RCC INSTITUTE OF INFORMATION TECHNOLOGY
APPROVED BY AICTE, NEW DELHI AND AFFILIATED TO MAKAUT, W.B.
AN ISO 9001 - 2008 & ISO 14001 - 2004 CERTIFIED INSTITUTE
A UNIT OF RCC INSTITUTE OF TECHNOLOGY AN AUTONOMOUS SOCIETY OF DEPARTMENT OF HIGHER EDUCATION, GOVT. OF WEST BENGAL

COURSE BOOKLET
B.TECH,1ST YEAR
(2017-2021)BATCH

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING
RCC INSTITUTE OF INFORMATION TECHNOLOGY
CANAL SOUTH ROAD, BELIAGHATA
KOLKATA - 700 015, WEST BENGAL, INDIA

This revised version of Course booklet is being published in accordance with OutcomeBased Education (OBE) policy approved by Program Assessment Committee (PAC), Departmental Advisory Board(DAB), Department of Electronics and Communication Engineering (ECE)

Department of Electronics and Communication Engineering

All faculty members associated with Department of Electronics and Communication Engineering, RCCIIT, concerned faculty members of Basic Science and Humanities and the honorable members of DAB, Electronics and Communication Engineering of RCCIIT are acknowledged for their timely support and relevant inputs towards the preparation of this booklet.

Table of Content

About Department:

Department of Electronics and Communication Engineering is successfully running since 2006 with a intake of 60 seats. In 2010 intake increased to 120; from 2012 the department also started 2 years full time PG program in Tele Communication to make a significant contribution in the field of higher studies.

The Department used to organize seminars, development programs, and workshops for faculties, staffs and students in support of incessant development. A pool of competent faculty member of the Department constantly motivates the students to get placed by means of job, research and higher studies; and the outcomes reflect in the achievement.

The pass out students of the ECE Department now associated with pioneer Institutions like North Dakota State University (USA), University of Regina (Canada), College of Medicine Swansea University (UK), University of Illinois, Chicago (USA), University of Buffalo (USA), Texas Tech University, different IITs (Kharagpur, Kanpur, Roorkee, Guwahati), IIM (Kozhikode), IIEST, ISM, Jadavpur University etc. Moreover the students of this Department are also allied with prestigious organizations like BSNL, ECIL, WBSEB, AAI, INTERRA SYSTEM, TCS, CTS, INFOSYS, IBM, ACCENTURE, TECH MAHINDRA, ERICSSON L&T etc. The Department is also involved actively in the frontier research, corroborated by a significant number of research papers in various national and international journals and conferences.

Vision of the Department

Graduates of this department will be part of global academia/industry through sincere professional commitments, research and innovations by ethically considering environmental impacts and societal benefits in the multidisciplinary culture for sustainable development of civilization throughout their career.

Mission of the Department

Mission No.	Mission Statements
M1	Be able to develop sustainable solutions of problems related to electronics and communication engineering as individual or part of a team maintaining professional ethics and environmental aspects.
M2	Be competent to perceive higher studies through research, innovation and managerial skills for integrated life-long learning..
M3	Create leadership qualities through learning beyond classroom, effective communication, inter-personal skill, technological development and innovation for benefit of society

Program Outcome (POs) of the Department

Engineering Graduates will be able to:

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend andwrite effective reports and design documentation, make effective presentations, and giveand receive clear instructions.

11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:**Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Educational Objectives (PEOs) of the Department

PEO No.	Program Educational Objectives Statements
PEO1	Be competent to solve electronics and communication engineering related problems by applying fundamental principles of natural sciences, domain knowledge using modern tools, techniques and inter-personal skills for early employment in industry/academia.
PEO2	Be part of diverse multinational sectors by continuously interpreting global professional development through innovative research and self-study in subject domain and allied fields as a part of life-long learning.
PEO3	Be qualified to construct professional work using acquired domain knowledge as individual or team-member in global environment pertaining to electronics fulfilling ethical, societal and environmental issues.

Program Specific Outcomes (PSOs)

PSO No.	Program Specific Outcome(PSOs) Statements
PSO1	Investigate the design/development of intra and interdisciplinary complex problems/systems through acquired technical knowledge in the field of electronics and communication engineering using state-of-the-art hardware and software tools.
PSO2	Estimate every multidisciplinary project in the light of professional ethics for societal welfare prior to implementation and keeping the environment safe through teamwork or individual means.
PSO3	Invent novel technical solutions applicable for academia/industry relevant to electronics and communication engineering through complex engineering activities maintaining specified constraints with possible life-long impact.

