GOVT. COLLEGE OF ENGINEERING AURANGABAD

CURRICULUM

First Year B. Tech.

(Civil/Electrical/Mechanical Engineering/ Electronics and Telecommunication/ Computer Science and Engineering/ Information Technology)

(With Effect From 2018-19)

Structure for First Year B.Tech. (Civil/Mechanical Engineering/Electrical) from Academic Year 2018 - 19

Choice Based Credit System

Semester- I

Sr. No	Code	Subject	Contact Period (Hrs.)			Credits	Continuous Evaluation in terms of Marks					
			L	T	P		Class Test I	Class test II	TA	ESE	TW	Total
1	MA1001	**Engineering Mathematics-I**	3	2	-	4	15	15	10	60	-	100
2	BS1001	**Engineering Physics**	3	-	-	3	15	15	10	60	-	100
3	HS1001	**Communication Skills**	3	2	-	4	15	15	10	60	-	100
4**	ET1099	**Engineering Exploration**	-	-	6	3	25	25	25	25	-	100
5*	#	**BCE/BME/BEE**	4	-	-	4	15	15	10	60	-	100
6	BS1002	**Lab- Engineering Physics**	-	-	2	1		-	-	-	50	50
7	HS1002	**Lab- Communication Skills**	-	-	2	1		-	-	-	50	50
8	#	**Lab- BCE/BME/BEE**	-	-	2	1		-	-	-	50	50
9	ME1005	**Lab- Workshop-I**	-	-	2	1		-	-	-	50	50
		Total	**13**	**4**	**14**	**22**	**85**	**85**	65	265	**200**	**700**

***BCE Course will be compulsory for FE Civil, BME Course will be compulsory for FE Mechanical, BEE Course will be compulsory for FE Electrical**

** For the course ET1009 Engineering Exploration Class Test – I will be Evaluation – I, Class Test – II will be Evaluation – II TA will be Evaluation – III and ESE will be Final Evaluation

Semester- II

Sr.No	Code	Subject	Contact Period (Hrs.)			Credits	Continuous Evaluation in terms of Marks					
			L	T	P		Class Test I	Class test II	TA	ESE	TW	Total
1	MA1002	**Engineering Mathematics-II**	3	2	-	4	15	15	10	60	-	100
2	BS1003	**Engineering Chemistry**	3	-	-	3	15	15	10	60	-	100
3	ME1003	**Engineering Graphics**	3	-	-	3	15	15	10	60	-	100
4	AM1001	**Engineering Mechanics**	3	-	-	3	15	15	10	60	-	100
5*	#	**BCE/BME/BEE /BECE/BCOMP&IT/BEEE**	4	-	-	4	15	15	10	60	-	100
6	BS1004	**Lab- Engineering Chemistry**	-	-	2	1		-	-	-	50	50
7	ME1004	**Lab- Engineering Graphics**	-		2	1		-	-	-	50	50
8	AM1002	**Lab- Engineering Mechanics**	-		2	1		-	-	-	50	50
9	#	**Lab- BCE/BME/BEE/ BCOMP&IT /BECE/BEEE**	-		2	1		-	-	-	50	50
10	ME1006	**Lab- Workshop-II**	-		2	1		-	-	-	50	50
		Total	**16**	**2**	**10**	**22**	**75**	**75**	**50**	**300**	**250**	**750**
		Grand Total	**29**	**6**	**24**	**44**	**160**	**160**	**115**	**565**	**450**	**1450**

L = Lecturer, **T** = Tutorial, **P** = Practical, **TA** = Teacher Assessment, **ESE** = End Semester Examination

**** Students of FE Civil shall select any one course except BCE, Students of FE Mechanical shall select any one course except BME, Students of FE EEP shall select any one course except BEE & BEEE.**

 # CE1001 BCE: Basics of Civil Engineering
ME1001 BME: Basics of Mechanical Engineering
EE1003 BEEE: Basics of Electrical & Electronics Engineering
CS1001 BCOMP&IT: Basics of Computer & IT
EE1001 BEE: Basics of Electrical Engineering
ET1001 BECE: Basics of Electronics Engineering

CE1002 : LAB. Basics of Civil Engineering
ME1002 : LAB. Basics of Mechanical Engineering
EE1004: LAB. Basics of Electrical & Electronics Engineering
CS1002: LAB. Basics of Computer & IT
EE1002 LAB. Basics of Electrical Engineering
ET1002 LAB. Basics of Electronics Engineering

Structure for First Year B.Tech. (Electronics and Telecommunication/Computer Science and Engineering/ Information Technology) from Academic Year 2018 – 19

Choice Based Credit System

Semester- I

Sr.No	Code	Subject	Contact Period (Hrs.)			Credits	Continuous Evaluation in terms of Marks					
			L	T	P		Class test I	Class Test II	TA	ESE	TW	Total
1	MA1001	Engineering Mathematics-I	3	2	-	4	15	15	10	60	-	100
2	BS1003	Engineering Chemistry	3	-	-	3	15	15	10	60	-	100
3	ME1003	Engineering Graphics	3	-	-	3	15	15	10	60	-	100
4	AM1001	Engineering Mechanics	3	-	-	3	15	15	10	60	-	100
5	#	BCOMP&IT/BECE	4	-	-	4	15	15	10	60	-	100
6	BS1004	Lab- Engineering Chemistry	-	-	2	1	-		-	-	50	50
7	ME1004	Lab- Engineering Graphics	-		2	1	-		-	-	50	50
8	AM1002	Lab- Engineering Mechanics	-		2	1	-		-	-	50	50
9	#	Lab- BCOMP&IT/BECE	-		2	1	-		-	-	50	50
10	ME1005	Lab- Workshop-I	-	-	2	1	-		-	-	50	50
		Total	**16**	**2**	**10**	**22**	**75**	**75**	**50**	**300**	**250**	**750**

***BECE Course will be compulsory for FE ETC, BCOMP&IT will be compulsory for FE CSE & FE IT**

Semester- II

Sr.No	Code	Subject	Contact Period (Hrs.)			Credits	Continuous Evaluation in terms of Marks					
			L	T	P		Class Test I	Class test II	TA	ESE	TW	Total
1	MA1002	Engineering Mathematics-II	3	2	-	4	15	15	10	60	-	100
2	BS1001	Engineering Physics	3	-	-	3	15	15	10	60	-	100
3	HS1001	Communication Skills	3	2	-	4	15	15	10	60	-	100
4**	ET1099	Engineering Exploration	-	-	6	3	25	25	25	25	-	100
5	#	BCE/BME/BEE /BECE/BCOMP&IT/BEEE ***	4	-	-	4	15	15	10	60	-	100
6	BS1002	Lab- Engineering Physics	-	-	2	1		-	-	-	50	50
7	HS1002	Lab- Communication Skills	-	-	2	1		-	-	-	50	50
8	#	Lab- BCE/BME/BEE /BECE/BCOMP&IT/BEEE	-	-	2	1		-	-	-	50	50
9	ME1006	Lab- Workshop-II	-		2	1		-	-	-	50	50
		Total	**13**	**4**	**14**	**22**	**85**	**85**	65	**265**	**200**	**700**
		Grand Total	**29**	**6**	**24**	**44**	**160**	**160**	**115**	**565**	**450**	**1450**

L = Lecturer, **T** = Tutorial, **P** = Practical, **TA** = Teacher Assessment, **ESE** = End Semester Examination

** For the course ET1009 Engineering Exploration Class Test – I will be Evaluation – I, Class Test – II will be Evaluation – II TA will be Evaluation – III and ESE will be Final Evaluation

***** Students of FE ETC shall select any one course except BEEE & BECE, Students of FE CSE & FE IT shall select any one course except BCOMP&IT**

 # CE1001 BCE: Basics of Civil Engineering
ME1001 BME: Basics of Mechanical Engineering
EE1003 BEEE: Basics of Electrical & Electronics Engineering
CS1001 BCOMP&IT: Basics of Computer & IT
EE1001 BEE: Basics of Electrical Engineering
ET1001 BECE: Basics of Electronics Engineering

CE1002 : LAB. Basics of Civil Engineering
ME1002 : LAB. Basics of Mechanical Engineering
EE1004: LAB. Basics of Electrical & Electronics Engineering
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MA1001 : Engineering Mathematics-I	
Teaching Scheme: **Lectures: 03 Hrs/Week** **Tutorials: 02 Hrs/Week**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: None

Course Description: Engineering Mathematics-I (MA 1001) is a compulsory course for the first year engineering students of all disciplines of the institute.

Course Objectives:

Main objective is to give adequate exposure of basics of Engineering Mathematics so as to enable them to visualize engineering problems by using Mathematical tools and to support their subsequent engineering studies.

Course Outcomes:

After completing the course, students will able to:

CO1	Understand and apply the concepts of complex numbers to support their subsequent engineering studies
CO2	Understand and apply theory of matrices to support their subsequent engineering studies
CO3	Understand and apply the concept of univariate calculus to support their subsequent engineering studies
CO4	Understand apply the concept of multivariate calculus to support their subsequent engineering studies.

