JIS College of Engineering

(NAAC 'A' Accredited Autonomous Institution, Affiliated by MAKAUT)

Revised Curriculum Structure (to be effective from 2018-19 admission batch)

Curriculum for B.Tech

Under Autonomy (**GR A:** ECE, EE, EIE, BME; **GR B:** CSE, IT, ME, CE, FT)

1st Semester							
Sl No	**Paper Code**	**Theory**	**Contact Hours /Week**				**Credit Points**
			L	**T**	**P**	**Total**	
A. THEORY							
1	M 101	Mathematics -I	3	1	0	4	4
2	CH 101/ PH 101	Chemistry-I (Gr. A) / Physics - I(Gr. B)	3	0	0	3	3
3	EE 101/ EC 101	Basic Electrical Engineering (Gr. A) / Basic Electronics Engineering (Gr. B)	3	0	0	3	3
4	HU 101	English	2	0	0	2	2
Total of Theory						**12**	**12**
B. PRACTICAL							
5	CH 191/ PH191	Chemistry-I Lab (Gr. A) / Physics-I Lab(Gr. B)	0	0	3	3	1.5
6	EE 191/ EC 191	Basic Electrical Engineering Lab (Gr. A) /Basic Electronics Engineering Lab(Gr. B)	0	0	3	3	1.5
7	ME 191/ ME 192	Engineering Graphics & Design (Gr A) / Workshop/Manufacturing Practices (Gr-B)	0	0	3	3	1.5
C. SESSIONAL							
8	XC181	Extra Curricular Activity	0	0	0	0	2 units
Total of Theory, Practical & Sessional						**21**	**16.5**

Total Credit in Semester I: 16.5

2nd Semester							
Sl No	**Paper Code**	**Theory**	**Contact Hours /Week**				**Credit Points**
			L	**T**	**P**	**Total**	
A. THEORY							
1	M 201	Mathematics -II	3	1	0	4	4
2	CH 201/ PH 201	Chemistry-I(Gr. B) / Physics - I(Gr. A)	3	0	0	3	3
3	EE 201/ EC 201	Basic Electrical Engineering (Gr. B) / Basic Electronics Engineering (Gr. A)	3	0	0	3	3
4	CS 201	Programming for Problem Solving	3	0	0	3	3
5	ME 201	Engineering Mechanics	3	0	0	3	3
Total of Theory						**16**	**16**
B. PRACTICAL							
6	CS291	Programming for Problem Solving Lab	0	0	3	3	1.5
7	CH 291/ PH291	Chemistry I Lab (Gr. B) / Physics -I Lab (Gr. A)	0	0	3	3	1.5
8	EE 291/ EC 291	Basic Electrical Engineering Lab (Gr. A) /Basic Electronics Engineering Lab(Gr. B)	0	0	3	3	1.5
9	ME 191/ ME 192	Engineering Graphics & Design (Gr B) /Workshop/Manufacturing Practice (Gr-A)	0	0	3	3	1.5
10	HU 291	Language Lab and Seminar Presentation	0	0	2	2	1
C.SESSIONAL							
11	XC281	Extra Curricular Activity	0	0	0	0	2 Units
Total of Theory, Practical & Sessional						**30**	**23**

Total Credit in Semester II: 23.0

Component	Credit (%)
Basic Sciences (Common for all streams under) [Physics-I, Physics-II, Chemistry-I*, Math-I, Math-II, Math-III]	15 to 20%
Humanities& Social Sciences (Common for all streams) [1-Eng, 1-Mgt, 1-Vaues & Ethics, 1-Eng. Economics]	5 to 10%
Engineering Sciences and Skills (Common for all streams) [1-Basic EE, 1-Basic Electronics, 1-Eng Mechanics, 1- Programming for Problem Solving, 1-Numerical Methods, 1-Circuit theory/relevant paper in non ckt stream, 1- Engg. Graphics & Design, 1- Workshop/Manufacturing Practice]	15 to 20%
Professional Core (stream specific) [Selection should be in line with respective PEO & PSO]	30 to 40%
Professional Electives (stream specific) [Selection should be in line with respective PEO & PSO]	10 to 15%
Open Elective (free elective/institutional elective) [To be selected from the list of all electives offered by the Institute]	5 to 10%
Project work, seminar, internship [Project work, Seminar-1, Internship-2, GD-1 Design-2, Grand Viva - 2]	10 to 15%
Environmental Science, Co & extracurricular activities [Environment studies, Foreign language, NCC/NSS, SLC]	100 units
Total Credit	**160 to 165 (4 years UG)** **+20 [10 through MOOCS** **+10 through mandatory project]**

***Chemistry II for FT instead of Physics II**

Credit Distribution Ratio:

Category	Credit Allocation As per AICTE
Basic Sciences	15 to 20%
Humanities & Social Sciences	5 to 10%
Engineering Sciences and Skills	15 to 20%
Professional Core	30 to 40%
Professional Electives	10 to 15%
Open Elective	5 to 10%
Project work, seminar, internship	10 to 15%
Environmental Science, Co & extracurricular activities	Non-credited

Implementation Scheme of Mandatory Project Work:

Semester	Credit	Number of papers to be assessed under mandatory project
1st	1	Two (0.5 Credit per paper)
2nd	2	Two (0.5 Credit per paper)
3rd	2	Four (0.5 Credit per paper)
4th	2	Four (0.5 Credit per paper)
5th	2	Four (0.5 Credit per paper)
6th	2	Four (0.5 Credit per paper)
Total	10	

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Subject Name: Mathematics-I
Subject Code: M 101
Total Contact Hours: 42
Credit: 4

Prerequisite:

The students to whom this course will be offered must have the concept of (10+2) standard matrix algebra and calculus.

Course Objectives:

The objective of this course is to disseminate the prospective engineers with techniques in matrix algebra and calculus. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

Course Outcomes (COs):

On successful completion of the learning sessions of the course, the learner will be able to:

CODES	BLOOM'S TAXONOMY	DESCRIPTIONS
M 101.1	Remembering	Recall the distinctive characteristics of matrix algebra and calculus.
M 101.2	Understanding	Understand the theoretical working of matrix algebra and calculus.
M 101.3	Applying	Apply the principles of matrix algebra and calculus to address problems in their disciplines.
M 101.4	Analyzing	Examine the nature of system using the concept of matrix algebra and calculus.

Course Content:

Module I: Matrix Algebra (10)

Echelon form and Normal (Canonical) form of a matrix; Inverse and rank of a matrix; Consistency and inconsistency of system of linear equations, Solution of system of linear equations; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton theorem.