Correlation between PEOs and Mission of the Department of Electronics & Communication Engineering, RCCIIT

PEO No.	PEO statements	M1	M2	M3
PEO1	Be competent to solve electronics and communication engineering related problems by applying fundamental principles of natural sciences, domain knowledge using modern tools, techniques and inter-personal skills for early employment in industry/academia.	3	2	2
PEO2	Be part of diverse multinational sectors by continuously interpreting global professional development through innovative research and self-study in subject domain and allied fields as a part of life-long learning.	1	3	3
PEO3	Be qualified to construct professional work using acquired domain knowledge as individual or team-member in global environment pertaining to electronics fulfilling ethical, societal and environmental issues.	2	2	3

1: Slight (Low), 2: Moderate (Medium), 3: Substantial (High)

Odd Semester(I)

Sl.No.	Paper Code	Paper Name	Credit
1.	M 101	Mathematics-1	4
2.	ME 101	Engg. Mechanics	4
3.	CH 101	Chemistry 1	4
4.	HU 101	English Language & Technical Communication	2
5.	ES 101	Basic Electrical & Electronic Engineering – 1	4
6.	CH191	Chemistry 1	2
7.	ME191	Engg Drawing & Computer Graphics	3
8.	ES191 *	Basic Electrical & Electronic Engineering -1	2
9.	HU181	Language Laboratory	1
10.	XC181	Extra CurricularActivities(NSS/NCC/NSO etc)	1

EvenSemester(II)

Sl.No.	Paper Code	Paper Name	Credit
1.	ME201	Engineering Thermodynamics& Fluid Mechanics	4
2.	M201	Mathematics-2	4
3.	PH201	Physics -1	4
4.	CS201	Basic Computation & Principles of Computer Programming	4
5.	ES201	Basic Electrical &Electronic Engineering-II	4
6.	PH291	Physics – 1	2
7.	ME292	Workshop/Manufacturing practices	2
8.	ES291	Basic Electrical & Electronic Engineering- II	2
9.	CS291	Basic Computation & Principles of Computer Programming	2

Odd Semester(I) Articulation Matrix

Paper Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO12	PSO 1	PSO 2	PSO 3
M 101	**3**	**3**	**2.5**	**1.5**	0	0	0	0	0	0	0	0	**2**	**0**	**0**
ME 101	**3**	**3**	**1.833**	**1**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**1**	**0**
CH 101	**3**	**1.66**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**
HU 101	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**2**	**0**	**0**	**1**
ES 101	**3**	**2.83**	**1.833**	**0**	**0**	**2**	**1.5**	**0**	**0**	**0**	**0**	**2**	**2.88**	**1.5**	**1.33**
CH191	**1**	**1.5**	**2**	**3**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1.5**	**0**	**0**
ME191	**1.5**	**1.83**	**1.33**	**1**	**0**	**1**	**0**	**0**	**0**	**1.4**	**0**	**0**	**1**	**0**	**1**
ES191 *	**3**	**3**	**3**	**3**		**2.5**	**1.5**		**3**			**3**	**3**	**2.83**	**2**
HU181	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**3**	**0**	**0**	**2**
XC181	**2.16**	**2**	**1.83**	**2**	**2.4**	**3**	**2**	**1**	**3**	**3**	**2.2**	**2**	**2**	**2.66**	**3**

EvenSemester (II) Articulation Matrix

Paper Code	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO12	PSO 1	PSO 2	PSO 3
ME201	2	2	1	0	1	1	2	1	0	0	1	1	**1**	**1**	**1**
M201	**3**	**2.67**	**2.5**	**1**	**0**		**0**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**
PH201	**1.8**	**2.3**	**1.8**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1.83**	**0**	**0**
CS201	**3**	**3**	**3**	**3**	**2**	**1**	**1**	**1**	**1**	**1**	**2**	**2**	**3**	**1**	**1.33**
ES201	**3**	**2.83**	**2.16**	**0**	**0**	**2.3**	**2**	**0**	**0**	**0**	**0**	**2.16**	**2.88**	**1.6**	**1.5**
PH291	1.67	2.5	1.8	1.75	0	0	0	0	0	0	0	0	**2**	**0**	**0**
ME292	1	0	0	0	0	1	2	1	1.75	1	1.333	1	**1**	**1.6**	**1**
ES291	**3**	**3**	**3**	**3**	**0**	**2.8**	**2.5**	**0**	**3**	**0**	**0**	**3**	**3**	**2.83**	**2**
CS291	2	2	1	0	1	1	2	1	0	0	1	1	**2.33**	**1**	**1**

Course Title: Mathematics-1	**Code: M101**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3L+1T /week**
Continuous Assessment: 25 Marks **Attendance : 5 Marks**	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (Convenor of DAB)**

Pre-requisites: Knowledge of Basic Mathematics in Class XII.

