna and Mobile communication.

iv) (a) TEXT BOOKS

1) William H. Hayt., Jr., Jack E. Kemmerly, Steven M. Durbin., *Engineering Circuit Analysis*, McGraw-Hill, 8th Edition, 2012.

2) Kothari D. P. and Nagrath I. J., *Basic Electrical Engineering*, Tata McGraw Hill, 2010.

3) Fitzgerald A.E., David Higginbotham E., Arvin Grabel, *Basic Electrical Engineering*, Tata McGraw Hill, 5th Edition,2009.

4) Boylested, R. L. and Nashelsky, L*., Electronic Devices and Circuit Theory*, Pearson Education, 10thEdition, 2009.

5) Wayne Tomasi and Neil Storey, *A Textbook on Basic Communication and Information Engineering*, Pearson, 5thEdition, 2010.

(b) REFERENCES

1) Paul Breeze, *Power Generation Technologies,* Newnes,3rd Edition, 2019.

2) Allan HambleyR., *Electrical Engineering: Principles & Applications*, Pearson Education,7thEdition, 2018.

3) Mittle V. N. and Arvind Mittal, *Basic Electrical Engineering*, McGraw Hill,2ndEdition, 2006.

4) N.N. Bhargava , D.C. Kulshreshtha , S.C. Gupta, *Basic Electronics and Linear Circuits*, Tata McGraw - Hill Education, New Delhi, 2nd Edition, 2014.

v)   COURSE PLAN

Module	Contents	No. of hours
I	**DC circuits:** Review of Elementary concepts of DC circuits, Current and Voltage Division Rules, Star-delta conversion (resistive networks only-derivation not required), Numerical problems.	9
	Analysis of DC circuits: Mesh current method, Node voltage method. Solution of network equations by matrix method, Numerical problems.	
	Magnetic Circuits: Review of Magnetic Circuits, Series magnetic circuits with composite materials, Numerical problems.	
II	**Electromagnetic Induction:** Faraday's laws, Lenz's law, statically induced and dynamically induced emfs, Self-inductance and mutual inductance, coefficient of coupling (derivation not required), Numerical Problems.	9

	Alternating Current fundamentals: Generation of alternating voltages, Basic definitions, Average and RMS values of sinusoidal waveforms, Numerical Problems.		
	Power Generating Stations: Solar, Wind, Hydro-electric and Nuclear power stations, Basic concepts with block diagrams only.		
III	**Analysis of AC Circuits:** Transient Analysis of RL circuit, Steady state Analysis of RL circuit, Phasor representation of sinusoidal quantities, Complex forms.	12	
	Analysis of simple AC circuits: Purely resistive, inductive and capacitive circuits; Analysis of RL, RC and RLC series circuits, active, reactive and apparent power. Illustrations using simple example.		
	Three phase AC systems: Generation of three phase voltages, advantages of three phase systems, star and delta connections (balanced only), relation between line and phase voltages, line and phase currents, Power in three phase circuit, Numerical problems.		
IV	**Introduction to Semiconductor devices**		
	Evolution of electronics – Vacuum tubes to nano electronics (In evolutional perspective only)	1	
	Resistors, Capacitors and Inductors: types, specifications, standard values, colour coding (No constructional features)	2	
	PN Junction diode: Principle of operation, V-I characteristics, principle of avalanche breakdown and Zener breakdown	2	
	Bipolar Junction Transistors: PNP and NPN structures, principle of operation, relation between current gains in CE, CB and CC Configurations, input and output characteristics of common emitter configuration.	5	
V	**Basic electronic circuits and instrumentation**		
	Rectifiers and Power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple Zener voltage regulator	3	