Module II: Differential Calculus and Infinite Series (9)

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Concept of sequence and series, Tests for convergence of infinite series: Comparison test, D'Alembert's ratio test, Raabe's test, Cauchy's root test, Power series; Taylor's series, Series for exponential, trigonometric and logarithm functions.

Module III: Multivariable Calculus (Differentiation) - I (8)

Function of several variables, Concept of limit, continuity and differentiability; Partial derivatives, Total derivative and its application; Chain rules, Derivatives of implicit functions Euler's theorem on homogeneous function, Jacobian.

Module IV: Multivariable Calculus (Differentiation) - II (6)

Maxima and minima of functions of two variables, Method of Lagrange multipliers; Directional derivatives, Gradient, Divergence, Curl.

Module V: Integral Calculus (10)

Evolutes and involutes; Evaluation of definite integrals and its applications to evaluate surface areas and volumes of revolutions; Improper integrals; Beta and Gamma functions and their properties.

Project Domains:

1. Study on eigenvalues and eigenvectors.
2. Study on convergence of infinite series.
3. Application of partial derivatives.
4. Application of vector calculus
5. Application of integral calculus.

Text Books:

1. Kreyszig, E., Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Ramana, B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
3. Veerarajan, T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
5. Bali, N.P. and Goyal, M., A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

Reference Books:

1. Thomas, G.B. and Finney, R.L., Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Apostol, M., Calculus, Volumes 1 and 2 (2nd Edition), Wiley Eastern, 1980.
3. Kumaresan, S., Linear Algebra - A Geometric approach, Prentice Hall of India, 2000.
4. Poole, D., Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
5. Bronson, R., Schaum's Outline of Matrix Operations. 1988.
6. Piskunov, N., Differential and Integral Calculus, Vol. I & Vol. II, Mir Publishers, 1969

CO-PO Mapping:

PO / CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**P10**	**P11**	**P12**
M 101.1	3	2	-	-	-	-	-	-	-	-	-	1
M 101.2	3	2	-	-	-	-	-	-	-	-	-	1
M 101.3	3	2	2	-	-	-	-	-	-	-	-	1
M 101.4	2	3	1	-	-	-	-	-	-	-	-	1

Provisional Syllabus of Physics-I (B. Tech. 1st year)

Theory

Paper Name: Physics –I
Paper Code: PH 101
Total Contact Hours: 34
Credit: 3
***Weekly 3L + 1T+1Project proposed to implement the project based study**

Pre requisites: Knowledge of Physics up to 12th standard.

Course Objective:

The aim of courses in Physics is to provide an adequate exposure and develop insight about the basic physics principles along with the possible applications. The acquaintance of basic principles of physics would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches. It can also create awareness of the vital role played by science and engineering in the development of new technologies. It also gives necessary exposure to the practical aspects, which is an essential component for learning sciences.

Course Outcome (CO) of Physics I (PH 101/PH 201)

At the end of the course students' should be able to

PH 101.1 : define ➢ **De-Broglie hypothesis, and Heisenberg's Uncertainty Principle** ➢ **Amplitude and Velocity Resonance** ➢ **Malus's Law, Brewster's Law** ➢ **Characteristics of LASER light** ➢ **Intrinsic and extrinsic semiconductor.**	
PH 101.2 : explain ➢ **Polarizer and analyzer** ➢ **basic principles and different types of LASER and Optical Fibre** ➢ **structure of solids, Miller indices** ➢ **theory of Matter Wave, equation of motion of Matter Wave** ➢ **wave function and its role in representing wave nature of matter** ➢ **p-n junction.**	
PH 101. 3 : apply the knowledge of ➢ **mechanical vibration in electrical circuits**	

➢ **superposition principle in Newton's ring phenomenon, diffraction phenomenon** ➢ **quantum nature of e.m. waves for production of laser** ➢ **total internal reflection in transmitting light through optical fibres** ➢ **x-ray diffraction in crystal structure** ➢ **probability interpretation in Heisenberg's uncertainty principle**	
PH 101.4 : analyze ➢ **grating as many slit system** ➢ **role of Q factor in a resonating circuit, conditions of different types of resonance** ➢ **minimum requirements for lasing action** ➢ **importance of light as a carrier of information** ➢ **the failures of classical physics in microscopic situation and need of quantum physics** ➢ **Einstein's A, B coefficient and predict the wavelength domain of Lasing action** ➢ **Requirement of Miller indices for describing crystallographic planes**	
PH 101.5 : judge ➢ **X-ray production process is inverse of the process of Photoelectric Effect.** ➢ **different crystallographic structures according to their Co-ordination number and packing factors** ➢ **the outcome of Photo-electric effect, Compton effect and Davission-Germer experiment to justify wave-particle duality of matter**	

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH 101.1	**3**	-	-	-	-	-	-	-	-	-	-	2
PH 101.2	**3**	-	-	-	-	-	-	-	-	-	-	2
PH 101.3	**3**	2	-	-	-	-	-	-	-	-	-	1
PH 101.4	2	**3**	-	-	-	-	-	-	-	-	-	1
PH 101.5	1	**3**	-	-	-	-	-	-	-	-	-	**1**
PH 101	2.4	**2.6**	-	-	-	-	-	-	-	-	-	**1.4**

Module 1 (6L):-
Waves & Oscillations:
1.01-Simple Harmonic Motion (only preliminary idea), damped harmonic motion-over damped, critically damped and under damped motion, energy decay, logarithmic decrement, force vibration and resonance (amplitude, velocity resonance), quality factor. Related numerical problems. 6L

Module 2 (7L):-
Classical Optics:
2.01- Interference of light: Huygens's principle, superposition of waves, conditions of sustained interference, Newton's ring (qualitative descriptions of working principles and procedures-no deduction required). Engineering applications, Numerical Problems. 3L

2.02- Diffraction of light: Fresnel and Fraunhofer class, Fraunhoffer diffraction of a single slit, multiple slits, missing order, Rayleigh criterion (no deduction) and resolving power (no deduction). 4L

Module 3 (8L):-
Quantum Mechanics-I
3.01 Quantum Theory: Inadequacy of classical physics and its modifications by Planck's quantum hypothesis-Qualitative (without deductions), particle concept of electromagnetic wave (example: photoelectric and Compton Effect; no derivation required, origin of modified and unmodified lines), wave particle duality; phase velocity and group velocity; de Broglie hypothesis; Davisson and Germer experiment. 4L