Course Outcomes (CO's) of Mathematics-1

On completion of the course students will be able to

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
M101.CO1	Apply the concept and techniques of differential and integral calculus to determine curvature and evaluation of different types of improper integrals	K3:Apply
M101.CO2	Understand the domain of applications of mean value theorems to engineering problems	K2:Understand
M101.CO3	Use different types of matrices, concept of rank, methods of matrix inversion for problem solving	K3:Use
M101.CO4	Understand linear spaces, its basis and dimension with corresponding applications in the field of computer science.	K2:Understand
M101.CO5	Apply the concept of eigen values, eigen vectors, diagonalisation of matrices and orthogonalization in inner product spaces for understanding physical and engineering problems	K3:Apply
M101.CO6	Implement Green's theorem, Gauss Divergence Theorem and Stoke's theorem which and whenever required	K3:Implement

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	2	1									1		
CO2	3	3	3	2									1		
CO3	3	3	2	2									2		
CO4	3	3	3	2									2		
CO5	3	3	3	1									3		
CO6	3	3	2	1									3		
AVG	3	3	2.5	1.5	0		0	0	0	0	0	0	2	0	0

University Syllabus:

Module	Content	Hrs/Unit
I	**Matrix:** Determinant of a square matrix, Minors and Cofactors, Laplace's method of expansion of a determinant, Product of two determinants, Adjoint of a determinant, Jacobi's theorem on adjoint determinant. Singular and non-singular matrices, Adjoint of a matrix, Inverse of a non-singular matrix and its properties, orthogonal matrix and its properties, Trace of a matrix. Rank of a matrix and its determination using elementary row and column operations, Solution of simultaneous linear equations by matrix inversion method, Consistency and inconsistency of a system of homogeneous and inhomogeneous linear simultaneous equations, Eigen values and eigen vectors of a square matrix (of order 2 or 3), Eigen values of AP^{TP}, kA, AP^{-1P}, Caley-Hamilton theorem and its applications.	9
II	**Successive differentiation:** Higher order derivatives of a function of single variable, Leibnitz's theorem (statement only and its application, problems of the type of recurrence relations in derivatives of different orders and also to find $((Yn)_0)$	2
	Mean Value Theorems & Expansion of Functions: Rolle's theorem and its application, Mean Value theorems – Lagrange & Cauchy and their application, Taylor's theorem with Lagrange's and Cauchy's form of remainders and its application, Expansions of functions by Taylor's and Maclaurin's theorem, Maclaurin's infinite series expansion of the functions: sin x , cos x, log(1 + x), e^x, $(a + x)^n$, n being an integer or a fraction (assuming that the remainder 0 as n $R_n \rightarrow 0$ and $n \rightarrow \infty$ in each case).	5
	Reduction formula: Reduction formulae both for indefinite and definite integrals of types **.**	2
III	**Calculus of Functions of Several Variables:** Introduction to functions of several variables with examples, Knowledge of limit and continuity, Partial derivatives and related problems, Homogeneous functions and Euler's theorem and related problems up to three variables, Chain rules, Differentiation of implicit functions, Total differentials and their related problems, Jacobians up to three variables and related problems, Maxima, minima and saddle points of functions and related problems, Concept of line integrals, Double and triple integrals.	9
1V	**Infinite Series:** Preliminary ideas of sequence, Infinite series and their convergence/divergence, Infinite series of positive terms, Tests for convergence: Comparison test, Cauchy's Root test, D' Alembert's Ratio test and Raabe's test (statements and related problems on these tests), Alternating series, Leibnitz's Test (statement, definition) illustrated by simple example, Absolute convergence and Conditional convergence.	5
V	**Vector Algebra and Vector Calculus**: Scalar and vector fields – definition and terminologies, dot and cross products, scalar and vector triple products and related problems, Equation of straight line, plane and sphere, Vector function of a scalar variable, Differentiation of a vector function, Scalar and vector point functions.	8L

GATE syllabus (If applicable for GATE):

GATE syllabus content	Mapping unit of university syllabus
Linear Algebra: Matrices, determinants, system of linear equations, eigenvalues and eigenvectors, LU decomposition.	Module 1, Module 2
Calculus: Limits, continuity and differentiability. Maxima and minima. Mean value theorem. Integration.	Module 2, Module 3, Module 5

RESOURCES:

1. Advanced Engineering Mathematics 8e by Erwin Kreyszig is published by Wiley India
2. Engineering Mathematics: B.S. Grewal (S. Chand & Co.)
3. Higher Engineering Mathematics: John Bird (4th Edition, 1st Indian Reprint 2006, Elsevier)
4. Mathematics Handbook: for Science and Engineering, L. Rade and B. Westergren (5th edition, 1st Indian Edition 2009, Springer

Course Title: Engineering Mechanics	**Code: ME101**
Type Of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3L+1T /week**
Continuous Assessment: 25 Marks **Attendance : 5 Marks**	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (Convenor of DAB)**

Pre-requisites: Knowledge of Maths& Physics in Class XII

Course Outcomes (CO's) of Engineering Mechanics

On completion of the course students will be able to

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
ME101:CO1	Identifies the various forces and its effects subjected on structural members.	K3: Applying
ME101:CO2	Understanding of scalar and vector analytical technique used for solving problem statically determinant structure.	K2: Understanding
ME101:CO3	Illustrate the mechanics problems associated with friction force, centroid, first moment and second moment of area.	K2: Understanding
ME101:CO4	Analyze the velocity and acceleration of rigid bodies in rectilinear and curvilinear motion.	K4: Analyzing
ME101:CO5	Analyze the forces acting on rigid body during translation motion	K4: Analyzing
ME101:CO6	Implementation of basic knowledge of mathematics and physics to solve real world problems	K3: Applying

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	1	-	-	-	-	-	-			
CO2	3	3	2	-	-	1	-	-	-	-	-	-			
CO3	3	3	2	-	-	1	-	-	-	-	-	-			
CO4	3	3	1	1	-	1	-	-	-	-	-	-			
CO5	3	3	2	-	-	1	-	-	-	-	-	-			
CO6	3	3	2	1	-	1	1	-	-	-	-	-			
AVG	3	3	1.833	1	0	1	1	0	0	0	0	0			

University Syllabus:

Module	Content	Hrs/Unit
I	Importance of Mechanics in engineering; Introduction to Statics; Concept of Particle and Rigid Body; Types of forces: collinear, concurrent, parallel, concentrated, distributed; Vector and scalar quantities; Force is a vector; Transmissibility of a force (sliding vector). Introduction to Vector Algebra; Parallelogram law; Addition and subtraction of vectors; Lami's theorem; Free vector; Bound vector; Representation of forces in terms of i, j, k; Cross product and Dot product and their applications. Two dimensional force system; Resolution of forces; Moment; Varignon's theorem; Couple; Resolution of a coplanar force by its equivalent force-couple system; Resultant of forces.	13
II	Concept and Equilibrium of forces in two dimensions; Free body concept and diagram; Equations of equilibrium. Concept of Friction; Laws of Coulomb friction; Angle of Repose; Coefficient of friction.	8
III	Distributed Force: Centroid and Centre of Gravity; Centroids of a triangle, circular sector, quadrilateral, composite areas consisting of above figures**.** Moments of inertia: MI of plane figure with respect to an axis in its plane, MI of plane figure with respect to an axis perpendicular to the plane of the figure; Parallel axis theorem; Mass moment of inertia of symmetrical bodies, e.g. cylinder, sphere, cone. Concept of simple stresses and strains: Normal stress, Shear stress, Bearing stress, Normal strain, Shearing strain; Hooke's law; Poisson's ratio; Stress-strain diagram of ductile and brittle materials; Elastic limit; Ultimate stress; Yielding; Modulus of elasticity; Factor of safety**.**	12
IV	Introduction to Dynamics: Kinematics and Kinetics; Newton's laws of motion; Law of gravitation & acceleration due to gravity; Rectilinear motion of particles; determination of position, velocity and acceleration under uniform and non-uniformly accelerated rectilinear motion; construction of x-t, v-t and a-t graphs. Plane curvilinear motion of particles: Rectangular components (Projectile motion); Normal and tangential components (circular motion**).**	8
V	Kinetics of particles: Newton's second law; Equation of motion; D.Alembert's principle and free body diagram; Principle of work and energy ; Principle of conservation of energy; Power and efficiency**.**	7

RESOURCES:

1. Engineering Mechanics [Vol-I & II] by Meriam &Kraige, 5th ed. – Wiley India
2. Engineering Mechanics: Statics & Dynamics by I.H.Shames, 4th ed. – PHI
3. Engineering Mechanics by Timoshenko, Young and Rao, Revised 4th ed. – TMH
4. Elements of Strength of Materials by Timoshenko & Young, 5th ed. – E.W.P
5. Fundamentals of Engineering Mechanics by Debabrata Nag & Abhijit Chanda– ChhayaPrakashani
6. Engineering Mechanics by Basudeb Bhattacharyya– Oxford University Press.
7. Engineering Mechanics: Statics & Dynamics by Hibbeler& Gupta, 11th ed. – Pearson
8. Elements of strength of Materials by Timoshenko & Young Chapt.