Detailed Syllabus:

Unit 1	**Complex Numbers** **(6L+4T)** De Moivre's theorem, Applications of De' Moivre's theorem to find roots of polynomial equations ,Expansion of $\sin n\theta, \cos n\theta, \sin^n \theta, \cos^n \theta$, Circular functions & Hyperbolic functions , Logarithm of complex numbers, Separation of complex numbers into real and imaginary parts
Unit 2	**Matrices** **(6L+6T)** Rank of a matrix, Normal form of matrix, Echelon form of matrix, Algebraic system of m linear equations in n unknowns, Linear dependence and independence of vectors, Eigen values and Eigen vectors , Cayley-Hamilton theorem and its applications
Unit 3	**Successive Derivatives** **(8L+4T)** n^{th} order ordinary derivatives of elementary functions, Leibnitz's rule of derivatives of product of two functions, Expansion of function in power series, Taylor series, Maclaurin's series, Convergence of series, Range of convergence of power series, Test for convergence- Ratio test, Comparison test
Unit 4	**Partial Derivatives** **(5L+2T)** First and second order Partial derivatives, Partial derivatives of implicit and composite function, Total Derivative of a function, Euler's theorem on homogeneous functions Change of independent variables
Unit 5	**Applications of differential calculus** **(5L+4T)** Jacobian, Partial derivatives using Jacobian , Functional dependence, Maxima and minima of functions of two variables , Errors and Approximations

Text and Reference Books:

1. A Text Book of Engineering Mathematics (Vol.1 &2)- P.N.Wartikar & J.N.Wartikar, Pune Vidhyarthi Griha Prakashan, Pune.
2. Advanced Engineering Mathematics- Erwin Kreyszig Willey Eastern Ltd. Mumbai.
3. Engineering Mathematics-A Tutorial Approach by Ravish R Singh, Mukul Bhatt.
4. Higher Engineering Mathematics- B. S. Grewal, Khanna publication, New Delhi.
5. Advanced Engineering Mathematics-H. K. Dass, S. Chand and Sons.
6. Advanced Engineering Mathematics- Michael Greenberg,2/e, Pearson

BS1001 : Engineering Physics	
Teaching Scheme **Lectures: 03 Hrs/Week**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: None

Course Description: Engineering Physics (BS1001) is a one semester compulsory course for the first year engineering students of all disciplines of the institute. The course is aimed at introducing the fundamentals of engineering physics to under graduate students.

Course Objectives:
To provide deeper insight in understanding of engineering courses.
To awaken them to understand latest developments in engineering and technology.
To provide the basic concept to resolve many engineering and technological problems.
To enable them to work in inter-disciplinary areas, having potential of new technologies.
To motivate the students through practical examples that demonstrates the role of physics in progress of engineering disciplines so as to inculcate the interdisciplinary academic environment.

Course Outcomes:
After completing the curse, students will able to:

CO1	Apply core concepts in engineering physics to solve engineering problems and communicate effectively their understanding of physical concepts.
CO2	Describe the physical principles of electron ballistics and apply the same to situations of physical and engineering world.
CO3	Understand optical phenomenon such as interference and diffraction in terms of wave model.
CO4	Understand optical phenomenon such as polarization and birefringence in terms of wave model.
CO5	Summarize the importance of free charged particles in determining properties of semiconductor; understand the concept of Fermi energy.
CO6	Apply core concepts in materials (magnetic and dielectric) to select proper material for engineering application.
CO7	Gain the fundamental knowledge of architectural acoustics and its application in designing acoustically good buildings and describe production and non-destructive applications of ultrasound.
CO8	Identify and solve engineering physics problems.

Detailed Syllabus:

Unit 1	**Electron Ballistics** Motion of Electron in uniform electric and magnetic field (parallel and perpendicular field), Millikan's oil drop method for electronic charge, e/m by Thomson's method, Electron Refraction, Electro-static and Magneto-static focusing, Electron microscope, block diagram and working of TEM
Unit 2	**Optics-I** Interference- Introduction, Concept of Thin Film, Interference due to thin films of uniform thickness (with derivation) and non uniform thickness (qualitative), Newton's rings, Anti-reflection coating. Diffraction- Diffraction of waves, Fraunhofer diffraction at single slit(geometrical method),Condition for maxima and minima ,Double slit Diffraction (qualitative results only).Plane diffraction grating(qualitative),Conditions for maxima and minima, Rayleigh's criterion of resolution, R.P of grating.
Unit 3	**Optics-II** Polarization - Introduction, Production of plane polarized light by double refraction, Polarizer and Analyzer, Law of Malus, Superposition of e-ray and o-ray for production of circularly and elliptically polarized light, Quarter and Half wave plates, Polaroides. LASER-Stimulated Absorption, Spontaneous and Stimulated emission of radiation, Population inversion, Pumping, Optical resonator, Construction and Working of He-Ne laser, Applications of laser.
Unit 4	**Semiconductors** Band theory of Solids, Classification of solids on the basis of energy band theory, Fermi-Dirac statistics, Concept of Fermi level and its variation with temperature and impurity, Density of states (qualitative), Position of Fermi level in intrinsic semiconductor (with derivation) and in extrinsic semiconductor (qualitative), Conductivity of semiconductor, Working of p-n junction from energy band diagram, Hall effect in semiconductor (with derivation).
Unit 5	**Engineering materials** Dielectric properties of material- Dielectric constant, Induced and Permanent dipoles, Polar and Non-Polar dielectrics, Polarization of dielectric materials, Types of polarization, Ferro and Piezo-electricity(qualitative),Frequency dependence of dielectric constant, Applications of dielectric materials. Magnetic properties of materials-Review of basic formulae, Magnetic susceptibility, Classification of dia, para and ferromagnetic materials, Ferromagnetic domains, Hysteresis in ferromagnetic materials, Soft and Hard magnetic materials, Applications.
Unit 6	**Sound** Acoustics- Reflection of sound, Echo, Reverberation, Reverberation time, Absorption of sound, Absorption coefficient, Sabine's formula (with derivation), Eyring's equation, Condition for good acoustic of the building, Ultrasound-Production of ultrasound by piezo-electric and magneto-striction oscillator, Engineering applications of ultrasound-non destructive testing.

Text Books

1. Engineering Physics,Malik and Singh,Mc Graw Hill Publication
2. Engineering Physics,Avadhanulu,Kshirsagar,S.Chand Publications
3. Engineering Physics, Gaur ,Gupta ,Dhanpat Rai and Sons Publications
4. Engineering Physics,K.Rajgopal,Prentice Hall of India Pvt.Ltd.
5. Applied Physics, P.K.Mittal,I.K.International New Delhi

Reference Books

1. Optics,Ajoy Ghatak,Tata-McGraw Hill Publications(Third Edition)
2. Fundamentals of Optics,Jenkin and White,Mc Graw Hill Publication(4th Edition)
3. Laser and non-linear optics,B.B.Land,Oscar Publications
4. Fundamentals of physics Halliday, Resnic and Walker, 9th Ed. , John Wiley

BS1002 : Lab Engineering Physics	
Teaching Scheme **Practical: 02 Hrs/Week**	**Examination Scheme** **Term Work : 50 Marks**

Laboratory Course Outcomes:
As an outcome of completing the Laboratory course, students will able to:

CO1	Gain hands-on experiences concerned to basic laws of physics with experimental process.
CO2	Acquire and interpret experimental data to examine the physical laws.
CO3	Conduct experiments to understand the relationships between variables in physical problems.
CO4	Learn to draw the relevance between theoretical knowledge and the means to imply it in a practical manner by performing various relative experiments.
CO5	Work in teams and understand the effective team dynamics.

List of Experiments

Sr. No.	Details
1	e/m by Thomson's method.
2	Determination of radius of curvature of plano-convex lens by Newton's ring.
3	Determination of the wavelength of light of a given source using diffraction grating.
4	Resolving power of telescope.
5	Study of C.R.O (amplitude and frequency measurement).
6	Specific rotation of sugar solution by Laurent's half shade polarimeter.
7	Determination of band gap of a semiconductor.
8	To study temperature dependence of resistivity of a semiconductor using four probe method.
9	To determine the Hall coefficient of a semiconductor material and then evaluate carrier type and its density of charge carrier.
10	Study of solar cell characteristics.
11	Determination of wavelength of Laser using grating.
12	Determination of velocity of sound through water using ultrasonic interferometer.
13	To plot the hysteresis loop of a given magnetic material (iron).
14	To study characteristics of photovoltaic cell.
15	To find curie temperature of a ferroelectric material by measuring capacitance as a function of temperature.
16	Study of divergence of Laser beam.
17	To measure thickness of fine wire and grating element with the help of Laser source.
18	Calculation of lattice constant from the given X-ray pattern.
19	Determination of the power distribution within Laser beam and spot size of the beam.
20	Semiconductor diode characteristics (Ge, SI, Zener, LED).
21	Determination of Plank's constant by Photocell.
22	Measurement of thermo e.m.f between different types of thermocouples as a function of temperature difference between the junctions, measurement of unknown temperatures.

BS1003 : Engineering Chemistry	
Teaching Scheme **Lectures: 03 Hrs/Week**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: None

Course Description: Engineering Chemistry (BS1003) is a one semester compulsory course for the first year engineering students of all disciplines of the institute.

The course is aimed at introducing the fundamentals of engineering chemistry to under graduate students. The goal of the course is to remember, understand and apply basic principles of engineering chemistry and their application in different branches of engineering to solve engineering problems and to support their concurrent and subsequent engineering studies.

Course Objectives:

To identify, formulate and solve problems.

To function on multidisciplinary terms.

To understand the impact of engineering chemistry on engineering solutions in global, economic, environmental and societal context.

Course Outcomes:

After completing the curse, students will able to:

CO1	To understand the basic principles of chemistry for handling of materials. To attain knowledge of properties and applications of such materials.
CO2	To apply knowledge of structure, reactivity, mechanism and stereochemistry for making advancement in research and technology.
CO3	To develop an ability of analysis of materials by using analytical methods.
CO4	An ability to conduct experiments, analyzes data, and interprets results, with responsible and ethical scientific conduct.
CO5	Effective interpretation of analytical data to transform complex technical information in a clear and concise manner.