3.02 Quantum Mechanics 1: Concept of wave function, Physical significance of wave function, Probability interpretation; normalization of wave functions; uncertainty principle, relevant numerical problems. 4L

Module 4 (7L):-
Solid State Physics-I:
4.01-Structure of solids, amorphous and crystalline solids (definition and examples), lattice, basis, unit cell, Fundamental types of lattices –Bravais lattice, Simple cubic, fcc and bcc lattices, Miller indices and miller planes, Co-ordination number and Atomic packing factor, Bragg's equation, Applications, Numerical problems. 4L

4.02-Physics of semiconductors, electrons and holes, metal, insulator and semiconductor, intrinsic and extrinsic semiconductor, p-n junction. 3L

Module 5 (6L):
Modern Optics-I:

5.01- Laser: Concepts of various emission and absorption process, Einstein A and B coefficients and equations, working principle of laser, metastable state, Population Inversion, condition necessary for active laser action, optical resonator, different types of lasers, semiconductor laser with illustrations, applications of laser. 4L

2.05-Fibre optics-Principle and propagation of light in optical fibres- Numerical aperture and Acceptance angle, Numerical problems. 2L

Project Domain

Mandatory Project based study:

1. Study of Superposition of waves: Lissajous figures.

2. Electrical analogue of mechanical vibrations: application to electrical circuit (LC and LCR circuits), Electrical and mechanical impedance, quality factor, complex representation and phasor diagram.

3. Study of N-slit diffractions

4. Optical Fibre & its applications: Study of losses, estimation of numerical aperture in practical problems.

5. Photonic nature of electromagnetic waves

Recommended Text Books for Physics I (PH 101//PH 201):

Waves & Oscillations:

1. Sound-N. K. Bajaj (TMH)
2. Advanced Acoustics-D. P. Roy Chowdhury (Chayan Publisher)
3. Principles of Acoustics-B.Ghosh (Sridhar Publisher)
4. A text book of sound-M. Ghosh (S. Chand publishers)
5. A text book of Light- K.G. Mazumder & B.Ghoshs, (Book & Allied Publisher)
6. Physics of Oscillations and Waves- R.P. Singh
7. College Physics Vol. II - A.B. Gupta
8. Vibration, Waves and Acoustics- Chattopadhyay and Rakshit

Classical & Modern Optics:

1. A text book of Light- K.G. Mazumder & B.Ghoshs (Book & Allied Publisher)
2. A text book of Light-Brijlal & Subhramanium, (S. Chand publishers)
3. Modern Optics-A. B. Gupta (Book & Allied Publisher)
4. Optics-Ajay Ghatak (TMH)
5. Optics-Hecht
6. Optics-R. Kar, Books Applied Publishers
7. Physical Optics Möler
8. Optics -F.A. Jenkins and H.E White

Quantum Mechanics-I

1. Introduction to Quantum Mechanics-S. N. Ghoshal (Calcutta Book House)
2. Quantum Mechanics-Bagde and Singh (S. Chand Publishers)
3. Perspective of Quantum Mechanics-S. P. Kuilla (New Central Book Agency)
4. Quantum Mechanics-Binayak Datta Roy (S. Chand Publishers)
5. Quantum Mechanics-Bransden (Pearson Education Ltd.)
6. Perspective of Modern Physics-A. Beiser (TMH)
7. Quantum mechanics -A.K. Ghatak and S Lokenathan
8. Modern Physics -E.E. Anderson
9. Physics Volume 2 -Haliday, Resnick & Krane Published by Wiley India

Solid State Physics-I:

1. Solid state physics-Puri & Babbar (S. Chand publishers)
2. Materials Science & Engineering-Kakani Kakani
3. Solid state physics- S. O. Pillai
4. Introduction to solid state physics-Kittel (TMH)
5. Solid State Physics and Electronics-A. B. Gupta and Nurul Islam (Book & Allied Publisher)
6. Problem in Solid state physics -S.O. Pillai (a. b.)

Text Books:

1. Refresher courses in physics (Vol. 1, Vol. 2 & Vol. 3)-C. L. Arora (S. Chand Publishers)
2. Basic Engineering Physics-Amal Chakraborty (Chaya Prakashani Pvt. Ltd.)
3. Perspective & Concept of Modern Physics -Arthur Baiser
4. Principles of engineering physics – Md. N Khan and S Panigrahi.

Provisional Syllabus of Physics-I (B. Tech. 1st year)

Practical

Paper Name: Physics I Lab
Paper Code: PH 191/ PH 291
Total Contact Hours: 3 P/Week
Credit: 2

Pre requisites: Knowledge of Physics upto 12th standard.

Course Objective:

The aim of courses in Physics is to provide an adequate exposure and develop insight about the basic physics principles along with the possible applications. The acquaintance of basic principles of physics would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches. It can also create awareness of the vital role played by science and engineering in the development of new technologies. It also gives necessary exposure to the practical aspects, which is an essential component for learning sciences.

Course Outcome of Physics-I practical (PH 191)

At the end of the course students' will be able to

PH 191.1 : demonstrate ✓ **Error estimation, Proportional error calculation** ✓ **superposition principle in Newton's ring, Fresnel's biprism, laser diffraction** ✓ **Basic circuit analysis in LCR circuits**	PO1
PH 191.2 : conduct experiments using ➢ **LASER, Optical fibre** ➢ **Interference by division of wave front, division of amplitude, diffraction grating, polarization of light** ➢ **Quantization of electronic energy inside an atom** ➢ **Torsional pendulum**	PO4
PH 191.3 : participate as an individual, and as a member or leader in groups in laboratory sessions actively	PO9
PH 191.4 : analyze experimental data from graphical representations , and to communicate effectively them in Laboratory reports including innovative experiments	PO10

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH 191.1	3	2	-	-	-	-	-	-	-	-	-	1
PH 191.2	1	2	-	3	-	-	-	-	-	-	-	1
PH 191.3	1	2	-	-	-	-	-	-	3	-	-	1
PH 191.4	1	2	-	-	-	-	-	-	-	3	-	1
PH 191	1.5	2	-	3	-	-	-	-	3	3	-	1

General idea about Measurements and Errors (One Mandatory):

i) Error estimation using Slide calipers/ Screw-gauge/travelling microscope for one experiment.
ii) Proportional error calculation using Carrey Foster Bridge.