	Amplifiers: Concept of voltage divider biasing, circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response, block diagram of Public Address system.		**5**
	Electronic Instrumentation: Block diagram of an electronic instrumentation system, functions of various equipments (multimeter, DSO and function generator)		**2**
VI	**Introduction to Communication Systems**		
	Evolution of communication systems: Telegraphy to 5G		**1**
	Radio communication: Principle of AM & FM, frequency bands used for various communication systems, block diagram of super heterodyne receiver. **Principle of antenna:** Radiation from accelerated charge		**5**
	Mobile communication: Basic principles of cellular communications, principle and block diagram of GSM.		**4**
		Total hours	**60**

Suggested Simulation Assignments for Basic Electronics Engineering

(1) Plot V-I characteristics of Si and Ge diodes on a simulator.
(2) Plot Input and Output characteristics of BJT on a simulator.
(3) Implementation of half wave and full wave rectifiers.
(4) Simulation of RC coupled amplifier with the design supplied.
(5) Generation of AM signal.

Note: The simulations can be done on open tools such as Proteus, QUCS, KiCad, GNURadio or similar software to augment the understanding.

vi) ASSESSMENT PATTERN

 BASICS OF ELECTRICAL ENGINEERING

Bloom's Taxonomy Level	Continuous Assessment Exams (Marks)		End Semester Exam (Marks)
	CA Exam I	**CA Exam II**	
Remember	5	5	10
Understand	10	10	20
Apply	10	10	20
Analyse			
Evaluate			
Create			

BASICS OF ELECTRONICS ENGINEERING

Bloom's Taxonomy Level	Continuous Assessment Exams (Marks)		End Semester Exam (Marks)
	CA Exam I	CA Exam II	
Remember	10	10	20
Understand	15	15	30
Apply			
Analyse			
Evaluate			
Create			

COMBINED

Bloom's Taxonomy Level	Continuous Assessment Exams (Marks)		End Semester Exam (Marks)
	CA Exam I	CA Exam II	
Remember	15	15	30
Understand	25	25	50
Apply	10	10	20
Analyse			
Evaluate			
Create			

vii) CONTINUOUS ASSESSMENT EVALUATION PATTERN

Attendance	:	**10 Marks**
CA Exams (2 numbers)	:	**25 marks**
Assignment/Project/Case study etc.	:	**15 marks**
Total	:	**50 marks**

viii) CONTINUOUS ASSESSMENT EXAMINATION PATTERN
- **Two tests of 50 marks** each (half the syllabus to be covered in each exam – 2 ½ modules)

- Duration – **1 ½ hours**

ix) END SEMESTER EXAMINATION PATTERN
There will be two parts; Part I – Basic Electrical Engineering and Part II – Basic Electronics Engineering. Part I and PART II carries 50 marks each.

For the end semester examination, part I contain 2 parts - Part A and Part B. Part A contain 5 questions carrying 4 marks each (not exceeding 2 questions from each module). Part B contains 2 questions from each module out of which one to be answered. Each question carries 10 marks and can have maximum 2 subdivisions.

The pattern for end semester examination for part II is same as that of part I. However, student should answer both part I and part 2 in separate answer booklets.

Part A	All modules	• 5 questions not exceeding 2 questions from each module • 4 marks each • Answer all	40%
Part B	All modules	• 1 out of 2 questions from each module • 10 marks each • Each question with maximum two sub-divisions	60%
		Number of questions to be answered	**15 (Minimum) to 20 (Maximum)**

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
HS0U10B	PROFESSIONAL COMMUNICATION	HSC	2	0	2	--	2020

i) COURSE OVERVIEW:

The objective of this course is to equip students with the necessary skills to listen, read, write, and speak so as to comprehend and successfully convey any idea, technical or otherwise, as well as give them the necessary polish to become persuasive communicators. The course aims to enhance the employability and career Skills of students and orient the students towards grooming as a professional.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Develop effective language skills relevant to Engineering as a profession and demonstrate these through writing and making presentations.	Create
CO 2	Analyze, interpret and effectively summarize a variety of textual and audio content for specific needs	Analyse
CO 3	Apply appropriate thinking and problem solving techniques to solve new case studies.	Apply
CO 4	Present and analyse a given technical/non-technical topic in a group setting and arrive at generalizations/consensus.	Analyse
CO 5	Create professional and technical documents that are clear and adhering to all the necessary conventions.	Create
CO 6	Manage and apply interviewing skills.	Apply

iii) SYLLABUS

Communication Skills: Introducing yourself and others professionally, elevator pitch, recommendation letter, e-mails, netiquettes, telephone etiquettes, demi-official letters.