Detailed Syllabus:

Unit 1	**Lubricants** Introduction, Mechanisms of lubrication - Fluid film, Boundary film & Extreme pressure. Types of lubricants – Solid lubricants – Molybdenum disulphide, Graphite. Liquid lubricants – Vegetable, Animal, Mineral & Synthetic oils. Semi solid lubricants – Greases, Lubricating Emulsions – Oil in water, Water in oil. Properties of lubricants & its significance – Physical properties – Viscosity & Viscosity Index. Determination of viscosity by Redwood viscometer, Flash & Fire point by Pensky-Marten's apparatus, Cloud & Pour point. Chemical properties – Acid value, Saponification value, Steam emulsification number.
Unit 2	**Fuels** Definition, Classification of fuels, Calorific value – Gross calorific value, Net calorific value, Different units of Calorific value & their inter-relation, Numerical. Types of fuels – Solid fuel – Coal – Proximate & Ultimate analysis of coal, Determination of calorific value by Bomb calorimeter, Numerical. Liquid fuel – Petroleum – origin, refining & Fractional distillation, Catalytic cracking – Fixed bed and Moving bed type. Gaseous fuel - preparation, properties and applications of – Coal gas, Water gas. Advantages and Disadvantages of solid, liquid and gaseous fuels.

Unit 3	**Water Treatment** Introduction, Definition of hard and soft water, Sources of water and classification of impurities, Hardness and its types, Units of hardness, Determination of hardness of water by EDTA method, Numerical. Boiler troubles - Scale & Sludge formation in boiler, Internal treatment methods, Priming & Foaming, Caustic Embrittlement. Water softening process – Zeolite process.
Unit 4	**Polymers** Introduction, Classification of polymers, Mechanism of addition polymerization by free radical method. Preparation, properties & applications of – Polyethylene, Polystyrene, PVC, Nylon 66, Teflon, Polyester. Vulcanization of rubber by accelerated sulpher method, Synthetic Rubber – preparation, properties & applications of – Styrene butadiene rubber (SBR), Nitrile rubber, Butyl rubber.
Unit 5	**Stereochemistry and Analytical methods** Optical isomerism – optical activity, Chirality, D-L and R-S configuration system, determination of configuration using sequence rules, Optical isomerism in compounds containing one & two asymmetric carbon atom - Lactic acid & Tartaric acid. Conformational analysis – Conformations of cyclohexane – chair & boat Conformation. Conformation of mono & di-substituted cyclohexane. Separation methods - Chromatography – Introduction, types of chromatography, Principle, techniques & applications - Paper chromatography (Ascending and Descending type), Thin layer chromatography. Absorption methods – Colorimetry - Principle, techniques & applications. Electro-analytical methods – Conductometry, P^{H} metry - Principle, techniques & applications.

Text Books

1. Jain & Jain, "Engineering Chemistry", Dhanpat Rai Publishing Co.
2. S S Dara, "A Text Book of Engineering Chemistry", S Chand & Co. Ltd.
3. B K Sharma, Krishna, "Engineering Chemistry", Prakashan Media (P) Ltd.
4. "Engineering Chemistry", B Sivasankar, Tata Mc Graw Hill (P) Ltd.
5. B S Chauhan, "Engineering Chemistry", University Science Press, Third Edition.
6. "Engineering Chemistry", S K Singh, New Age International.
7. Shashi Chawla, "A Text book of Engineering Chemistry", Dhanpat Rai Publishing Co.

Reference Books

1. "Stereochemistry", P S Kalsi, Wiley Eastern Ltd.
2. V R Gowariker, "Polymer Science", New Age International.
3. "Industrial methods of Chemical Analysis" Volume I & II, Scott.
4. "Instrumental methods of Chemical Analysis" B K Sharma
5. "Instrumental methods of Chemical Analysis" Chatwal & Anand
6. "Instrumental methods of Chemical Analysis" G W Ewing, 3rd Ed. Tata Mc Graw Hill (P) Ltd.
7. "Fundamentals of organic chemistry", Graham - Soloman T W, John Wiley & Sons Inc.
8. "Physical Chemistry", Alberty & Silbey, John Wiley & Sons Inc.
9. "Organic Chemistry", Morrison & Boyd, Prentice Hall of India, 6th Edition.
10. "Laboratory manual on Engineering chemistry", S K Basin, Sudha Rani, Dhanpat Rai Publishing Co.
11. S S Dara, "A Textbook on Experiment and calculation in Engineering Chemistry" S. Chand Publication
12. "Experiment in General Chemistry" East West Press, New Delhi

BS1004 : Lab Engineering Chemistry	
Teaching Scheme **Practical: 02 Hrs/Week**	**Examination Scheme** **Term Work : 50 Marks**

Laboratory Course Outcomes:

As an outcome of completing the Laboratory course, students will able to:

CO1	To perform accurate quantitative measurements with an understanding of the theory, principle and procedure.
CO2	To understand the objectives of experiments, carry out the experiments, and appropriately record and analyze the results.
CO3	To demonstrate excellent laboratory skills and techniques including the proper use of relevant instruments and related technologies.
CO4	To Work effectively and safely in a laboratory environment in teams as well as independently.
CO5	To have Knowledge and understanding of the issues of safety regulations, ethics and societal issues in the use of chemicals in their laboratory work.

List of Experiments

Sr. No.	Details
1	Determination of Hardness of Water by EDTA method.
2	To determine the chloride content of water sample by Mohr's method.
3	Conductometric titration – mixture of Acid & Base.
4	Determination of Cell Constant.
5	Determination of Acid Value of lubricant.
6	Determination of Saponification Value of lubricant.
7	Determination of Viscosity of lubricating oils by Redwood Viscometer.
8	Determination of Flash & Fire point of lubricant oil.
9	To Determination PH value of solutions by indicator, paper and by PH meter.
10	Preparation of Phenol Formaldehyde Resin (Bakelite).
11	Determine the yield percentage of Polystyrene by bulk polymerization.
12	Determination of Iron by colorimetric method.
13	Separation of chemicals by thin layer chromatography.
14	To determine % purity of an iron form an ore.
15	Determination of Cloud & Pour point.
16	To verify Lambert Beer's Law colorimetrically.
17	Determination of specific rotation and concentration of dextrose solution using colorimeter.
18	To determine Rf value and identify phenyl alanine & Glycine mixture by ascending paper chromatography.
19	To separate Methylene blue and Methyl orange by thin layer chromatography.
20	To determine conductometrically, the strength of given HCl solution by titrating with standard NaOH solution.
21	To estimate HCl in a given solution using 0.05 N NaOH solution PH metrically.
22	To determine moisture, volatile matter and ash contents in a given coal sample by proximate analysis.
23	Determination of calorific value of a solid fuel, using Bomb calorimeter.
24	To determine the empirical formula of ferric-5 sulpho salicylate complex by Jobs method.
25	Determination of Chemical Oxygen Demand (C.O.D.) of waste water.

HS1001 : Communication Skills	
Teaching Scheme **Lectures: 03 Hrs/Week** **Tutorials: 02 Hrs/Week**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: None

Course Description: Communication Skills (HS1001) is a one semester compulsory course for the first year engineering students of all disciplines of the institute. The course is aimed at introducing the basic of the communication skills. Communication skill is for the development of formal communication and improvement in the communication of day to day life.

Course Objectives:
To develop interpersonal communication skills.
To able them to communicate in professional as well as day to day life.

Course Outcomes:
After completing the course, students will able to:

CO1	Understand communicative process and ways to communicate effectively, overcome the barriers in speaking and writing English and know and correlate concepts of communication and get the ability to communicate in different situations.
CO2	Develop their personality through corporate etiquettes and take active participation in classroom discussion and other academic activities as well.
CO3	Use proper words and structure in speaking English language and develop vocabulary and use of correct English.
CO4	Express them through oral as well as written communication, acquire techniques for effective writing and develop written communication for professional and business purpose.
CO5	Use of E-Communication in their day to day as well as professional life and familiar with the E-Communication and the etiquettes used in Email writing.

Detailed Syllabus:

Unit 1	**Communication Skills & Soft Skills** Basic Concept, Factors, Process and Types of Communication, Principles of Effective Communication, Barriers of Communication. And how to overcome these barriers. Basic of Soft skills, phonetics symbols, articulation of speech sound.
Unit 2	**Nonverbal Communication and Corporate Etiquettes** Body Language and its different aspects, Voice Dynamics & Voice Modulation, Professional Appearance, Clothing Etiquettes and Corporate Dressing.
Unit 3	**Remedial Grammar And Vocabulary Building** Parts of Speech, Types of Tense, Use of Articles, Synonyms and Antonyms, Find out the Grammatical Errors in the given sentences.
Unit 4	**Writing Skills And Business Correspondence** Letter Writing, Office documents like Circulars, Notices, Minutes, Agenda And Memos Report Writings. Resume Writing.
Unit 5	**E-Communication** Email Communication And Email Etiquettes

Reference Books

1. " Business Communication" By Urmila Rai & S. M. Rai
2. "Communication Skills" By Leena Sen
3. "Technical communication" By William Sanborn (Pearson publications.)
4. "Presentation Skills for Managers", McGraw Hills brief case books.
5. Professional Communication Skill, Pravil S.R. Bhatia, S.Bhatia
6. Technical Report Writing Today: Daniel G. Riordan, Steven E. Pauley
7. Technical Writing: B. N. Basu 22 of 25
8. English Grammar Composition & Effective Business Communication, M.A Pink, S. E. Thomas.
9. Written Communication in English, by Sarah Freeman

HS1002 : Lab Communication Skills	
Teaching Scheme **Practical: 02 Hrs/Week**	**Examination Scheme** **Term Work : 50 Marks**

Laboratory Course Outcomes:

As an outcome of completing the Laboratory course, students will able to:

CO1	Understand the role of communication.
CO2	Acquire the skills of communication to achieve excellence in academic and professional career.
CO3	Develop leadership and management skills.
CO4	Use the correct English in both written and oral communication as well.
CO5	Utilize the techniques of E- Communication.
CO6	Enhance the listening and understanding capacity.
CO7	Understand the use of non-verbal communication.