<u>Any 6 to be performed from the following experiments</u>

Experiments on Waves & Oscillations:
1. Study of Torsional oscillation of Torsional pendulum & determination of time period using various load of the oscillator.
2. Determination of elastic moduli of different materials (Young's modulus /Rigidity modulus)

Experiments on Classical Optics:
3. Determination of wavelength of light by Newton's ring method.
4. Determination of wavelength of light by Laser diffraction method.

Experiments on Quantum Physics-I:
5. Determination of Planck's constant using photoelectric cell.
6. Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.
7. Determination of Stefan's Constant

Experiments on Solid State Physics-I:
8. Determination of Band gap of a semiconductor

In addition it is **recommended that each student should carry out at least one experiment beyond the syllabus/one experiment as Innovative experiment.

Probable experiments beyond the syllabus:
1. Determination of wavelength of light by Fresnel's bi-prism method (beyond the syllabus).
3. Study of dispersive power of material of a prism.
4. Study of viscosity using Poyseullie's caplillary flow method/using Stoke's law.
5. Measurement of nodal and antinodal points along transmission wire and measurement of wave length.
6. Any other experiment related to the theory**.**

Outline of Physics-II

1. **Vector calculus**
2. **Electrostatics, Magneto statics, electromagnetism,**
3. **Electromagnetic theory**
4. **Polarization.**
5. **Quantum mechanics II**
6. **Solid state physics II**

Syllabus of B. Tech. Course
Implemented from the Academic Year 2018

Syllabus of Chemistry-I (Applicable to B. Tech. 1st year)

Theory

Subject : Chemistry 1
Subject Code: CH 101/CH201
Credits : 3
Contact hour: 35
Weekly 3L + 1T+ 1Project

Pre requisites: Knowledge of Chemistry up to 12th standard.

Course Objective
The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Course Outcomes

CH 101.1 : Able to describe the fundamental properties of atoms & molecules, atomic structure and the periodicity of elements in the periodic table
CH 101.2 : Able to apply fundamental concepts of thermodynamics in different engineering applications.
CH 101.3: Able to apply the knowledge of water quality parameters, corrosion control & polymers to different industries.
CH 101.4: Able to determine the structure of organic molecules using different spectroscopic techniques.
CH 101.5: Capable to evaluate theoretical and practical aspects relating to the transfer of the production of chemical products from laboratories to the industrial scale, in accordance with environmental considerations.

Detailed contents

Module I: Inorganic Chemistry (8 L)

(i) Atomic structure (4 Lectures)

Bohr's theory to hydrogen-like atoms and ions; spectrum of hydrogen atom. Quantum numbers, Introduction to the concept of atomic orbitals, diagrams of s, p and d orbitals, Pauli's exclusion principle, Hund's rule, exchange energy, Aufbau principle and its limitation, introduction to Schrodinger equation.

(ii) Periodic properties (4 Lectures)

Modern Periodic table, group trends and periodic trends in physical properties: electron

affinity, electronegativity, polarizability, oxidation states, effective nuclear charges, penetration of orbitals, variations of s, p and d orbital energies of atoms.

Module II: Physical Chemistry (8 L)

(iii) Use of free energy in chemical equilibria (6 lectures)

Thermodynamic functions: internal energy, enthalpy, entropy and free energy. 2nd Law of Thermodynamics, Estimations of entropy and free energies, Free energy and emf, Cell potentials, the Nernst equation and applications.

(iv) Real Gases (2 lectures)

Reason for deviation of real gases from ideal behavior, Equations of state of real gases, Vander Waals' equation, pressure & volume correction, validity, critical state of gas.

Module III: Organic Chemistry (8 L)

(v) Stereochemistry (4 lectures)

Representations of 3 dimensional structures, Chirality, optical activity, isomerism, structural isomerism, stereoisomers, enantiomers, diastereomers, configurations (D,L & cis trans), racemisation.

(vi) Organic reactions (4 lectures)

Concepts of inductive effect, resonance, hyperconjugation, introduction to reactions involving substitution, addition, elimination, oxidation (Baeyer villiger oxidation), reduction (Clemmensen reduction, Wolff-Kishner reduction)

Module IV: Industrial Chemistry 8L

(vii) Water (2 lectures)

Hardness, alkalinity, numerical

(viii) Corrosion. (2 lectures)

Types of corrosion: wet & dry, preventive measures

(ix) Polymers (3 lectures)

Classification of polymers, conducting polymers, biodegradable polymers

(x) Synthesis of a commonly used drug molecule. (1 lecture)

Paracetamol, Aspirin

Module V: Spectroscopic techniques in Chemistry (3L)

Electromagnetic radiation, Principles of spectroscopy, spectrophotometer, infrared spectroscopy, fingerprint region, functional group region, UV-VIS spectroscopy, ^{1}H Nuclear magnetic resonance spectroscopy, chemical shift

Project Domain

1. Application of Thermodynamics
2. Application of polymers in daily life
3. Nanomaterials and its applications
4. Determination of water quality parameters
5. Electronic storage devices
6. Managing E –wastes
7. Application of chemistry in core engineering
8. Application of spectroscopy in medical field
9. Applications of green chemistry
10. Merits of commercial organic products
11. Bioplastics
12. Any other related topics

Suggested Text Books

(i) A Text Book of Organic Chemistry, Arun Bahl & Arun Bahl
(ii) General & Inorganic Chemistry, P.K. Dutt
(iii) General & Inorganic Chemistry, Vol I, R.P. Sarkar
(iv) Physical Chemistry, P.C. Rakshit

Reference Books

(v) Chemistry: Principles and Applications, by M. J. Sienko and R. A.
Plane (iii)Fundamentals of Molecular Spectroscopy, by C. N. Banwell
(iv) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(v) Physical Chemistry, by P. W. Atkins
(vi) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

CO v/s PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3	2	2	2	-	-	-	-	1	2	2	2
2	3	3	3	3	-	-	-	-	1	1	2	3
3	3	3	2	1	-	2	1	-	1	-	3	3
4	3	2	3	2	-	-	1	-	1	2	3	3
5	3	3	3	3	1	1	1	-	1	-	2	3

Syllabus of Chemistry-I Lab (Applicable to B. Tech. 1st year)
Practical

Paper Name: Chemistry I Lab
Paper Code: CH 191/ CH 291
Total Contact Hours: 3 P/Week
Credit: 1.5

Pre requisites: Knowledge of Physics upto 12th standard.

Course Objective

- Study the basic principles of pH meter and conductivity meter for different applications.
- Analysis of water for its various parameters & its significance in industries.
- Learn to synthesis Polymeric materials and drugs.
- Study the various reactions in homogeneous and heterogeneous medium.