Course Title: Chemistry-1	**Code: CH101**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3P+1L /week**
Continuous Assessment: 25 marks **Attendance : 5 Marks**	**Final Exam:70Marks**
Writer: Course Coordinators	**Approved by HoD (Convenor of DAB)**

Course Outcomes (CO's) of Chemistry-1

On completion of the course students will be able to

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
CH101.CO1	**Apply** first and second law of thermodynamics to different chemical and physical processes under specified condition to determine the equilibrium condition, spontaneity and thermo-chemical behaviour of a reaction.	Application (Level III)
CH101.CO2	**Analyze** the design and working principle of different electrochemical cells using the concept of conductance of ions.	Analysis (Level IV)
CH101.CO3	**Derive** rate of a reaction at a specified temperature under different medium	Application (Level III)
CH101.CO4	**Explain** the mechanism considering the structure of the molecules and type of electronic effect present in them.	Evaluate (Level V)
CH101.CO5	**Analyze**different types of fuels for industrial application.	Analysis (Level IV)
CH101.CO6	**Distinguish** different types of polymers for diverse application	Analysis (Level IV)

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO 1	3	2	1	1									2		
CO 2	3	2	1										2		
CO 3	3	2	1										2		
CO 4	3	2	1										2		
CO 5	3	1	1	1									2		
CO	3	1	1	1									2		

6															
AVG	3	1.666666667	1	1	0	0	0	0	0	0	0	0	2.00	0	0

University Syllabus:

Module	Content	Hrs/Unit
I	**Chemical Thermodynamics -I** Concept of Thermodynamic system: Definition with example of diathermal wall, adiabatic wall, isolated system, closed system, open system, extensive property, intensive property. Introduction to first law of thermodynamics: different statements, mathematical form. Internal energy: Definition, Example, Characteristics, Physical significance, Mathematical expression for change in internal Energy, Expression for change in internal energy for ideal gas. Enthalpy: Definition, Characteristics, Physical significance, Mathematical expression for change in Enthalpy, Expression for change in enthalpy for ideal gas.	3
	Heat Capacity: Definition, Classification of Heat Capacity (Cp and CV): Definition and General expression of Cp - CV. Expression of Cp - CV for ideal gas. **Reversible and Irreversible processes:** Definition, Work done in Isothermal Reversible and Isothermal Irreversible process for Ideal gas, **Adiabatic changes:** Work done in adiabatic process, Interrelation between thermodynamic parameters (P, V and T), slope of P-V curve in adiabatic and isothermal process. **Application of first law of thermodynamics to chemical processes:** exothermic, endothermic processes, law of Lavoisier and Laplace, Hess's law of constant heat summation, Kirchoff's law.	3
	2 nd law of thermodynamics: Statement, Mathematical form of 2nd law of thermodynamics (Carnot cycle). Joule Thomson and throttling processes; Joule Thomson coefficient for Ideal gas, Concept of inversion temperature. Evaluation of entropy: characteristics and expression, entropy change in irreversible cyclic process, entropy change for irreversible isothermal expansion of an ideal gas, entropy change of a mixture of gases.	
	Work function and free energy: Definition, characteristics, physical significance, mathematical expression of ΔA and ΔG for ideal gas, Maxwell's Expression (only the derivation of 4 different forms), Gibbs Helmholtz equation. Condition of spontaneity and equilibrium reaction.	2 2
II	**Reaction Dynamics** Reaction laws: rate and order; molecularity; zero, first and second order kinetics. Pseudounimolecular reaction, Arrhenius equation. Mechanism and theories of reaction rates (Transition state theory, Collison theory:). **Catalysis:** Homogeneous catalysis (Definition, example, mechanism, kinetics).	3
	Solid state Chemistry Introduction to stoichiometric defects (Schottky & Frenkel) and non –	