List of Experiments

Sr. No.	Details
1	**Communication Skills**
	1. Different Communication Situation.
	(Formal, Informal, Upward, Downward . etc)
	2. Telephonic Communication.
	(Enquiry, Leaving Message.etc)
2	**Functional English**
	3.JAM Sessions
	4. Group Discussion.
	5. Debate.
	6.Presentation
	7.Interview
3	**Remedial Grammar And Vocabulary Building**
	8.Practical Based on the following Points
	a. Parts of Speech,
	b. Types of Tense,
	c. Use of Articles,
	d. Synonyms and Antonyms,
	e. Find out the Grammatical Errors in the given sentences
4	**Writing Skills And Business Correspondence**
	9. Practical Based on the following Points
	a. Letter Writing,
	b. Office documents like, Notices, Minutes, Agenda
	c. Report Writings.
	d. Resume Writing
5	**E-Communication**
	10.Email Writing,
6	**Listening Skills**
	11.Listen to the Audio and Answer the Questions
7	**Data Interpretation and Analysis**
	12.Analyse the Data and answer The questions

ME 1001: Basics of Mechanical Engineering	
Teaching Scheme Lectures: 4 Hrs/Week Credits: 4	**Examination Scheme** Class Test I: 15 Marks Class Test II: 15 Marks Teachers Assessment : 10 Marks End Semester Exam : 60 Marks

Course Description: After completing this course, students will have fundamental understanding of the Laws of thermodynamics, pressure and temperature measurement, thermal machines, sources of energy, power transmitting elements, various manufacturing processes and engineering materials.

Course Objectives:

- Impart knowledge of General Principles of Mechanical Engineering.
- Have a understanding of laws of thermodynamics and Thermodynamic Processes
- Understanding working Principles of Thermal Machines and Power Transmitting Devices
- Understanding Basic Materials and Manufacturing Processes

Course outcomes

After completing the course, students will able to:

CO1	Acquire basic knowledge of Thermodynamics, able to solve numerical problems on fundamental of thermodynamics, laws of thermodynamics, energy interaction
CO2	Understand working of two stroke and Four stroke IC engine, Compressor and Turbines, Refrigeration, Non conventional energy sources.
CO3	Understand the Working Principles of power transmitting elements.
CO4	Understand various manufacturing and machining processes and its applications.

Unit 1	**Fundamentals of Thermodynamics**, Pressure and Pressure Measurement, Temperature, Zeroth law of Thermodynamics, Measurement of Temperature, Thermometric scale, Forms of Energy, Work Transfer, P-dV work, other forms of Work Transfer, Heat Transfer, Concept of Specific Heat, Sensible Heat, Latent Heat.
Unit 2	**First law of Thermodynamics**: Law of Conservation of Energy, Joule's experiment, First law for Cyclic and Non-Cyclic processes, Concept of Internal Energy, Enthalpy, Ideal Gases – Concept of Constant Pressure, Constant Volume, Constant Temperature, Adiabatic, Polytropic, Throttling Processes and their representation on p-V and T-s diagrams, Engineering applications of various processes
Unit 3	**Introduction to Thermal Machines & Sources of Energy**: Working principles and application of - Internal Combustion Engines – (2-stroke and 4- stroke engines), Turbines, Compressor, Refrigerator (Description with block diagrams), Renewable and Non-Renewable energy, Principles and Working of – Steam Power Plant, Nuclear Power Plant, (Description with block diagrams).

Unit 4	**Power Transmitting Elements**: Working principles and application of – Shaft, Axle and Spindles. Couplings- types of couplings, Friction Clutches, Bearings, Brakes- types of Brakes, Drives – Belt, Chain drives construction, Gears- Classification of Gears.
Unit 5	**Manufacturing Processes and Engineering Materials**: Working principles and applications of – Casting, Forging, Welding, Brazing and Soldering. Machining Processes- Turning, Shaping, Milling, Drilling and Grinding, Introduction to Engineering Materials- Ferrous and Non Ferrous

Text Books and Reference Books

1. Ballaney P.L., "Thermal Engineering", Khanna Publishers
2. Rajput R.K., "Engineering Thermodynamics", Laxmi Publications.
3. Hajra Choudhary, Bose, "Work Shop Technology", Media Promoters & publishers Pvt. Ltd. (Vol.-I & II).
4. Bhandari V.B., "Machine Design", Tata-McGraw Hill Publications.
5. Domkundwar V.M., "Engineering Thermodynamics" Dhanpat Rai & Co.
6. Rao P.N., "Manufacturing Technology" McGraw Hill Pvt. Ltd.
7. Chapman series "Workshop Technology" Edward Arnold,1972.
8. Nag P.K., "Engineering Thermodynamics", Tata-McGraw Hill Publications.
9. Ven Violin "Classical Thermodynamics" Tata-McGraw Hill Publications

ME 1002: Lab Basics of Mechanical Engineering	
Teaching Scheme Practical: 2 Hrs/Week Credit: 1	**Examination Scheme** Term Work : 50 Marks

Course Objectives

1. Understand the concept of manufacturing processes and basic mechanical engineering.
2. To impart knowledge of: Internal Combustion engines, Refrigeration

Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Understand the operation of IC Engine and Refrigerator
CO2	Understand the working of Brakes, Clutch, Couplings. Bearings and Gears.
CO3	Understand manufacturing operation of Various Machines Viz. Lathe, Milling.
CO4	Understand the operations of CNC Machines.
CO5	Understand operation of welding process.

The students shall perform the following experiments

Sr. No.	Details
1.	Study and Demonstration of operation of I.C. Engines
2.	Study and Demonstration of operation of Refrigerator.
3.	Study and Demonstration of working of Brakes, Clutch and Couplings.
4.	Study and Demonstration of working of Bearings and Gears
5.	Study and Demonstration of working of Lathe Machines, Milling Machines.
6.	Study and Demonstration of operation of CNC Machines
7.	Study and Demonstration of operation of Welding Processes.
8.	Industrial Visit

ME 1003: Engineering Graphics	
Teaching Scheme **Lectures: 3 Hrs/Week** **Credits: 3**	**Examination Scheme** **Class Test-I : 15 Marks** **Class Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Course Description: Engineering Graphics course is aimed at providing basic understanding of the fundamentals; mainly visualization, graphics theory, standards, conventions and tools.

Course Objectives:

1. Understand the basic principles of engineering graphics and improve the visualization skills.
2. To gain knowledge on projection of points, straight lines, planes, solids.
3. To know the principles of orthographic and isometric projections.
4. To understand the real life objects through Drawings.

Course Outcome

After completing the course, students will able to:

CO1	Identify basic concepts in drawing and its application
CO2	Plan and prepare neat orthographic drawings of points, straight lines, planes and solids
CO3	Develop the ability to visualize and draw orthographic and isometric projection of solids
CO4	Acquire skill to draw real life engineering objects by using the engineering drawing

Detailed Syllabus:

Unit 1	**Projections of Straight Lines:** Projections of Points in Four Quadrants, Projections of Points in Reference Plane, Line Parallel to both the Plane, Line Parallel to One Plane and Perpendicular to the other, Line Inclined to One Plane and Parallel to The Other, Line Inclined to Both the Reference Planes, Traces of Line, Use of Traces of Line in obtaining Projections (All four quadrants should be considered).
Unit 2	**Projections of Planes:** Plane with Surface Parallel to One Plane and Perpendicular to other, Plane Inclined to One Plane and Perpendicular to other, Projections of Planes Inclined to both the Planes.
Unit 3	**Projections of Solids:** Introduction to Solids: Prisms, Pyramid, Cylinder, Cone, Cube, Tetrahedron, Sphere, Projections of above Solids with Axis inclined to one plane, Projections of above solids with Axis inclined to both the Planes, Projection of composite solids (different arrangement of Spheres with above Solids).
Unit 4	**Orthographic Projections:** Orthographic projections of different Machine Parts, Sectional Orthographic Projections.
Unit 5	**Isometric Views:** Introduction to Pictorial views, Isometric Projections and Isometric views (Isometric and Non Isometric planes).

Text Books and Reference Books

1. Bhatt N. D. and Panchal V. M., "Engineering Drawing", Charotar Publishing House, Ananad
2. N. B. Shaha and B. C. Rana, "Engineering Drawing", Pearson Education
3. Dhabhade M. L., "Engineering Graphics", Vol.-I and Vol.-II, Vision Publications, Pune
4. W. J. Luzadder, "Fundamentals of Engineering Drawing", Prentice Hall of India, New Delhi
5. French and Vierck, "Graphic Science", Mc-Graw Hill International
6. Amar Pathak, "Engineering Drawing", WIELY India Publication

ME 1004: Lab Engineering Graphics	
Teaching Scheme Practical: 2 Hrs/Week Credit: 1	**Examination Scheme** Term Work : 50 Marks

Course Description: Engineering Graphics course is aimed at providing basic understanding of the fundamentals of Engineering Graphics; mainly visualization, graphics theory, standards and conventions of drawing, the tools of drawing and the use of Drawings in engineering applications. Drawing is the language of Engineers.