Course Outcome

CH191.1: Able to operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.
CH191.2: Able to analyse and determine the composition of liquid and solid samples working as an individual and also as an team member
CH191.3: Able to analyse different parameters of water considering environmental issues
CH191.4: Able to synthesize drug and polymer materials.
CH191.5: Capable to design innovative experiments applying the fundamentals of chemistry

Course Content

Choice of 10-12 experiments from the following:

- Determination of surface tension and viscosity
- Thin layer chromatography
- Determination of hardness of water
- Determination of chloride content of water
- Determination of the rate constant of a reaction
- Determination of cell constant and conductometric tritration
- pH metric titrations
- Synthesis of a polymer/drug
- Saponification/acid value of an oil
- Chemical analysis of a salt
- Chemical oscillations- Iodine clock reaction
- Determination of the partition coefficient of a substance between two immiscible liquids
- Adsorption of acetic acid by charcoal

Innovative experiments (any one)

- Synthesis of silver nano particles
- Green synthesis

CO-PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	1	1	3	1	-	2	3	-	-	-	-	1
2	2	2	1	1	-	1	-	-	-	1	-	1
3	-	-	-	-	-	-	-	-	3	3	2	2
4	2	1	2	2	-	-	1	-	-	-	-	2
5	3	3	3	3	1	1	1	1	-	-	2	2

Subject Name: Basic Electronics Engineering

Paper/Subject Code: EC101/EC201

Total Contact Hours: 3L/Week (Total 34 L)

Credit: 3

Prerequisite:

Electric current and voltage-D.C and A.C., Complex impedance, conductivity, resistivity, transformer, charging and discharging of capacitor, active and passive elements.

Course Objective:

1. To understand the behavior of Conductors, Insulators, and Semiconductors based on energy-band theory and relevant problems.
2. To instill the knowledge of working principles of P-N Junction Diode, Zener diode and analyze their applications in the rectifier, clipper, clamper, regulator etc.
3. To familiarize with the characteristics of Bipolar junction transistor(BJT) under CE, CE, CC mode of operation and its biasing mechanisms.
4. To understand working principles of JFET, MOSFET and perform operations under CG, CS, CD configurations for parametric observation.
5. To determine the parameters due to the effect of feedback in amplifier to ,adder circuit , integrator and differentiator circuit using Operational Amplifier

Course Outcome:

Course Name	COs	CO Statement
BASIC ELECTRONICS ENGINEERING (EC101/EC201)	EC101/EC201.1	Students able to describe the fundamentals of Semiconductors
	EC101/EC201.2	Students able to explain V-I characteristics of P-N Junction Diode, zener diode , working of diode rectifier, clipper, clamper, and regulator circuit
	EC101/EC201.3	Students able to analyze characteristics of Bipolar junction transistor(BJT) under CE, CB, CC mode of operation and its biasing therein
	EC101/EC201.4	Students able to illustrate the operations of JFET, MOSFET and the CS,CD , CG configuration using JFET
	EC101/EC201.5	Students able to determine parameters due to effect of feedback in amplifier
	EC101/EC201.6	Students able to construct inverting amplifier circuit , non-inverting amplifier circuit ,adder circuit , integrator and differentiator circuit using Operational Amplifier IC

Mapping of COs with POs

Course Name: Basic Electronics Engineering

Code:EC101/EC201

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC101/EC201.1	3	2	1	1	-	-	-	-	-	2	-	1
EC101/EC201.2	3	3	3	1	-	-	-	-	1	1	1	2
EC101/EC201.3	3	1	1	1	-	-	-	-	1	1	1	1
EC101/EC201.4	3	2	1	1	-	-	-	-	1	1	2	2
EC101/EC201.5	3	2	3	1	-	-	-	-	1	1	1	2
EC101/EC201.6	3	3	3	1	-	-	-	-	2	1	2	3

N.B. : 3 = Highly Mapped, 2=Moderately Mapped , 1=Slightly Mapped , Not Mapped = '-'

Course Content:

Module-I: Basics of semiconductor (6L)
Conductors, Insulators, and Semiconductors- crystal structure, Fermi Dirac function, Fermi level, Energy band diagrams, valence band, conduction band, and band gap; intrinsic, and extrinsic (p-type and n-type) semiconductors, position of Fermi level in intrinsic and extrinsic semiconductor, drift and diffusion current – expression only (no derivation) , mass action law , charge neutrality in semiconductor, Einstein relationship in semiconductor , Numerical problems.

Module-II: P-N Junction Diode and its applications (8L)
p-n junction formation and depletion region, energy band diagram of p-n junction at equilibrium and barrier energy, built in potential at p-n junction, energy band diagram and current through p-n junction at forward and reverse bias, Static and Dynamic resistance of Diode, Transition capacitance and diffusion capacitance, V-I characteristics and current expression of diode, temperature dependencies of V-I characteristics of diode, p-n junction breakdown – conditions, avalanche and Zener breakdown, Concept of Junction capacitance, Zener diode and characteristics.

Diode half wave and full wave rectifiers (centre tapped and bridge) circuits and operation ($I_{DC,}$ I_{rms}, $V_{Dc,}$ $V_{rms)}$, ripple factor without filter, efficiency, PIV, TUF; Reduction of ac ripples using filter circuit (Qualitative analysis); Design of diode clipper and clamper circuit - explanation with example, application of Zener diode in regulator circuit. Numerical problems.

Module-III: Bipolar junction transistor (BJT) (6L)
Concept of "Transistor", Formation of PNP/NPN Transistors, energy band diagram, current conduction mechanism, CE, CB, CC configurations, transistor static characteristics in CE, CB and CC

mode, junction biasing condition for active, saturation and cut-off modes, current gain α, β and γ, early effect.
Biasing and bias stability; biasing circuits - fixed bias; voltage divider bias; collector to base bias, D.C. load line and Quiescent point, calculation of stability factors for different biasing circuits.
BJT as an amplifier and as a switch – Graphical analysis; Numerical Problems.

Module-IV: Field effect transistor (FET) (6L)
Concept of "field effect", Classification of FETs-JFET, MOSFET, operating principle of JFET. Drain and transfer characteristics of JFET (n-channel and p-channel), CS, CG, CD configurations, Relation between JFET parameters. FET as an amplifier and as a switch– graphical analysis. E-MOSFET (n-channel and p-channel), D-MOSFET (n-channel and p-channel), Numerical Problems.