	stoichiometric defects (Metal excess and metal deficiency). Role of silicon and germanium in the field of semiconductor.	2
III	**Conductance** Conductance of electrolytic solutions, specific conductance, equivalent conductance, molar conductance and ion conductance, effect of temperature and concentration (Strong and Weak electrolyte). Kohlrausch's law of independent migration of ions, transport numbers and hydration of ions. Conductometric titrations: SA vs SB & SA vs WB; precipitation titration KCl vs AgNO3.	2
	Electrochemical cell Cell EMF and its Thermodynamic derivation of the EMF of a Galvanic cell (Nernst equation), single electrode potentials, hydrogen half cell, quinhydrone half cell and calomel half cell (construction, representation, cell reaction, expression of potential, Discussion, Application) Storage cell, fuel cell (construction, representation, cell reaction, expression of potential, Discussion, Application). Application of EMF measurement on a) Ascertain the change in thermodynamic function (ΔG, ΔH, ΔS) b) ascertain the equilibrium constant of a reversible chemical reaction c) ascertain the valency of an ion.	3
IV	**Structure and reactivity of Organic molecule** Electronegativity, electron affinity, hybridisation, Inductive effect, resonance, hyperconjugation, electromeric effect, carbocation, carbanion and free radicals. Brief study of some addition, eliminations and substitution reactions.	3
	Polymerization Concepts classifications and industrial applications. 8 Polymer molecular weight (number avg. weight avg. viscosity avg.: Theory and mathematical expression only), Poly dispersity index (PDI). Polymerization processes (addition and condensation polymerization), degree of polymerization, Copolymerization, stereo-regularity of polymer, crystallinity (concept of Tm) and amorphicity (Concept of Tg) of polymer. Preparation, structure and use of some common polymers: plastic (PE: HDPE, LDPE, LLDPE, UHMWPE)), rubber (natural rubber, SBR), fibre(nylon 6.6). Vulcanization. Conducting and semi-conducting polymers.	5
V	**Industrial Chemistry Solid Fuel:** Coal, Classification of coal, constituents of coal, carbonization of coal (HTC and LTC), Coal analysis: Proximate and ultimate analysis. Liquid fuel: Petroleum, classification of petroleum, Refining, Petroleum distillation, Thermal cracking, Octane number, Cetane number, Aviation Fuel (Aviation Gasoline, Jet Gasoline), Bio-diesel. Gaseous fuels: Natural gas, water gas, Coal gas, bio gas.	5

RESOURCES:

Text Books:

1.P. C. Rakshit, Physical Chemistry, Sarat Book House (7th Edition).
2. S. Glasston, Text Book of Physical Chemistry, Macmillan India Limited.
3. S. Pahari, Physical Chemistry, New Central Book Agency.

Reference Books:

1. S. Sarkar, Fuels and Combustion, Taylor & Francis (3rd Edition), 2009

2. P. Ghosh, Polymer Science and Technology of Plastics and Rubbers, Tata McGraw Hill Publishing Company Limited.
3. F.W.Billmeyer : Textbook of Polymer Science is published by Wiley India (is now an Indian Imprint.)

Course Title: ENGLISH LANGUAGE & TECHNICAL COMMUNICATION	**Code: HU101**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 2L /week**
Continuous Assessment: 25 Marks Attendance 5 Marks	**Final Exam: 70 Marks**
Writer: Course Coordinator	**Approved by HoD (convenor of DAB)**

COURSE OUTCOMES (COs) ENGLISH LANGUAGE & TECHNICAL COMMUNICATION

On completion of the course students will be able to

Course Outcomes	Details	Knowledge Level
HU101.CO1	Understand Basics of Spoken variety of English Language as used in Electronics & related fields	K2: Understanding
HU101.CO2	Apply basic Rules of English Vocabulary Skill for Speaking correctly in Electronics & related fields	K3: Applying
HU101.CO3	Apply basicRules of English Grammar Skill for Presentation in Electronics & related fields	K3: Applying
HU101.CO4	Apply basic Rules of English Grammar Skill for Writing correctlyin Electronics & related fields	K3: Applying
HU101.CO5	Apply basic English Language Skills for Responding Verbally & Nonverballyin Electronics & related fields	K3: Applying
HU101.CO6	Demonstrate basic English Language Skill for Technical Writingin Electronics & related fields	K2: Understanding

Mapping of COs with POs and PSOs:

	PO	PO	PO3	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1	PSO	PSO	PSO

	1	2		4	5	6	7	8	9	0	1	2	1	2	3
CO1										3		2			1
CO2										3		2			1
CO3										3		2			1
CO4										3		2			1
CO5										3		2			1
CO6										3		2			1
AVG.	0	0	0	0	0	0	0	0	0	3	0	2			1.00

University Syllabus:

Module	Content	Hrs/Unit
I	**A. ENGLISH LANGUAGE GRAMMAR:** Correction of Errors in Sentences Building Vocabulary Word formation Single Word for a group of Words Fill in the blanks using correct Words Sentence Structures and Transformation Active & Passive Voice Direct & Indirect Narration (MCQ Practice during classes).	5
II	B. READING COMPREHENSION: Strategies for Reading Comprehension Practicing Technical &Non Technical Texts for Global/Local/Inferential/Referential comprehension; Précis Writing	4
III	C. TECHNICAL COMMUNICATION The Theory of Communication –Definition & Scope Barriers of Communication Different Communication Models Effective Communication (Verbal / Non verbal) Presentation / Public Speaking Skills 5L (MCQ Practice during classes)	5
IV	D. MASTERING TECHNICAL COMMUNICATION Technical Report (formal drafting)	3
	Business Letter (formal drafting)	4
	Job Application (formal drafting)	3
	Organizational Communication	3
	Group Discussion –Principle & Practice	3