Course Objectives:

5. To learn the use of different types of drawing instruments, symbols, conventions and representation of letters/numbers/title block in engineering drawing
6. To enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient
7. To gain knowledge on projection of points, straight lines, planes, solids
8. To know the principles of orthographic and isometric projections
9. Develop ability to demonstrates ideas and design concepts using drafting software

Course Outcome

As an outcome of completing the Laboratory course, students will able to:

CO1	Develop competence in correct expression of the visualized objects
CO2	Dimension and annotate two-dimensional engineering drawings
CO3	Plan and prepare neat orthographic drawings of points, straight lines, planes and solids
CO4	Develop the ability to visualize and draw orthographic and isometric projection of solids using CAD software

List of Experiments

Laboratory work shall consist of drawing sheets as given below

Sr. No.	Details
1	Drawing three problems based on projections of lines on half imperial size drawing sheet
2	Drawing three problems based on projections of planes on half imperial size drawing sheet
3	Drawing three problems based on projections of solids on half imperial size drawing sheet
4	Drawing two problems based on orthographic projections using software package
5	Drawing two problems based on isometric projections using software package

ME 1005: LAB – WORKSHOP -I	
Teaching Scheme Practical: 2 Hrs/Week Credit: 1	**Examination Scheme** Term Work : 50 Marks

Laboratory Course Outcomes
Students will able to:

CO1	Understand use of tools of Fitting, Carpentry & Sheet Metal working operations
CO2	Acquire engineering skills in Fitting, Carpentry & Sheet Metal working operations.

List of Experiments

Sr. No.	Details
1	**Fitting:** Preparing one job involving simple Fitting operations like Sawing, Marking, Fitting different shapes. By using different types of Files, Drilling, Tapping or use of Die for external Threading.
2	**Carpentry**: Preparing one job by using different Carpentry Tools and Operations.
3	**Sheet Metal Working:** Preparing one job of Sheet Metal using different Tools and Operations.

Text and Reference Books:

1. Raghuwanshi B.S., Workshop Technology Vol. I & II, Dhanpath Rai & Sons.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2nd Edn, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2nd Edn. PHI 2010.
4. Jeyapoovan T.and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub.2008

CE 1001 : Basics of Civil Engineering	
Teaching Scheme **Lectures: 4 Hrs/Week** **Tutorials: None**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Course Description: After completing this course, students will have a broad and fundamental understanding of different aspects of Civil Engineering. Topics range from building planning, civil engineering materials, construction equipments, geographical measurement, building and road construction. Students will learn different aspects of earth quake engineering. In addition, students will learn terminology; methods used in water shed management and roof top rain water harvesting. Students will also be introduced with different types of dams, necessity of irrigation and micro irrigation.

Course Objectives:

1. To introduce function of various components of the building and structures.
2. To identify suitable material for the construction of particular component of a structure.
3. Define the various terms used in earthquake engineering and the concept of earthquake resistant structures.
4. Carry out linear and angular measurement, elevation details and calculate the missing data.
5. Select specific water harvesting storage structure suitable for the watershed and river basin.

Course Outcomes:

After completing the course, students will able to:

CO1	Plan and draw line plan of residential building and sketch different components of structure
CO2	Get knowledge regarding occurrence of earthquake and earthquake resistant structures
CO3	Know component parts of buildings, roads and water resources structures
CO4	Determine the reduced levels of different stations
CO5	Know importance of water and different measures to be adopted for water harvesting

Detailed Syllabus:

Unit 1	**Building Planning, Civil Engineering Materials and Construction Equipments:** Functions of building, Site selection, Principles of planning, plinth area, carpet area, Floor space Index, Cost of building, Building Bye-laws, typical plan of residential building, setting out plan of a building. Properties and uses of civil engineering materials a) Bricks b)Stones c) Aggregates d) Sand e) Cement f) Concrete g) Steel and h) concrete blocks Construction Equipments: Excavation equipment- power shovel, drag line, scrapers, bull dozer, Concrete mixer, and Rollers: smooth wheeled, pneumatic tyred and sheep foot rollers.
Unit 2	**Geographical Measurement:** Principles of survey, measurement of distance by chain and tape, base line and offsets. Equipments for laying offsets, Prismatic compass, measurement of bearing and calculation of included angles, study and use of dumpy level, levelling staff, bench mark, determination of reduced levels.

Unit 3	**Building and Road Construction** Loads coming on structure, Types of construction a) Load bearing structure b) Framed structure Function of foundation, Column footing, combined footing and machine foundation. Superstructure and its components, typical cross section through load bearing wall, Brick and stone masonry used for construction. Technical terms related with doors, windows and stairs. Classification of roads, Rigid and flexible pavements, typical road sections in cutting and embankment, function of Camber, Super-elevation
Unit 4	**Earthquake Engineering** Earth quake- definition, Causes of earthquake, Changes in earth crust during earthquake, Technical terms related with earthquake such as focus, epicentre, magnitude and intensity of Earthquake, seismograph. Factors affecting damage, nature of earthquake forces, General construction aspects, Earthquake resistant Low Cost buildings, Precautions to be taken before and during an earthquake
Unit 5	**Water Resources Engineering** Definition of watershed, Necessity of watershed management works. Different structures involved in watershed management. Roof top rainwater harvesting and ground water recharge. Classifications of dams, Typical cross section of gravity dam and zoned earthen embankment. Necessity of irrigation and benefits of irrigation, Micro irrigation-sprinkler and drip irrigation

Text and Reference Books

1. Anderson "Introduction to Surveying" McGraw Hill International Student Edition.
2. Arora S.P. and Bindra S.P. "Building Construction", DhanpatRai and Sons, Delhi.
3. Duggal A.K. "Surveying and Levelling", Vol-I, Prentice Hall of India
4. Garg S.K. "Irrigation Engineering and Hydraulic Structures", Khanna Publishers, Delhi.
5. Richter C.F. "Elementary Seismology", S. Chand and Company, New Delhi.
6. Shah, Kale and Patki "Building Design and Drawing", TATA McGraw Hill.

CE1002 : Laboratory Basics of Civil Engineering	
Teaching Scheme **Practical: 2 Hrs/Week**	**Examination Scheme** **Term Work : 50 marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Measure the dimensions of building and different components
CO2	Identify and decide the location of stairs, doors, windows
CO3	Measure included angle by using compass and distance by using chain and tape
CO4	Draw the plan and sectional elevation of roads, door, windows, stair and water resources structures

List of Experiments

The term work shall consist of at least 10 exercises of following nature. Individual course teacher shall have freedom of including additional exercises.

Sr. No.	Details
1	Lettering and numbering in different sizes
2	Measured drawing of laboratory/hall (with furniture arrangement)
3	Line plan of residential building/bungalow
4	Plan and sectional elevation of paneled door/window
5	Plan and sectional elevation of dog-legged stair case
6	Typical cross section of load bearing wall
7	Study and use of chain and compass
8	Introduction of surveying equipments
9	Typical road section of pavement
10	A report based on site visit to construction site
11	Cross-section of gravity dam/earthen dam
12	Case study of successful water conservation/ water harvesting practices

ET1001: Basics of Electronics Engineering	
Teaching Scheme **Lectures: 4 Hrs/Week** **Tutorials:**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: None

Course description: **(Sample)** After completing this course, students will have a broad and fundamental understanding basic electronics. Students will be able to discuss the basic principles of various electronics devices and communication techniques and explain basic applications of electronics devices and communication.

Course Objectives:

To impart knowledge of basic electronics devices and its applications
To create awareness of electronics communication concept
To educate basic concepts of transducers, consumer electronics and instruments

Course Outcomes
After completing the course, students will able to:

CO1	Discuss the basic principles of various electronics devices and communication techniques.
CO2	Explain basic application of electronics devices and communication
CO3	Acquire knowledge of consumer electronics gadgets

Detailed Syllabus:

Unit 1	Diode -PN junction diode, characteristics and parameter, diode as rectifier Bipolar junction transistors: NPN & PNP transistors, structure, typical doping, working of NPN transistor, concepts of common base, common emitter & common collector configurations, current gain of each, input & output characteristics of common emitter configuration, comparison of three configurations with reference to voltage & current gain, input & output resistances and applications
Unit 2	Introduction of Electronics devices- Zener diode: Operation and Applications, pto-Electronic Devices – LEDs, Photo Diode and Applications; Silicon Controlled Rectifier (SCR), DIAC,TRIAC – Operation, Construction, Characteristics, Ratings, Applications
Unit 3	Consumer Electronics: Products-blue ray player,CCTV systems, HDTV, basic principles of Plasma TV and displays LCD&LED displays, Dolby System, speaker systems, etc
Unit 4	Measurements: principle and block diagram of analog and digital multimeter, working principle of CRT, block diagram of CRO, measurements using CRO, principle of digital storage oscilloscope, principle and block diagram of function generator Transducers : Introduction , classification , LVDT, Photo electric and piezoelectric transducer, temperature sensors

Unit 5	Radio communication: principle of AM & FM, wave forms, bandwidths, block diagrams of AM & FM transmitters, principle of AM &FM demodulation, comparison of AM & FM,principle &block diagram of super heterodyne receiver. Radar and navigation, Mobile communication Satellite communication: microwave frequency bands, concept of geo-stationary satellite, frequency bands used, satellite transponder, block diagram of earth station transmitter & receiver, advantages of satellite communication, principle of Global Positioning System(GPS).