Business Communication and Technical writing: Product description, narrating an incident, report writing, agenda and minutes, memo, Asking for information and giving information, explaining processes and products, giving instructions, planning a course of action.

Creative Thinking, Critical Thinking Skills and problem solving: Expressing opinion, GD, Arguing, Reading critical texts (general and academic) and summarizing, listening and responding, Negotiation strategies and decision making skills.

Presentation Skills: Oral Presentation Skills (Proposal presentation), Power point presentation (Projects).

Interviews: CVs and Resumes, Job application, Types of interviews, successful interviews, interview etiquette, dress code, body language, telephone/online (Skype)

interviews, one-to-one interview & panel interview, FAQs related to job interviews.

iv) (a) TEXT BOOKS

1. Meenakshi Raman and Sangeetha Sharma (2018). *Professional Communication*, Oxford University Press, 3rd Edition, 2018.
2. Meenakshi Raman and Sangeetha Sharma*, Technical Communication: Principles and Practice*, Oxford University Press, 2nd Edition, 2011.
3. Ashraf Rizvi M., *Effective Technical Communication*. New Delhi: Tata McGraw Hill Publications, 2007.

(b) REFERENCES

1. *English for Engineers and Technologists* (Combined edition, Vol. 1 and 2, Orient Blackswan, 2010.
2. Stephen E. Lucas, *The Art of Public Speaking*, 10th Edition; McGraw Hill Education, 2012.
3. William Strunk Jr. & E.B. White, *The Elements of Style*, 4th Edition, Pearson, 1999.
4. David F. Beer and David*, Guide to writing as an Engineer*, John Willey. New York, 2004.
5. Goodheart-Willcox, *Professional Communication*, 1st Edition, 2017.
6. *Training in Interpersonal Skills: Tips for Managing People at Work,* Pearson Education, India, 6th Edition,2015.
7. *The Ace of Soft Skills: Attitude, Communication and Etiquette for Success*, Pearson Education; 1st Edition, 2013.
8. Anand Ganguly, *Success in Interview*, RPH, 5th Edition, 2016.
9. Raman Sharma, *Technical Communications*, Oxford Publication, London, 2004.

v) COURSE PLAN

Module	Contents	No. of hours
I	Use of language in communication: Significance of technical communication Vocabulary Development: technical vocabulary, vocabulary used in formal letters/emails and reports, sequence words, misspelled words, compound words, finding suitable synonyms, paraphrasing, verbal analogies. Language Development: subject-verb agreement, personal passive voice, numerical adjectives, embedded sentences, clauses, conditionals, reported speech, active/passive voice.	6

	Technology-based communication: Effective email messages, slide presentations, editing skills using

software. Modern day research and study skills: search engines, repositories, forums such as GitHub, Stack Exchange, OSS communities (MOOC, SWAYAM, NPTEL), and Quora; Plagiarism | |
| II | Reading, Comprehension, and Summarizing: Reading styles, speed, valuation, critical reading, reading and comprehending shorter and longer technical articles from journals, newspapers, identifying the various transitions in a text, SQ3R method, PQRST method, speed reading.

Comprehension: techniques, understanding textbooks, marking and underlining, Note-taking: recognizing non-verbal cues. | **6** |
| III | Oral Presentation: Voice modulation, tone, describing a process, Presentation Skills: Oral presentation and public speaking skills, business presentations, Preparation: organizing the material, self-introduction, introducing the topic, answering questions, individual presentation practice, presenting visuals effectively.