RESOURCES:

1. Board of Editors: Contemporary Communicative English for Technical Communication Pearson Longman,2010
2. Dr. D. Sudharani: Manual for English Language Laboratory Pearson Education (W.B. edition), 2010
3. D. Thakur: Syntax Bharati Bhawan , 1998
4. Longman Dictionary of Contemporary English (New Edition) for Advanced Learners

Course Title: Basic Electrical &Electronic Engineering – 1	Code: ES101
Type Of Course: Theory	Course Designation: Compulsory
Continuous Assessment: 25 marks Attendance : 5 Marks	Final Exam:70Marks
Semester: 1st	Contact Hours: 3P/week
Course Coordinator:	

COURSE OUTCOMES (COs) Basic Electrical & Electronic Engineering – 1

On completion of the course students will be able to

Course Outcomes	Details	Knowledge Level
ES101.CO1	**Apply** different theorems to solve complicated DC network systems used in industrial applications.	K3: Apply
ES101.CO2	**Identify** the theory of magnetism, elector-magnetism , inductance to make use of in in different application.	K3:Identify
ES101.CO3	**Analyze** the behaviour of AC wave forms to categorize the series, parallel, resonance circuits.	K4:Analyze
ES101.CO4	**Understand** the basic properties of semiconductors to classify extrinsic and intrinsic semiconductor .	K2: Understand
ES101.CO5	**Explain** the various junction properties and IV characteristics of different types diodes to compare the figure of merits of rectifiers circuits.	K2: Understand
ES101.CO6	**Analyze**the IV characteristics of BJT in different configuration to compare the stability factor, injection efficiency, base transport factor and current amplification factor.	K4: Analyze

Mapping of COs with POs and PSOs:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	-	-	2	1	-	-	-	-	2	3	1	1
CO2	3	2	1	-	-	2	1	-	-	-	-	1	2	1	1
CO3	3	3	2	-	-	2	2	-	-	-	-	1	3	2	1
CO4	3	3	2	-	-	2	2	-	-	-	-	3	3	2	2
CO5	3	3	2	-	-	2	2	-	-	-	-	3	3	2	2

CO6	3	3	2	-	-	2	1	-	-	-	-	2	3	1	1
AVG.	3.00	2.83	1.83	0	0	2.00	1.50	0	0	0	0	2.00	2.83	1.50	1.33

University Syllabus of Basic Electrical

Module	Content	Hrs/Unit
I	**DC Network Theorem:** Definition of electric circuit, network, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, Kirchhoff's law, Principle of superposition. Source equivalence and conversion, Thevenin's theorem, Norton Theorem, nodal analysis, mesh analysis, star delta conversion. Maximum power transfer theorem with proof.	7
II	**Electromagnetism:** Biot-savart law, Ampere's circuital law, field calculation using Biot-savart & ampere's circuital law. Magnetic circuits, Analogous quantities in magnetic and electric circuits, Faraday's law, Self and mutual inductance. Energy stored in a magnetic field, B-H curve, Hysteretic and Eddy current losses, Lifting power of Electromagnet.	5
III	**AC fundamental:** Production of alternating voltage, waveforms, average and RMS values, peak factor, form factor, phase and phase difference, phasor representation of alternating quantities, phasor diagram, behavior of AC series , parallel and series parallel circuits, Power factor, Power in AC circuit, Effect of frequency variation in RLC series and parallel circuits, Resonance in RLC series and parallel circuit, Q factor, band width of resonant circuit.	9

University Syllabus of Basic electronics

Module	Content	Hrs/Unit
I	**Semiconductors:** Crystalline material: Mechanical properties, Energy band theory, Fermi levels; Conductors, Semiconductors and Insulators: electrical properties, band diagrams. Semiconductors: intrinsic and extrinsic, energy band diagram, electrical conduction phenomenon, P-type and N-type semiconductors, drift and diffusion carriers.	4
II	**Diodes and Diode Circuits:** Formation of P-N junction, energy band diagram, built-in-potential forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics; Junction capacitance and Varactor diode. Simple diode circuits, load line, linear piecewise model; Rectifier circuits: half wave, full wave, PIV, DC voltage and current, ripple factor, efficiency, idea of regulation.	6
III	**Bipolar Junction Transistors:** Formation of PNP / NPN junctions, energy band diagram; transistor mechanism and principle of transistors, CE, CB, CC configuration, transistor characteristics: cut-off active and saturation mode, transistor action, injection efficiency, base transport factor and current amplification factors for CB and CE modes.	8