Module-V: Feedback and Operational Amplifier (8L)

Concept of feedback with block diagram, positive and negative feedback, gain with feedback. Feedback topologies, effect of feedback on input and output impedance, distortion, concept of oscillation and Barkhausen criterion.
Operational amplifier – electrical equivalent circuit, ideal characteristics, non-ideal characteristics of op-amp – offset voltages; bias current; offset current; Slew rate; CMRR and bandwidth, Configuration of inverting and non-inverting amplifier using Op-amp, closed loop voltage gain of inverting and non-inverting amplifier, Concept of virtual ground, Applications op-amp – summing amplifier; differential amplifier; voltage follower; basic differentiator and integrator, Numerical Problems.

Project Domains:

1. Zener diode in voltage regulation
2. Amplifier design using BJT
3. Amplifier design using FET
4. Circuit design using Op-Amp

Text Books:

1. D. Chattopadhyay, P. C. Rakshit, Electronics Fundamentals and Applications, New Age International
2. Millman & Halkias, Integrated Electronics, Tata McGraw Hill.
3. Boylestead and Nashelsky, Electronic Devices and Circuits Theory, 9/e, PHI, 2006.

Reference Books:

1. Sedra & Smith, Microelectronics Engineering.
2. John D. Ryder, Electronic Fundamentals and Applications, PHI
3. J.B.Gupta, Basic Electronics, S.K. Kataria.
4. Malvino: Electronic Principle.
5. Schilling & Belove: Electronics Circuits

Paper Name: Basic Electronics Engineering Lab
Paper Code: EC 191/EC 291
Contacts: 3P/Week
Credit: 1.5
Course Objective

The objectives of this course are

1. To prepare the students to have a basic knowledge of active and passive components.
2. To build knowledge to distinguish pure and impure DC signals.
3. To grow measuring ability of signals through multi meter and CRO
4. To understand characteristics of proper biasing for BJT and FET.
5. To encourage in developing circuits using diodes, transistors, FETs and OPAMPs.

Course Name	COs	CO Statement
BASIC ELECTRONICS ENGINEERING Lab (EC191/EC291)	EC191/EC291.1	Students able to identify different types of passive and active electronic components
	EC191/EC291.2	Students able to demonstrate the working of CRO , Function Generator ,Digital Multimeter and D.C. power supply
	EC191/EC291.3	Students able to sketch the I-V characteristics of ordinary diode , Zener diode , BJTs and FET
	EC191/EC291.4	Students able to construct the rectifier circuit using diode and Inverting and Non-inverting amplifiers Circuit using Op-Amp
	EC191/EC291.5	Students able to determine the characteristics parameters of actual Op-Amps
	EC191/EC291.6	Students able to validate the truth table of basic logic gates using digital IC

Mapping of COs with POs

Course Name: Basic Electronics Engineering Lab

Code:EC191/EC291

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
EC191/EC291.1	3	2	1	1	-	-	-	1	2	2	1	2
EC191/EC291.2	3	2	1	2	2	-	-	1	2	2	1	2
EC191/EC291.3	3	3	1	1	2	-	-	1	2	1	1	2
EC191/EC291.4	3	3	3	2	2	1	1	1	3	2	2	3
EC191/EC291.5	3	2	1	1	-	-	-	-	1	1	1	2
EC191/EC291.6	3	3	3	1	-	-	-	-	2	1	2	2

N.B. : 3 = Highly Mapped, 2=Moderately Mapped, 1=Slightly Mapped, Not Mapped = '-'

List of Experiments:

1. Familiarization with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT)
2. Familiarization with measuring and testing equipment like Digital Multimeter, CRO, Signal generators and Power Supply etc.
3. Study of I-V characteristics of Junction diodes.
4. Study of I-V characteristics of Zener diodes.
5. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
6. Study of I-V characteristics of BJTs.
7. Study of I-V characteristics of Field Effect Transistors.
8. Determination of input-offset voltage, input bias current and Slew rate of OPAMPs.
9. Determination of Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
10. Study of OPAMP circuits: Inverting and Non-inverting amplifiers.
11. Verification of truth table of basic logic gates using IC
12. Innovative Experiment

Paper Name: Basic Electrical Engineering
Paper Code: EE101/EE201
Contact hours: 3L per week
Credit: 3

Pre-requisites

- **Basic 12th standard Physics and Mathematics.**
- **Concept of components of electric circuit.**

Course Objective

To introduce the students to basic principles of DC and AC circuits, Electrical Machines and Electrical Systems.

Course Outcome

At the end of this course, students will able

EE101/EE201.1. To understand Basic Electrical circuits, Power distribution and Safety measures.

EE101/EE201.2. To analyze an apply DC network theorems.

EE101/EE201.3. To analyze and apply concept of AC circuits of single-phase and three-phase.

EE101/EE201.4. To analyze and apply concepts of AC fundamentals in solving AC network problems.

EE101/EE201.5. To understand basic principles of Transformers and Rotating Machines.

CO-PO Mapping:

	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
EE 101/201. 1	3	1	-	-	-	2	-	-	-	2	2	1
EE 101/201. 2	2	3	-	-	-	-	-	-	-	-	1	1
EE 101/201. 3	2	3	1	-	-	-	-	-	-	-	1	1
EE 101/201. 4	1	2	3	1	-	-	-	-	-	-	-	1
EE	3	-	-	-	-	-	-	-	-	-	-	1

101/201.5												

Course contents

Module I: DC Circuits (8L)

Definition of electric circuit, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, node, branch, active and passive elements, Kirchhoff's laws, Source equivalence and conversion, Network Theorems - Superposition Theorem, Thevenin's Theorem, Norton Theorem, Maximum Power Transfer Theorem, Star-Delta Conversions.

Module II: AC Fundamentals (8L)

Sinusoidal quantities, Average and RMS values, peak factor, Form factor, Phase and Phase difference, concept of phasor diagram, V-I Relationship in R, L, C circuit, Combination R-L-C in series and parallel circuits with phasor diagrams, impedance and admittance, impedance triangle and power triangle, Power factor, concept of resonance, Power in AC circuit, simple problems (series and parallel circuit only), Three-phase balanced circuits, Concept of three-phase power measurement.

Module III: Single-Phase Transformer (4L)

Brief idea on constructional parts, classifications, working principle. Problems on EMF equation. Phasor diagram, Equivalent circuit.

Module IV: Electrical Rotating Machines (7L)

a) DC Machines (4L)

Brief idea on constructional features, classifications, working principle of both motor and generator. Simple problems on Voltage equation.

b) Three-Phase Induction Motor (3L)

Basic concept of three phase circuit and production of rotating magnetic field. Working principle of three-phase induction motor and torque-speed characteristics (concept only). No numerical problem.