Debate and Group Discussions: introduction to Group Discussion (GD), differences between GD and debate; participating GD, understanding GD, brainstorming the topic, questioning and clarifying, GD strategies, activities to improve GD skills. | **6** |
| IV | Listening and Interview Skills Listening: Active and Passive listening, listening: for general content, to fill up information, intensive listening, for specific information, to answer, and to understand.

Developing effective listening skills, barriers to effective listening, listening to longer technical talks, listening to classroom lectures, talks on engineering /technology, listening to documentaries and making notes, TED talks.

Interview Skills: types of interviews, successful interviews, interview etiquette, dress code, body language, telephone/online (skype) interviews, one-to-one interview & panel interview, FAQs related to job interviews | **6** |
| V | Formal writing: Technical Writing: differences between technical and literary style. Letter Writing (formal, informal and semi formal), Job applications, Minute preparation, CV preparation (differences between Bio-Data, CV and Resume), and Reports. Elements of style, | **6** |

	Common Errors in Writing: describing a process, use of sequence words, Statements of Purpose, Instructions, Checklists. Analytical and issue-based Essays and Report Writing: basics of report writing; Referencing Style (IEEE Format), structure of a report; types of reports, references, bibliography	
	Total Hours	**30**

Lab Activities-Total hours 30

Written: Letter writing, CV writing, Attending a meeting and Minute Preparation, Vocabulary Building

Spoken: Phonetics, MMFS (Multimedia Feedback System), Mirroring, Elevator Pitch, telephone etiquette, qualities of a good presentation with emphasis on body language and use of visual aids.

Listening: Exercises based on audio materials like radio and podcasts. Listening to Song practice and exercises.

Reading: Speed Reading, Reading with the help of Audio Visual Aids, Reading Comprehension Skills

Mock interview and Debate/Group Discussion: concepts, types, Do's and don'ts- intensive practice

vi) CONTINUOUS ASSESSMENT EVALUATION PATTERN

Continuous Internal Evaluation

Total Marks   :   50
Attendance   :   10 marks
Regular assessment   :   25 marks

Series test (one test only, should include verbal aptitude for placement and higher studies, this test will be conducted for 50 marks and reduced to 15):   15 marks

Regular assessment

Project report presentation and Technical presentation through PPT: 7.5 marks

Listening Test: 5 marks

Group discussion/mock job interview: 7.5 marks

Resume submission: 5 marks

End Semester Examination

Mark distribution

Total Marks	CIE	ESE	ESE Duration
100	50	50	2hrs

Continuous Internal Evaluation:50 marks

End term evaluation: 50 marks

Regular assessment
Group Discussion (Marks:7.5)

Create groups of about 6 students each and engage them in a GD on a suitable topic for about 20 minutes. Parameters to be used for evaluation are as follows:

- Communication Skills   : 3 marks
- Subject Clarity   : 3marks
- Group Dynamics   : 0.5 marks
- Behaviours &Mannerisms : 1 mark

Presentation Skills and project report writing (Marks: 7.5)

Students will submit a technical report and make a power point presentation.

- Communication Skills   : 2 marks
- Platform Skills   : 1 mark
- Team player flexibility   : 1 mark
- Subject Clarity/Knowledge (Report writing): 3.5 marks

Project Report writing

Writing report of Project undertaken following the guidelines and procedures. These marks Parameters to be used for evaluation are as follows:

- Usage of English and Grammar-0.5 marks
- Following the format-1 marks
- Content clarity-2 marks

Listening and summarizing (Marks: 5 marks)

Listening to a clipping and writing the summary. Parameters to be used for evaluation are as follows:

- Identification of key ideas   : 2 marks
- Usage of English and Grammar: 1.5 marks
- Cohesion and coherence   : 1.5 marks
-

Interviews (Marks:7.5 marks)
Students will participate in a mock interview with a panel of interviewers. Parameters to be used for evaluation are as follows:

- Communication Skills   :2 marks
- Subject Clarity   : 2marks
- Body language: : 1.5 marks
- Resume   : 2 marks

vii)   END SEMESTER EXAMINATION PATTERN

Evaluation

Total Marks: 50

Time: 2hrs

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
ES0U10E	PROGRAMMING IN C	ESC	2	1	2	4	2020

i)   COURSE OVERVIEW:

This course aims to introduce the concepts of structured programming. It covers basic concepts of C programming language including arrays, functions, pointers and files. This course involves a lab component which equips the learner to solve computational problems through programming.

ii)   COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Explain the fundamentals of computer architecture and types of software.	Understand
CO 2	Develop a solution using algorithm /flowchart to a computational problem.	Apply
CO 3	Construct programs with control statements and arrays.	Apply
CO4	Make use of user defined data types or functions to solve computational problems.	Apply
CO5	Develop programs using files and pointers.	Apply

iii)   SYLLABUS

Computer architecture & Programming Languages – Basics of Computer architecture, Types of Programming Languages, System Software, Application Software, Introduction to structured programming, Algorithms, Flowcharts and Pseudo-codes

C Programming Language – Data Types, variables, keywords, Constants, Operators and Expressions, Control Flow Statements- Conditional statements, Iterative statements, programs

Arrays and Strings– Multidimensional arrays and matrices, String processing, searching and sorting in 1D array.

Functions – Scope of variable, Pass by reference and value methods, Recursive functions. Structures and union, Storage Classes

Pointers and Files- File Operations, Sequential access and random access, programs covering pointers and files, Introduction to data structures – Types of data structure, Singly linked list.

iv)   (a) TEXT BOOKS

1) Byron Gottfried, *Programming with C* (Schaum's Outlines Series), Mcgraw Hill Education, 3rd Edition, 2017.
2) H. M. Deitel, P. J. Deitel, *C: How to program*, 7th Edition, Pearson Education, 2010.
3) Anita Goel, Computer Fundamentals, Pearson, 1st Edition, 2010.
4) Ellis Horowits, Sartaj Sahini, Susan Anderson Freed, *Fundamentals of Data Structures in C*, 2nd Edition, 2008.

(b) REFERENCES

1) Brian W. Kernighan and Dennis M. Ritchie, *C Programming Language*, Pearson, 2nd Edition, 2015.
2) Rajaraman V, PHI, *Computer Basics and Programming in C*, 1st Edition, 2007.
3) Anita Goel and Ajay Mittal, *Computer fundamentals and Programming in C*, 1st Edition, 2013.

v)   COURSE PLAN

Module	Contents	No. of hours
I	Basics of Computer architecture.-Von-Neumann Architecture-Processor, Memory, Input and Output devices. Types of Programming Languages, System Software, Application Software: Compilers, Interpreters, high level and low level languages Introduction to structured programming, Algorithm, flowcharts and Pseudo-code -Examples	8
II	Basic structure of C program: Character set, Tokens, Identifiers in C, Variables and Data Types, Constants, Console IO Operations, printf and scanf, Operators and Expressions: Expressions and Arithmetic Operators, Relational and Logical Operators, Conditional operator, size of operator, Assignment operators and Bitwise Operators. Operators Precedence. Control Flow Statements: If Statement, Switch Statement, Unconditional Branching using goto statement, While Loop, Do While Loop, For Loop, Break and Continue statements.	9
III	Arrays. Strings-string handling functions. Multidimensional arrays and matrices. Linear search and Bubble Sort in array. String processing: In built string handling functions Simple programs covering arrays and strings	9
IV	Functions : The prototype declaration, Function definition. Function call: Passing arguments to a function, by value, by reference. Scope of variable names. Recursive function calls. Storage Classes. Structure and union in C, Array of structures	8
V	Pointers: Pointer variables. Declaring and dereferencing pointer variables.. Accessing arrays through pointers. File Operations: open, close, read, write, append Sequential access and random access to files: In built file handling functions (rewind() ,fseek(), ftell(), feof(), fread(), fwrite()), simple programs covering pointers and files. Introduction to Data Structures: Linear and Non-linear data structures, Singly Linked list and its operations.	11
	Total hours	**45**