Text and Reference Books

1. Thomas L. Floyd, "Electronic Devices", Pearson Education, 9e, 2011
2. R. G. Gupta, "Audio-Video Engineering", TMG, 2e.
3. R. S. Sedha, "A textbook of Applied Electronics", S. Chand Publication. 2e.
4. Helfric A.D & Cooper W.D, Modern Electronic Instrumentation &Measurement Techniques, Pearson Education
5. David A Bell, Electronic Devices And Circuits, Oxford University Press
6. Wayne Tomasy, Advanced Electronic Communication System, Phi Publishers
7. C. S. Rangan, G. R. Sarma, V. S. V. Mani, Instrumentation: devices and systems, Tata McGraw-Hill
8. Robert L. Boylested, Louis Nashelsky, Electronic Devices And Circuit Theory, Pearson Education
9. George Kennedy, Bernard Davis, Electronic Communication Systems, Mc Graw Hill
10. Louis E. Frenzel, Principles Of Electronic Communication Systems, Mc Graw Hill

LAB ET 1002: Lab Basic Of Electronics Engineering	
Teaching Scheme **Practical: 2 Hrs/Week**	**Examination Scheme** **Term Work : 50** **Practical Examination & Viva Voce: : --**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Observe the characteristics of semiconductor devices, components
CO2	Perform experiment to identify transducers. characteristics
CO3	Imitate the various communication techniques
CO4	Observe the various test point signals of consumer electronics gadget

List of Experiments

Sr. No.	Details
1	Plot the characteristics of PN diode, LED,Photo diode
2	Plot the characteristics of transistor NPN/PNP.
3	Plot the characteristics of diac/triac
4	Plot the characteristics of sensors : thermister , LVDT
5	Plot the characteristics of sensors: Piezoelectric/ Piezo-resistive
6	Observe the various test point signals of consumer electronics gadget(Any One)
7	Study of basic Audio-Video systems
8	Implement different modulation technique
9	To demonstrate radar/satellite communication

CS1001 : Basics of Computer & IT	
Teaching Scheme **Lectures: 4 Hrs/Week** **Tutorials:**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: None

Course description: Basics of Computer & IT is designed to familiarize students with basic architecture of Computer System along with its important integral hardware & software components. It introduces internet based applications through web technology. The course emphasizes on applications of computer in problem solving through programming Language.

Course Objectives:

1.Aware students with different components of computer system.
2. Demonstrate working of computer system.
3. Introduce with current trends in Computer Technology for general purpose applications.
4. Illustrate basic C programming concepts for problem solving.

Course Outcomes

After completing the course, students will able to:

CO1	Distinguish different key components of a computer system and demonstrate their working. (hardware, software, firmware etc)
CO2	Describe current trends in computer technology and Identify applications
CO3	Use Web technology for general purpose application
CO4	Write & execute C Programs using basic C constructs.
CO5	Solve real time problems using C programming Language

Detailed Syllabus:

Unit 1	**Introduction to Computer** : Brief Overview of Computer History. A basic Computer architecture. Hardware & Software Components. Introduction to Web Architecture: two tier , three tier, Multitier. Introduction to Open Source Software. **Introduction to number system:** Data representation, character representation codes, Binary, hex, octal codes and their inter conversions.
Unit 2	**System software**: Types of software, High level language, Low level language, Translators (Compiler, Interpreter, Assembler), Linker. Operating System and its type. **Web Technologies :** Introduction to World Wide Web, Search engines, e-mail, news, gopher, Audio & Video Conferencing, Internet Protocols: FTP, telnet, TCP/IP, SMTP, HTTP, Languages used for WEB Technology: HTML
Unit 3	**Introduction to C Language fundamentals**, The C character set, variables and constants, data types, keywords, expressions, statements, operators- arithmetic operators , unary operators, relational & logical operators, conditional operators, type conversions , type casting.
Unit 4	**Conditional execution** - if, nested if, it else, switch, goto statement, Loop execution - For loop, While loop, Do while loop, break, and continue statements. **Functions** - Defining a function, passing arguments to functions, returning values from function, command line arguments, Recursion, Local & Global variables concept.

Unit 5	**Arrays-** definition, passing array to the function, Multidimensional array, String operation- String copy, String length, String concatenation, String compare. Introduction to structure and union. Array of structure, Passing structure as an object to function. Structure as an return type of function. **Pointer**s- pointer as a variable, pointer to array, pointer as argument to function. String operations using pointers.

Text and Reference Books

1. E. Balagurusamy; *Programming in C, Third Edition. Tata McGraw Hill.*
2. H.S.Kalsi, Electronic Instrumentation, TMH
3. K. R.Venugopal, Rajkumar B., T.Ravishankar; *Mastering C, Tata McGraw Hill.*Rangan and Sarma,
4. PC Hardware a begginers guide by Ron Ginlster
5. Dennis Ritchie; C *Programming Language, Pearson Education Asia.*
6. Thomas Powell,"HTML & CSS: The Complete Reference", Fifth Edition by.
7. Jon Duckett ,"Beginning HTML, XHTML, CSS, and JavaScript". – Wrox Publication.on

CS1002:Lab. Basics of Computer & IT	
Teaching Scheme **Practical: 2Hrs/Week** **Credits :01**	**Examination Scheme** **Term Work : 50 Marks**

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Familiarize with C programming development environment, compiling, debugging, linking and executing a program using the development environment
CO2	Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
CO3	Use and apply the in-built functions and customized functions for solving the problems.
CO4	Document and present the algorithms, flowcharts and programs in form of user-manuals
CO5	Providing students with the necessary knowledge and skills in using the various technologies and tools for developing web sites.

List of Experiments

Sr. No.	Details
	Level: Basic (all)
1	Introduction to HTML tags
2	Creating Web site using free web hosting
3	Simple program using scanf() and printf()
4	Program using Control Statements
5	Program using Loops
6	Program to generate Fibonacci series and/or factorial of a number using recursive function
	Level: Moderate (any three)
7	Creating Web site using free web hosting
8	Using arrays for sorting numbers
9	Program which shows use of call by value and call by reference
10	Program to accept and display student information using structure.
	Level: Complex (any two)
11	Program to pass structure/array as a parameter to a function
12	Program to prepare monthly telephone bill
13	Menu driven program for matrix addition and subtraction
14	Program for matrix multiplication
15	Program for pointers

EE1001: Basics of Electrical Engineering	
Teaching Scheme **Lectures: 04 Hrs./Week**	**Examination Scheme** **Test I : 15Marks** **Test II : 15Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Course description: This is the basic course in Electrical Engineering which introduces the basic concepts, transformer, and electrical motors to students.

Course Objectives:

The objectives of the course are to

1. Explain basic laws & theorems of electrical networks
2. Explain fundamentals of magnetic circuits and alternating current circuits
3. Apply knowledge of magnetic circuits to electrical machines
4. Illustrate electrical wiring fundamentals and safety measures

Course Outcomes

After completing the course, students will be able to:

CO1	Demonstrate knowledge of circuit analysis using various basic laws and theorems of electrical circuit
CO2	Demonstrate knowledge of magnetic circuit
CO3	Demonstrate and understand definition and relationship of various AC circuits
CO4	Demonstrate and understand the operations of Transformers, DC motors, Induction motors and their applications
CO5	Demonstrate and understand the electrical wiring installations

Detailed Syllabus:

Unit 1	a) DC Circuits: Kirchoff's laws, Source conversion, series and parallel circuit, currentand voltage division rule, Delta star and star delta conversion, Node voltage and Mesh current methods, Superposition theorem, Thevenin's and Norton's theorems, Maximum power transfer theorem, (Numericals limited to two sources) b) Charging and discharging of capacitor, Time constant for RC circuit
Unit 2	a) Electromagnetic Induction: Faraday's laws, statically and dynamically induced emf, self and mutual inductance, coefficients of coupling, dot convention, inductance in series and parallel b) Magnetic Circuits: Terms related with magnetic circuits, Magnetization curve, Magnetic leakage and fringing, Leakage coefficient, Series and parallel magnetic circuits, Magnetic hysteresis, Hysteresis and eddy current loss C) Rise and decay of current in inductive circuit, Time constant for RL circuit
Unit 3	a) Single phase AC Circuits: Concept of single phase supply, Terms related with A.C.quantities, pure resistive, inductive and capacitive circuits, Complex and phasorrepresentation of AC quantities, series and parallel circuits, resonance in series and parallel circuits, Q-factor of coil b) Three phase AC Circuits: Concept of Three phase supply, star and delta connections, line and phase values, solution of balanced three phase circuits, phasor diagram
Unit 4	Principle of operation, constructional details, types and applications of single phase Transformer Single phase and three Induction motors, DC motors (Descriptive treatment only)

Unit 5	Electric Wiring installations: Types of insulated wires & wiring systems, concept of fuses, MCBs, ELCBs, etc. in wiring installations, concept of earthing, energy bill calculations, study of different lamps

Text and Reference Books

1. Leonard Bobrow ''Fundamentals of Electrical Engineering" ,Oxford University press
2. Vincent Del Toro, "Principles of Electrical Engineering ", Prentice Hall.
3. D.P. Kothari, I.J Nagrath ,"Basic Electrical Engineering "Tata McGraw Hill
4. M.S.Naidu, S.Kamakshaiah ,"Introduction to Electrical Engineering" Tata McGraw Hill
5. J.P.Tiwari,"Basic Electrical Engineering "New Age Publication
6. Joseph Administer,"Schaum's outline of Electric circuits", Tata McGraw Hill

EE1002: Lab - Basics of Electrical Engineering	
Teaching Scheme **Practical: 2 Hrs/Week**	**Examination Scheme** **Term Work** : **50Marks** Practical/Oral : ---

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Understand and apply electrical safety measures
CO2	Apply various basic laws and theorems of electrical circuit
CO3	Demonstrate and understand definition and relationship of various AC circuits
CO4	Explain the fundamental principle of transformer and electrical machine.
CO5	Calculate energy bill consummation for domestic applications.