Module V: General Structure of Electrical Power System (1L)

Power generation to distribution through overhead lines and underground cables with single line diagram.

Module VI: Electrical Installations (2L)

Earthing of Electrical Equipment, ideas of basic components- MCB, MCCB, ELCB, SFU, Megger.

Project Domains:

a) **DC Network Theorem**

b) **R-L-C Circuit**

c) **Transformers**

d) DC Motors

Text books:

1. D. P. Kothari & I. J. Nagrath, Basic Electrical Engineering, TMH.
2. V. Mittle & Arvind Mittal, Basic Electrical Engineering, TMH.
3. Ashfaq Hussain, Basic Electrical Engineering, S. Chand Publication.
4. Chakrabarti,Nath & Chanda, Basic Electrical Engineering, TMH.
5. C.L. Wadhwa, Basic Electrical Engineering, Pearson Education**.**

Reference books

1. E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
2. V. D. Toro, “Electrical Engineering Fundamentals”, Printice Hall India, 1989.

FOR GROUP A: EE, ECE, EIE/AEIE, BME

Paper Name: Basic Electrical Engineering Laboratory
Paper Code: EE191/EE291
Total Contact Hours: 36
Credit: 1.5

Pre requisites:

- Basic Physics and applied physics.
- Basic Mathematics.
- Basic concept of Electric Circuit

Course Objective:

To impart and apply knowledge about the Basic Electrical Components, Machineries, Instruments and Safety measures.

Course Outcome:

EE191/EE291.1. Identify and use common electrical components.
EE191/EE291.2. To develop electrical networks by physical connection of various components and analyze the circuit behavior.
EE191/EE291.3. Apply and analyze the basic characteristics of transformers and electrical machines.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
EE 191/291.1	3	-	-	-	-	2	-	-	-	-	-	1
EE 191/291.2	2	3	-	-	-	-	-	-	-	-	1	1
EE 191/291.3	3	-	-	-	-	-	-	-	-	-	-	1

Course contents

List of Experiments:

1. Basic safety precautions – earthing, introduction to measuring instruments – Voltmeter, Ammeter, Multimeter, Wattmeter, Real life Resistor, Capacitor, Inductor.
2. Verification of Thevenin's and Norton's Theorem.

3. Verification of Superposition and Maximum Power Transfer Theorem.
4. Characteristics of Fluorescent, Tungsten and Carbon filament lamps.
5. Study of R-L-C series circuit.
6. Three-phase Power measurement with two wattmeter method.
7. Demonstration of cut-out sections of machines: DC Machine (commutator-brush arrangement), Induction Machine (squirrel cage rotor).
8. Measurement of primary and secondary voltage and current of single-phase transformer – Open Circuit and Short Circuit Test.
9. Starting, Reversing and speed control of DC shunt motor.
10. Torque-Speed characteristics of DC Machine.
11. Torque-Speed characteristics of Three-phase Induction Motor.
12. Test on single-phase Energy Meter.

B.Tech Semester 1 Syllabus (Proposed Modified Syllabus)

Session: 2018-2019

Paper Name**: English (HU101)** [Common for all courses]

Credits: 2

Classes: 24 L

Prerequisites: The course presupposes a high school level knowledge of English grammar, punctuation, and elementary to intermediate reading and writing skills.

Course Objectives: The basic objectives of this course are to impart professional communication skills in the globalized workplace context, to enable functional competence in reading and writing so as to create industry-ready personnel.

Course Outcomes: By pursuing this course the students shall be able to

- Know about and employ communication in a globalized workplace scenario.
- Understand and apply functional grammar, reading skills and sub-skills.
- Acquire a working knowledge of writing strategies, formats and templates of professional writing.
- Apply and make use of the modalities of intercultural communication.

The proposed revised syllabus is as follows:

Module 1: Communication in a Globalized World **4L**
1.1 Definition, Process, Types of Communication
1.2 Verbal and Non-Verbal Communication
1.3 Barriers to Communication
1.4 Workplace Communication

Module 2: Functional Grammar **4L**
2.1Articles, Prepositions and Verbs
2.2 Verb-Subject Agreement
2.3 Voice, Modality and Modifiers
2.4 Direct and Indirect Speech
2.5 Common Errors in English

Module 3: Vocabulary and Reading **6L**
3.1 Word Roots, Prefixes and Suffixes
3.2 Antonyms, Synonyms and one word Substitution
3.3 Reading—Purposes and Skills (Skimming, Scanning & Intensive Reading)
3.4 Reading Comprehension (Fictional and Non-fictional prose)
Texts:

a. **Ruskin Bond:** ***The Night Train at Deoli*** **OR Khushwant Singh:** ***The Portrait of a Lady***
b. **Roald Dahl:** ***Lamb to the Slaughter*** OR **Somerset Maugham:** ***The Man with the Scar***
c. **Anne Frank:** ***The Diary of a Young Girl*** **(Letters of 3rd February 1944, 12th February 1944 and 13th February 1944)** OR **Jawaharlal Nehru: "How Britain Ruled India" (*Glimpses of World History*, Chap 112)**

Module 4: Professional Writing **10L**

4.1Writing Functions: Describing, Defining, Classifying
4.2 Structuring—coherence and clarity
4.3 Business Writing—Letters (Enquiry, Order, Sales, Complaint, Adjustment, Job Application letters), Memos, Notices, Circulars, Agendas and Minutes of Meetings).
4.4 E-mails—types, conventions, jargons and modalities.
4.5 Reports and Proposals
4.6 Précis writing
4.7 Essay writing
4.8 Punctuation and its importance in writing
4.9 Writing for an Audience

The following areas for student projects may be suggested:

a. **Role of Communication in Everyday Life**
b. **Grammar Builders**
c. **Group Activities on Workplace Communication**
d. **Reading Challenge**
e. **Quizzicals**

References:

1.Raymond Murphy. *English Grammar in Use*. 3rd Edn. CUP, 2001.
2. A. J Thomson and A. V. Martinet. *A Practical English Grammar* Oxford: OUP, 1980.
3. Michael Swan. *Practical English Usage*. Oxford: OUP, 1980.
4. Simeon Potter. *Our Language*. Oxford: OUP, 1950.
5. Pickett, Laster and Staples. *Technical English: Writing, Reading & Speaking*. 8th ed. London: Longman, 2001.
6. Ben Heasley and Liz Hamp-Lyons. *Study Writing*. Cambridge: CUP, 2006.