vi)   ASSESSMENT PATTERN

Bloom's Taxonomy Level	Continuous Assessment Exams (Marks)		End Semester Exam (Marks)
	CA Exam I	CA Exam II	
Remember	15	10	25
Understand	10	15	25
Apply	25	25	50
Analyse			
Evaluate			
Create			

vii) CONTINUOUS ASSESSMENT EVALUATION PATTERN

Attendance	:	**10 marks**
CA Exams 1 (Theory)	:	**20 marks**
CA Exams 2 (Lab)	:	**20 marks**
Total	:	**50 marks**

viii)   CONTINUOUS ASSESSMENT EXAMINATION PATTERN

CA Exam I

- **Two tests of 50 marks** each (half the syllabus to be covered in each exam – 2 ½ modules)

- Duration – **1 ½ hours**

CA Exam II

- The assessment will be made on 50 marks and the mark is divided as follows: Practical Records/Outputs - 20 marks, Regular Lab Viva - 5 marks, Final Practical Exam – 25 marks.

ix)   END SEMESTER EXAMINATION PATTERN
There will be two parts; Part A and Part B. Part A contains 10questions with 2 questions from each module, having 3 marks for each question. Students should answer all questions. Part B contains 2 questions from each module of which a student should answer any one. Each question can have maximum 2 sub-divisions and carry 14 marks.

C PROGRAMMING LAB (Practical Part of ES0U10E)-Total hours 15

1. Familiarization of console I/O and operators in C
   i) Display "Hello World"
   ii) Read two numbers, add them and display their sum
   iii) Read the radius of a circle, calculate its area and display it
   iv) Area of triangle after reading its sides
2. Read 3 integer values and find largest of three numbers.
3. Check whether given year is leap year.
4. Display the grade of a student after reading his mark for a subject. (Use switch)
5. Read a Natural Number and check whether the number is prime or not
6. Read a Natural Number and check whether the number is Armstrong or not
7. Display second largest number after reading n numbers from user. (Without array).
8. Read n integers, store them in an array and find their sum and average
9. Read n integers, store them in an array and search for an element in the array using an algorithm for Linear Search
10. Read n integers, store them in an array and sort the elements in the array using Bubble Sort algorithm
11. Write a menu driven program for performing matrix addition, multiplication and finding the transpose. Use functions to (i) read a matrix, (ii) find the sum of two matrices, (iii) find the product of two matrices, (i) find the transpose of a matrix and (v) display a matrix.
12. Display sum of diagonal elements of a matrix
13. Read a string (word), store it in an array and check whether it is a palindrome word or not.
14. Read a string (ending with a $ symbol), store it in an array and count the number of vowels, consonants and spaces in it.
15. Display first n prime numbers using Function.
16. Program to find the sum of digits of a number using recursion
17. Using structure, read and print data of n employees(Name, Employee Id and Salary)
18. Read the marks of three subjects for n students of a class and display their names in the order of rank. (Use array of structure)
19. Input and Print the sum of elements of an array using pointers
20. Create a file and perform the following
    i) Write data to the file
    ii) Read the data in a given file & display the file content on console
    iii) append new data and display on console
21. Open a text input file and count number of characters, words and lines in it; and store the results in an output file.
22. Implementation of Singly Linked List.