List of Experiments

Sr. No.	Details
1	Study and representation of electrical components/equipment's
2	Verification of any two circuit theorems i. Thevenin's theorem, ii. Superposition theorem, iii. Norton's theorem iv. Maximum power transfer theorem
3	Any one experiments out of the following i. To measure current, voltage and power in R-L-C series circuit exited by single phase AC supply ii. Study of R-L-C series resonance circuit
4	1. Any Four experiments out of the following i. To plot hysteresis loop of magnetic material ii. To Determine transformation ratio (K) of a single phase transformer iii. Starting and reversing of D.C. motor iv. Connection, starting and reversal of a three phase induction motor v. Connection & measurement of power consumption of a fluorescent lamp. vi. Energy bill calculation for different lamps vii. Measurements of light output in lumens of different lamps. viii. Study of wiring systems

EE1003 BEEE: Basics of Electrical and Electronics Engineering	
Teaching Scheme **Lectures: 04 Hrs/Week**	**Examination Scheme** **Test I : 15Marks** **Test II : 15 Marks** **Teachers Assessment : 10Marks** **End Semester Exam : 60 Marks**

Prerequisites: Basic knowledge of Physics, mathematics

Course description: The objectives of this course are to learn Basic laws & theorems of electrical networks, Fundamentals of magnetic circuits and electrical circuits and Application of concepts to solve numerical on electrical & magnetic circuits

This course provides comprehensive idea about working principle, operation and characteristics of electronic devices, transducers, Digital Electronics and Audio-Video Systems.

Course Outcomes:

After completing the course, students will able to:

CO1	Define and explain electrical circuit using various basic laws and theorems
CO2	Define and explain fundamentals of electrical and magnetic circuits
CO3	Apply the concepts of electrical and magnetic circuits to solve numerical.
CO4	Understand the fundamentals of electronic components, devices, transducers and Audio-Video Systems.
CO5	Explain basic concepts of digital electronics.

Detailed Syllabus:

Unit 1	**DC Circuits:** Kirchhoff's laws, Source conversion, Series and parallel circuit, Current and voltage division rule, Delta-star and star-delta conversion, Node voltage and Mesh current methods, Superposition theorem, Thevenin's and Norton's theorems, Maximum power transfer theorem, (Numerical limited to two sources)
Unit 2	**Electromagnetic Induction:** Faraday's laws, statically and dynamically induced emf, self and mutual inductance, coefficients of coupling, dot convention, inductance in series and parallel **Magnetic Circuits:** Terms related with magnetic circuits, Magnetization curve, Magnetic leakage and fringing, Leakage coefficient, Series and parallel magnetic circuits, Magnetic hysteresis, Hysteresis and eddy current loss
Unit 3	**Single phase AC Circuits:** Concept of single phase supply, Terms related with alternating quantities, Electrical circuits with pure resistance, inductance and capacitance, Complex and Phasor representation of AC quantities, Series and parallel circuits, Resonance in series and parallel circuits, Q-factor of coil

	Three phase AC Circuits: Concept of Three phase supply, Star and delta connections, Line and phase values, solution of balanced three phase circuits, Phasor diagram
Unit 4	**Electronic Components** (3 hours) Passive components – resistors, capacitors & inductors (properties, common types, I-V relationship and uses). **Semiconductor Devices** (5 hours) Semiconductor Devices - Overview of Semiconductors - basic principle, operation and characteristics of PN diode, Zener diode, BJT, JFET, optoelectronic devices (LDR, photodiode, phototransistor, solar cell, optocouplers).
Unit 5	**Digital Electronics** (5 hours) Number systems – binary codes - logic gates - Boolean algebra, laws & theorems, simplification of Boolean expression, implementation of Boolean expressions using logic gates, standard forms of Boolean expression, Introduction to Flip-Flop, Registers, Counters.

Text and Reference Books

1. Thyagarajan. T, SendurChelvi. K. P, Rangaswamy. T.R, "Engineering Basics: Electrical, Electronics and Computer Engineering", New Age International, 3e, 2007.
2. Thomas L. Floyd, "Electronic Devices", Pearson Education, 9e, 2011
3. R. G. Gupta, "Audio-Video Engineering", TMG, 2e.
4. R. S. Sedha, "A textbook of Applied Electronics", S. Chand Publication. 2e.
5. Helfric A.D & Cooper W.D, Modern Electronic Instrumentation &Measurement Techniques, Pearson Education
6. Leonard Bobrow ***"Fundamentals of Electrical Engineering"*** ,Oxford University press
7. Vincent Del Toro ,"***Principles of Electrical Engineering*** ", Prentice Hall
8. D.P. Kothari, I.J Nagrath ,"***Basic Electrical Engineering*** "Tata McGraw Hill
9. M.S.Naidu, S.Kamakshaiah ,"***Introduction to Electrical Engineering"*** Tata McGraw Hill

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO 13	PO 14
CO1	1					2								
CO2	1		3											
CO3	1	3	3			2								
CO4	1		3			2				3				
CO5	1		2			2				3				

1 – High2 – Medium3 - Low

Teacher's Assessment: Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Simulation
2) Application development
3) Power point presentation of case studies
4) Question & answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	Test I	Test II	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	5	5	4	15
K2	Understand	5	5	2	15
K3	Apply	5	5	2	15
K4	Analyze			2	15
K5	Evaluate				
K6	Create				
Total Marks 100		15	15	10	60

Assessment table

Assessment Tool	K1	K2	K4	K3	K2
	C01	C02	C03	CO4	CO5
Class Test (30 Marks)	10	10		10	
Teachers Assessment (20 Marks)	4	2	2	2	
ESE Assessment (60 Marks)	15	12	5	25	3

Special Instructions if any: NIL

Designed by
1.Supriya R. Kulkarni
2.Dhote V.P.

EE1004 : Lab - Basics of Electrical and Electronics Engineering	
Teaching Scheme **Practical: 2 Hrs/Week**	**Examination Scheme** **Term Work** : **50Marks** Practical/Oral : ---

Laboratory Course Outcomes

As an outcome of completing the Laboratory course, students will able to:

CO1	Understand and apply electrical safety measures
CO2	Apply various basic laws and theorems of electrical circuit
CO3	Demonstrate and understand definition and relationship of various AC circuits
CO4	Understand the fundamentals of electronic components, devices, transducers and Audio-Video Systems.
CO5	Explain basic concepts of digital electronics.

List of Experiments

Sr. No.	Details
1	Study and representation of electrical components/equipment's
2	Verification of any two circuit theorems i. Thevenin's theorem, ii. Superposition theorem, iii. Norton's theorem iv. Maximum power transfer theorem
3	Any one experiments out of the following i. Measurement of current, voltage and power in R-L-C series exited by single phase AC supply ii. Study of R-L-C series resonance
4	Study of basic electronic component
5	Study of basic semiconductor devices and transducers.
6	Study of basic Audio-Video systems.
7	Study of Basic logic gates

Assessment Table Course coordinator has full flexibility in deciding assessment table

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO 13	PO 14
CO1	3		1			2								
CO2	1	2	3			3								
CO3	1		3											
CO4	1		3			3								
CO5	1					2								

1 – High 2 – Medium 3 - Low

Mapping of Course outcome with Program Outcomes (ElectricalEngineering Department)

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

Assessment Table

Assessment Tool	S1	S2	S3	S3	S2
	CO1	CO2	CO3	CO4	CO5
Term Work (50 Marks)	10	10	10	10	10
Practical Examination & Viva Voce					

Assessment Pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work**	**Practical Examination & viva voce**
S1	Imitation	20	
S2	Manipulation	20	
S3	Precision	10	
S4	Articulation		
55	Naturalization		
Total		50	

Preparation (S1)	10	
Conduct of Experiment (S2)	10	
Observation and Analysis of Results (S3)	20	
Record (S2)	10	
Mini-Project / Presentation/ Viva-Voce (S3)		
Total	50	

AM1001: Engineering Mechanics			
Teaching Scheme		**Evaluation Scheme**	
Lectures	3 Hrs/Week	Test 1 Test 2	15 Marks 15 Marks
Tutorials	-	Teacher Assessment	10 Marks
Total Credits	3	End-Semester Examination	60 Marks

Course Objectives

1. To introduce the concepts of rigid body mechanics for bodies at rest and in motion.
2. To make the students appreciate the applications of basic laws of physics to a variety of problems.
3. To inculcate the analytical skills to solve numerical problems.

Course Outcomes

1. Students will be able to state the relevant laws and apply them to numerical problems.
2. Students will be able to identify the force system acting on bodies and perform analysis.
3. Students will be able to locate the centroid and compute moment of inertia.
4. Students will be able to establish relations between kinematic parameters for different types of motion.
5. Students will be able to formulate relevant equations for static and dynamic systems.

UNIT-1	Fundamental Concepts and Principles, Types of Force systems, Composition and Resolution of Forces, Moment of force, Couple, Resultant of Planar and Spatial force systems, Analytical and Graphical methods
UNIT-2	Free body diagrams, Equations of Equilibrium, Types of Supports and support reactions, Equilibrium of Co-planer force systems, Applications to beams and frames, Theory and Laws of Friction, Cone of friction, wedge friction, rolling friction, Belt friction and their applications.
UNIT-3	Centroid of Plane figures and lines, Moment of Inertia of plane sections, Transformation theorems, Radius of gyration, Mass Moment of Inertia.
UNIT-4	Kinematics of particles : Rectilinear Motion, Equations of Motion, Motion curves and their applications, Curvilinear motion in Cartesian and Polar Co-ordinates, Motion of projectile, Relative motion, Fixed axis rotation.
UNIT-5	Kinetics of particles , D'Alembert's Principle: Newton's laws of Motion, Equations of motion of particle and rigid body ,motion of connected bodies, Fixed axis rotation. Principle of work and Energy, Principle of Impulse and Momentum and their applications to particles, Direct central impact

Text books:

1. Beer and Johnston, Mechanics for Engineers (Statics and Dynamics), McGraw Hill Co.Ltd.
2. A.K.Tayal, Engineering Mechanics , Umesh publications.
3. V.S. Mokashi, Engineering Mechanics Vol. I and II, Tata McGraw Hill Publishing Co. ltd., New Delhi

Reference Books:

1. F.L. Singer, Engineering Mechanics, Harper and Row Publishers, USA
2. Timoshenko and Young, Engineering Mechanics, McGraw Hill Co.Ltd.
3. R.C. Hibbeler, Engineering Mechanics (Statics and Dynamics), McMillan publications
4. Engineering Mechanics by McLean and Nelson, Schaum's Outline Series, McGraw Hill Co.Ltd. New Delhi

AM 1002: Lab- Engineering Mechanics			
Teaching Scheme Practical's Total Credits	2 Hrs/Week 1	**Evaluation Scheme** Term Work	50 Marks

Course Objectives

Experimental verification of principles of Engineering Mechanics and analytical solutions.