CO-PO Mapping
Course Name: Communicative English (HU101)1st Year 1st Sem

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
HU101.1	3	-	-	-	-	-	1	-	-	3	-	2
HU101.2	2	3	2	-	-	2	2	-	-	3	-	3
HU101.3	1	3	-	-	-	3	3	-	-	3	-	3

HU101.4	**-**	**-**	**-**	**-**	**-**	**3**	**3**			**3**	**-**	**3**

Subject Name: Engineering Graphics & Design

Paper / Subject Code: ME 191/ME 291

Total Contact Hours: 36

Credit: 1.5

Prerequisite: Basic knowledge of geometry

Course Objectives:

To learn detailed drawing and modeling of a system, component, or process which meets desired needs within realistic constraints. It will help students to use the techniques, skills, and modern engineering tools and communicate effectively.

Course Outcomes: On successful completion of the course the student will be able to

1. Get introduced with Engineering Graphics and visual aspects of design.
2. Know and use common drafting tools with the knowledge of drafting standards.
3. Apply computer aided drafting techniques to represent line, surface or solid models in different engineering viewpoints.
3. Produce part models; carry out assembly operation and show working procedure of a designed project work using animation.

Course Content:

Traditional Engineering Graphics:

Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.

Computer Graphics:

Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modeling; Solid Modeling.

Module 1: Introduction to Engineering Drawing (6P)

Principles of Engineering Graphics and their significance, Usage of Drawing instruments, lettering, Conic sections including Rectangular Hyperbola (General method only); Cycloid, Epicycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

Module 2: Orthographic & Isometric Projections (9P)

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes; Projection of Solids inclined to both the Planes- Auxiliary Views; Isometric Scale, Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa.

Module 3: Sections and Sectional Views of Right Angular Solids (6P)

Drawing sectional views of solids for Prism, Cylinder, Pyramid, Cone and project the true shape of the sectioned surface, Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw sectional orthographic views of objects from industry and dwellings (foundation to slab only)

Module 4: Overview of Computer Graphics (3P)

Demonstration of CAD software [The Menu System, Toolbars (Standard, Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), Zooming methods, Select and erase objects].

Module 5: CAD Drawing, Customization, Annotations, layering (6P)

Set up of drawing page including scale settings, ISO and ANSI standards for dimensioning and tolerancing; Using various methods to draw straight lines, circles, applying dimensions and annotations to drawings; Setting up and use of Layers, Changing line lengths (extend/lengthen); Printing documents; Drawing sectional views of solids and project the true shape of the sectioned surface; Drawing annotation, CAD modeling of parts and assemblies with animation, Parametric and non parametric solid, surface and wireframe modeling, Part editing and two dimensional documentation of models.

Module 6:

Demonstration of a simple team design project (6P)

Illustrating Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; Meshed topologies for engineering analysis and tool-path generation for component manufacture, Use of solid-modeling software for creating associative models at the component and assembly levels.

Project Domain

2D and 3D modeling of Machine parts or Households.

Text Books:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

2. (Corresponding set of) CAD Software Theory and User Manuals

References:

1. K. Venugopal Engineering Drawing + AutoCAD, New Age International publishers

2. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication.

3. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.

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

Subject Name: Workshop/Manufacturing Practices

Paper / Subject Code: ME 192/ME 292

Total Contact Hours: 36

Credit: 1.5

Prerequisite: Higher Secondary with Mathematics, Physics and Chemistry

Course Objectives:

To understand the basic knowledge of Workshop Practice and Safety. To identify and use of different hand tools and other instruments like Hack Saw, Jack Plane, Chisels etc. and operations like Marking, Cutting etc. To expose students to different types of manufacturing/fabrication processes

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

1. Fabricate components with their own hands.
2. Get practical knowledge of the dimensional accuracies and tolerances applicable for different manufacturing processes.
3. Produce small devices of their interest for project or research purpose.

Course Content:

(i) Theoretical discussion & videos: (6P)

Detailed contents:

1. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods
2. Fitting operations & power tools
3. Carpentry
4. Welding (arc welding & gas welding), brazing
5. Electrical & Electronics
6. Metal casting
7. CNC machining, Additive manufacturing
8. Plastic moulding& Glass Cutting.

(ii) Workshop Practice:

Module 1 - Machine shop (6P)

Typical jobs that may be made in this practice module:

i. To make a pin from a mild steel rod in a lathe.

ii. To make rectangular and vee slot in a block of cast iron or mild steel in a shaping and / or milling machine.

Module 2 - Fitting shop **(6P)**

Typical jobs that may be made in this practice module:

i. To make a Gauge from MS plate.

Module 3 - Carpentry **(6P)**

Typical jobs that may be made in this practice module:

i. To make wooden joints and/or a pattern or like.

Module 4 - Welding shop (Arc welding 3P + gas welding 3P) **(6P)**

Typical jobs that may be made in this practice module:

i. ARC WELDING (3P): To join two thick (approx 5mm) MS plates by manual metal arcwelding.

ii. GAS WELDING (3P): To join two thin mild steel plates or sheets by gas welding.

Module 5 - Electrical & Electronics **(3P)**

House wiring, soft Soldering

Module 6 - Smithy **(3P)**

Typical jobs that may be made in this practice module:

i. A simple job of making a square rod from a round bar or like.

For further study (Optional)

Module 7 - Casting

Typical jobs that may be made in this practice module:

i. One/ two green sand moulds to prepare, and a casting be demonstrated.

Module 8 - Plastic moulding & Glass Cutting

Typical jobs that may be made in this practice module:

i. For plastic moulding, making at least one simple plastic component should be made.

ii. At least one sample shape on glass should be made using laser cutting machine.

Examinations could involve the actual fabrication of simple components, utilizing one or more of the techniques covered above.

Project domain: Carpentry, Machining, Welding, Casting, Smithy, Advanced manufacturing processes

Text Books:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of WorkshopTechnology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

References:

1. Gowri P., Hariharan and A. Suresh Babu, Manufacturing Technology – I, Pearson Education, 2008.
2. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
3. Kalpakjian S. and Steven S. Schmid, Manufacturing Engineering and Technology, 4th edition, Pearson Education India Edition, 2002.
4. Manufacturing Science by A.Ghosh and A.K.Mallick, Wiley Eastern.
5. Principles of Metal Cutting/Principles of Machine Tools by G.C.Sen and A.Bhattacharya, New Central Book Agency, Kolkata.

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