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
CY0U18A	ENGINEERING CHEMISTRY LAB	BSC	0	0	2	1	2020

i)   COURSE OVERVIEW:

This course is designed to familiarize with the basic experiments in industrial chemistry and to accustom the students with the handling and analysing chemicals and standard laboratory equipments.

ii)   COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Apply different techniques of quantitative chemical analysis to generate basic experimental skills.	Apply
CO 2	Explain the use of spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds.	Understand
CO 3	Use instrumental techniques for chemical analysis.	Apply
CO 4	Organize scientific experiments as a team and analyse the results of such experiments.	Evaluate
CO 5	Create an experiment by themselves and applying them to real world problems and data.	Create

iii) SYLLABUS
1. Estimation of total hardness of water by EDTA method.
2. Analysis of IR and 1H NMR spectra of organic compounds.
3. Determination of wavelength of absorption maximum and colorimetric estimation of Fe^{3+} in solution.
4. Determination of molar absorptivity of a compound.
5. Estimation of chloride in water by argentometric method.
6. Calibration of pH meter and determination of pH of a solution.
7. Potentiometric titration: Acid – base titration.
8. Estimation of dissolved oxygen in water by Winkler's method.

iv) REFERENCES

1) Mohapatra R. K., *Engineering Chemistry with Laboratory Experiments*, PHI Learning, New Delhi, 1st Edition, 2015.
2) George S. C., Jose R., *Lab Manual of Engineering Chemistry*, S. Chand & Company Pvt Ltd, New Delhi, 1st Edition, 2019.
3) Slowinski E., Wolsey W. C., *Chemical Principles in the Laboratory*, Cengage Learning, New Delhi, 11th Edition, 2008.

v) ASSESSMENT PATTERN

Continuous Assessment Evaluation(Marks)	End Semester Exam (Marks)
70	30

vi) CONTINUOUS ASSESSMENT EVALUATION PATTERN

Attendance	:	**20 marks**
Class work/ Assessment /Viva-voce	:	**50 marks**
Total	:	**70 marks**

vii) END SEMESTER EXAMINATION PATTERN

Written Objective Examination of one hour (15 questions for 30 marks which contains data analysis, numerical etc.)

Course Code	Course Name	Category	L	T	P	Credit	Year of Introduction
ES0U18B	ELECTRICAL AND ELECTRONICS WORKSHOP	ESC	0	0	2	1	2020

i) COURSE OVERVIEW:

- To expose the students to the commonly used accessories and components in electrical installations and to provide hands on experience of wiring of electrical circuits.

- To enable the students to familiarize, identify, construct, and debug the electronic components, devices and circuits. It also enables the students engineering skills by soldering practices of electronic circuits.

ii) COURSE OUTCOMES

After the completion of the course, the student will be able to:

CO 1	Identify electrical accessories, protective elements and their standard symbols and the tools used for electrical wiring.	Remember
CO 2	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings.	Apply
CO 3	Identify different types of batteries and different types of earthing.	Remember
CO 4	Explain the working and purpose of fuse, MCB, ELCB etc. and solar powered circuit.	Understand
CO 5	Identify and test various electronic components.	Understand
CO 6	Draw circuit schematics with EDA tools.	Apply
CO 7	Assemble and test electronic circuits on boards.	Apply

iii) SYLLABUS

Familiarization/Identification of electrical accessories and protective elements, wiring of circuits using PVC conduits, wiring of simple solar chargeable circuit and determination of its characteristics, Demonstration of power distribution arrangement and earthing schemes, Identification of different types of batteries.

Familiarization of electronic components, drawing of electronic circuit diagrams, Familiarization of testing instruments, testing of electronic components, Inter-connection methods, soldering practice, Printed circuit boards, Assembling of electronic circuits in PCB.

iv) REFERENCES

1) Singh R. P., *Electrical Workshop: Safety, Commissioning, Maintenance & Testing of*

Electrical Equipment, Dream tech Press, 3rd Edition, 2019.

2) John H. Watt, *Terrell Croft American Electricians' Handbook: A Reference Book for the Practical Electrical Manual*, McGraw-Hill, 9th Edition, 2002.