Course Outcomes

Students will be able to

1. Apply graphical method to solve problems in statics.
2. Verify the principles of Engineering Mechanics experimentally.

The term work shall consist of

1. Graphical solutions for the following problems
    a. Resultant of Coplanar Non Concurrent force system:
        i. At least one problem with resultant as a force
        ii. At least one problem with resultant as a couple
    b. Equilibrium of Coplanar Non Concurrent force system: At least one Problem
    c. Friction: At least one Problem
2. Following experiments shall be conducted.
    a. Polygon law of forces
    b. Law of moments
    c. Jib crane
    d. Beam Reaction
    e. Friction
    f. Screw Jack
    g. Fly wheel
3. Tutorial Problem
    a. At least three problem each on unit of the theory course AM 1001.
    b. The tutorial problem need to be solved by the student during the practical hours only.

MA1002 : Engineering Mathematics-II	
Teaching Scheme **Lectures: 03 Hrs/Week** **Tutorials: 02 Hrs/Week**	**Examination Scheme** **Test-I : 15 Marks** **Test-II : 15 Marks** **Teachers Assessment : 10 Marks** **End Semester Exam : 60 Marks**

Prerequisites: MA1001 : Engineering Mathematics-I

Course description: Engineering Mathematics-II is a compulsory course for the first year engineering students of all disciplines of the institute

Course Objectives: Main objective is to give adequate exposure of basics of engineering mathematics so as to enable them to visualize engineering problems by using Mathematical tools and to support their subsequent engineering studies.

Course Outcomes

After completing the course, students will able to:

CO1	Understand and apply the theory of first order first degree differential equation to simple electrical circuits, rectilinear motion, geometrical curves and orthogonal trajectories.
CO2	Understand and apply special functions like Beta, Gamma and error function and rule of differentiation under integral sign to evaluate some definite integrals.
CO3	Trace and rectify the plane geometric curves manually.
CO4	Evaluate multiple integrals and apply them to find area bounded by plane curves and volume bounded by closed surfaces.
CO5	Understand and apply knowledge of Fourier series to expand the periodic function in a infinite series of sine and cosine terms.

Detailed Syllabus:

Unit 1	**Ordinary Differential equations of first order first degree and its applications (8L+4T)** Classification of differential equations as ordinary and partial, Derivation of Differential equations, General solution of ordinary differential equation, Exact differential equation, Reducible to exact differential equation (Method of Integrating factor), Linear differential equation of first order first degree, Reducible to linear differential equation of first order first degree, Length of Tangent, normal, sub tangent and sub normal of a plane curve, Determination of curves, Orthogonal trajectories, Electrical circuits, Mechanical systems
Unit 2	**Integral Calculus (5L+4T)** Reduction formulae, Beta function, Gamma function, Error function, Leibnitz's rule of Differentiation under Integral sign (DUIS)
Unit 3	**Curve Tracing and its applications (4L+4T)** Tracing of Cartesian, polar and parametric curves, Rectification of plane curves
Unit 4	**Multiple Integrals and its applications (8L+4T)** Double Integration (Cartesian form, polar forms), Change of order of Integration double integration , Triple Integration (Cartesian and polar form), Area bounded by plane curves, Volume of solid bounded by closed surface

Unit 5	**Fourier series**	**(5L+4T)**
	Definitions, expansion of periodic functions (continuous and discontinuous) in to Fourier series, Half Range Sine series, Half Range Cosine Series, Practical harmonic analysis	

Text and Reference Books:

1. A Text Book of Engineering Mathematics (Vol.1 &2)- P.N.Wartikar & J.N.Wartikar, Pune Vidhyarthi Griha Prakashan, Pune.
2. Advanced Engineering Mathematics- Erwin Kreyszig Willey Eastern Ltd. Mumbai.
3. Engineering Mathematics-A Tutorial Approach by Ravish R Singh, Mukul Bhatt.
4. Higher Engineering Mathematics- B. S. Grewal, Khanna publication, New Delhi.
5. Advanced Engineering Mathematics-H. K. Dass, S. Chand and Sons.
6. Advanced Engineering Mathematics- Michael Greenberg,2/e, Pearson

ME 1006: LAB – WORKSHOP -II	
Teaching Scheme Practical: 2 Hrs/Week Credit: 1	**Examination Scheme** Term Work : 50 Marks

Pre-requisite: Basic Mechanical Engineering

Laboratory Course Outcomes

Students will able to:

CO1	Understanding use of various tools of Plumbing, Welding & Black smithy operations.
CO2	Acquire engineering skills in Plumbing, Welding & Black smithy operations.

List of Experiments

Sr. No.	Details
1	**Plumbing**: Demonstration of different Plumbing tools and operations. Preparation of a job individually or amongst a group of students (not more than four) involving Plumbing operations on Pipe using different Plumbing Tools.
2	**Welding:** Preparing one job involving Butt Joint, Lap Joint, Tee Joint, Joint at Angle. The edge preparation in Welding Joints is undertaken where required.
3	**Black Smithy:** Study of the Smithy Tools and the process. Preparing one job involving various Black Smithy operation and changes in cross section, Bending and forming.

Text Books and Reference Books

1. Raghuwanshi B.S., Workshop Technology Vol. I & II, Dhanpath Rai & Sons.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2nd Edn, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2nd Edn. PHI 2010.
4. Jeyapoovan T.and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas
5. Pub.2008

ET1099: Engineering Exploration	
Teaching Scheme **06 Hrs/Week** **Total Credits:3** Contact Hours 60 Mandatory course	**Examination Scheme** **Evaluation I : 25 Marks** **Evaluation II : 25 Marks** **Evaluation III : 25 Marks** **Final Evaluation : 25 Marks**

Prerequisites: NIL

Course Outcomes

As an outcome of completing the course, students will able to:

CO1	Explain the role of an Engineer as a problem solver
CO2	Identify multi-disciplinary approach required in solving an engineering problem
CO3	Build simple systems using engineering design process
CO4	Analyse engineering solutions from ethical perspectives
CO5	Analyse engineering solutions from sustainability perspectives
CO6	Use basics of engineering project management skills in doing projects
CO7	Demonstrate data acquisition and analysis skills using a tool.

Detailed Syllabus:

Content	Hrs
Module1: Introduction to Engineering and Engineering Study Introduction to Engineering and Engineering Study: Difference between science and engineering, scientist and engineer needs and wants, various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer and Graduate Attributes.	3 hrs
Module2: Engineering Design Engineering Design Process, Multidisciplinary facet of design, Pair wise comparison chart, Introduction to mechatronics system, generation of multiple solution ,Pugh Chart, Motor and battery sizing concepts, introduction to PCB design	18 hrs
Module3: Mechanisms Basic Components of a Mechanism, Degrees of Freedom or Mobility of a Mechanism,4 Bar Chain, Crank Rocker Mechanism, Slider Crank Mechanism. Simple Robotic Arm building.	6 hrs
Module4: Platform based development Introduction to various platform based development (Arduino) programming and its essentials, Introduction to sensors, transducers and actuators and its interfacing with Arduino.	15 hrs
Module5. Data Acquisition and Analysis Types of Data, Descriptive Statistics techniques as applicable to different types of data, Types of graphs as applicable to different types of data, Usage of Microsoft Excel tool for descriptive statistics, Data Acquisition(Temperature and humidity) using Sensors interfaced with Arduino, Exporting acquired data to Microsoft Excel and analysis using visual representation,	6 hrs

Module6. Project Management Introduction to Agile practices, Significance of team work, Importance of communication in engineering profession, Project management tools: Checklist, Timeline, Gantt Chart, Significance of documentation	3 hrs
Module7. Engineering Ethics Identifying Engineering as a Profession, Significance of Professional Ethics, Code of Conduct for Engineers, Identifying Ethical Dilemmas in different tasks of engineering, Applying Moral Theories and codes of conduct for resolution of Ethical Dilemmas	3 hrs
Module8. Sustainability in Engineering Introduction to sustainability, Sustainability leadership, Life cycle assessment, carbon foot print	6 hrs
Total Contact Hours	**60 Hrs**
Course Project Reviews Evaluation of group projects	12 hrs

Evaluation Scheme			
Name of the module	Hours		
		Marks	Evaluation
1.Introduction to Engineering & Engineering study	3	0	Evaluation - I
2. Engineering Design	18	15	
3. Mechanisms	6	5	
4. Engineering Ethics	3	5	
5. Platform based development	15	25	Evaluation - II
6. Data Acquisition & Analysis	6	15	Evaluation - III
8. Project Mgmt.	3	5	
9. Sustainability in Engineering	6	5	
10. Course Project Reviews	12	20	Final Evaluation
11.Honor code	-	5	
TOTAL	72	100	