3) NavasK A, *Electronics Lab Manual*, , Volume 1, PHI Learning Private Limited, 5th Edition, 2015.

v)   COURSE PLAN

Experiment No.	PART I ELECTRICAL WORKSHOP List of exercises/experiments	No. of hours
1	Familiarization/Identification of electrical components with specification (Functionality, type, size, colour coding, symbol, cost etc. of Wires, Cables, Connectors, Fuses, MCB, ELCB, Switches and other electrical installation equipments with ratings).	2
2	Wiring of one lamp controlled by one SPST switch and a plug socket (PVC conduit wiring).	2
3	Wiring of light/fan circuit controlled by two SPDT switches (Staircase wiring).	2
4	Wiring of a light circuit and a power circuit for domestic applications.	2
5	Wiring of simple solar chargeable circuit and determination of its characteristics.	2
6	Demonstration of power distribution arrangement using single phase MCB distribution board with ELCB, main switch and Energy meter.	2
7	Understand the safety precautions to be observed in the workshop and learn about safety procedures of first aid in case of electrical hazards.	2
8	Video demonstration of Pipe and Plate Earthing Schemes.	1
	Total hours	**15**
	PART II **ELECTRONICS WORKSHOP** **List of Exercises / Experiments**	
1	Familiarization/Identification of electronic components with specification (Functionality, type, size, colour coding, package, symbol, cost etc. (Active, Passive, Electrical, Electronic, Electro-mechanical, Wires, Cables, Connectors, Fuses, Switches, Relays, Crystals, Displays, Fasteners, Heat sink etc.))	2
2	Drawing of electronic circuit diagrams using standard symbols and introduction to EDA tools, Interpret data sheets of discrete components and IC's, Estimation and costing.	2

3	Familiarization/Application of testing instruments and commonly used tools. [Multimeter, Function generator, Power supply, DSO etc.] [Soldering iron, Desoldering pump, Pliers, Cutters, Wire strippers, Screw drivers, Tweezers, Crimping tool, Hot air soldering and de- soldering station etc.]	2
4	Testing of electronic components [Resistor, Capacitor, Diode, Transistor and JFET using multimeter]	2
5	Inter-connection methods and soldering practice. [Bread board, Wrapping, Crimping, Soldering - types - selection of materials and safety precautions, soldering practice in connectors and general-purpose PCB, Crimping.]	2
6	Printed circuit boards (PCB) [Types, Single sided, Double sided, PTH, Processing methods, Design (using Proteus) and fabrication of a single sided PCB for a simple circuit with manual etching (Ferric chloride) and drilling.]	2
7	Assembling of electronic circuit/system on general purpose PCB, test and show the functioning 1. Fixed voltage power supply with transformer, rectifier diode, capacitor filter, Zener/IC regulator 2. Square wave generation using IC 555 timer in IC base.	3
	Total hours	**15**

vi) ASSESSMENT PATTERN
ELECTRICAL WORKSHOP

Bloom's Taxonomy Level	Continuous Assessment Exams (25 Marks)		End Semester Exam (15 Marks)
	Continuous Assessment (20 marks)	**Viva (5 marks)**	
Remember	5	-	7.5
Understand	5	5	7.5
Apply	10	-	-
Analyse			
Evaluate			
Create			

ELECTRONICS WORKSHOP

Bloom's Taxonomy Level	Internal Assessment (25 marks)		End Semester Exam (15 Marks)
	Continuous Assessment (20 marks)	Viva (5 marks)	
Remember	10	-	7.5
Understand	10	5	7.5
Apply			
Analyse			
Evaluate			
Create			

vii) CONTINUOUS ASSESSMENT EVALUATION PATTERN

   (a) Attendance   : 20 marks

   (b) Class work/Assessment/Viva voce   : 50 marks

   (c) End Semester Examination (Internally by college)   : 30 marks

      Total   : **100 marks**

viii) END SEMESETER EXAMINATION PATTERN

- **Written Objective examination of one hour**