	Biasing and Bias stability: calculation of stability factor;	

RESOURCES:

1. Sedra& Smith: Microelectronics Engineering.
2. Millman&Halkias: Integrated Electronics.

Course Title: Chemistry-1	**Code: CH191**
Type of Course:Practical	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (Convenor of DAB)**

Pre-requisites: Knowledge of in Chemistry in class XII

COURSE OUTCOMES (CO's) of Chemistry-1

On completion of the course students will be able to

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
CH191.CO1	Determine the strength of an acid using volumetric, method.	K5:Evaluate
CH191.CO2	Determine the strength of an acid using conductometric method.	K5:Evaluate
CH191.CO3	Determine the strength of an acid using pH-metric methods	K5:Evaluate
CH191.CO4	Determine some physical property like partition coefficient of a compound and viscosity of a solution at room temperature	K5:Evaluate
CH101.CO5	Estimate the amount of an ion present in a given solution using permanganometric and argentometric methods	K5:Evaluate
CH191.CO6	Evaluate alkalinity (in terms of CaCO3 equivalent), hardness (in ppm) and amount of dissolved oxygen (in mg/l) present in a given water sample using volumetric method	K5:Evaluate

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	2	3									1		
CO2	1	1	2	3									1		
CO3	1	1	2	3									1		
CO4	1	2	2	3									2		
CO5	1	2	2	3									2		
CO6	1	2	2	3									2		
AV	1	1.5	2	3	0	0	0	0	0	0	0	0	1.50	0	0

University Syllabus:

Unit	Content
1	To Determine the alkalinity in a given water sample.
2	Red-ox titration (estimation of iron using permanganometry)
3	To determine calcium and magnesium hardness of a given water sample separately.
4	To determine the value of the rate constant for the hydrolysis of ethyl acetate catalyzed by hydrochloric acid.
5	Heterogeneous equilibrium (determination of partition coefficient of acetic acid between n-butanol and water)
6	Viscosity of solutions (determination of percentage composition of sugar solution from viscosity)
7	Conductometric titration for determination of the strength of a given HCl solution by titration against a standard NaOH solution.
8	pH- metric titration for determination of strength of a given HCl solution against a standard NaOH solution.
9	Determination of dissolved oxygen present in a given water sample.
1O	To determine chloride ion in a given water sample by Argentometric method (using chromate indicator solution)

Course Title: Engg Drawing & Computer Graphics	**Code: ME191**
Type of Course:Practical	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 3P+1T/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (Convenor of DAB)**

Course Outcomes (CO's) ofEngg Drawing & Computer Graphics

On completion of the course students will be able to

CO number	CO Statements	Bloom's Revised Knowledge Level
ME191.CO1	Understand the utility of drawing instruments, dimensions and lines in technical drawing.	K3: Applying
ME191.CO2	Know the Standard conventions and Construction of various Scales and Engineering curves	K2: Understanding
ME191.CO3	Apply fundamentals of theory of projections and draw orthographic projections of points, lines and surfaces.	K3: Applying
ME191.CO4	Construct the sketch of orthographic projections of regular solids and their sectional views.	K3: Applying
ME191.CO5	Comprehend and apply the theory of development of surfaces	K2: Understanding
ME191.CO6	Apply basic concepts of CAD to develop and construct accurate 2D geometry through creation of basic geometric constructions.	K3: Applying

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	1	1	-	-	-	-	-	-	2	-	-	-	-	1
CO2	2	1	1	-	-	1	-	-	-	-	-	-	-	-	-
CO3	1	2	-	-	-	-	-	-	-	2	-	-	-	-	1
CO4	1	2	-	-	-	-	-	-	-	1	-	-	-	-	-
CO5	1	2	-	-	-	-	-	-	-	1	-	-	-	-	-

CO6	3	3	2	1	-	-	-	-	-	1	-	-	1	-	-
AVG	1.5	1.83	1.33	1	0	1	0	0	0	1.4	0	0	1.00	0	1.00

University Syllabus:

Unit	Content	Hours
	THEORY PART	
1	Introduction to Lines, Lettering, Dimensioning, Scales.	1
2	Geometrical Construction and Curves	1
3	Projection of Points, Lines and surfaces	2
4	Projection of Solids	2
5	Isometric Views	1
6	Sectional Views	1
7	Development of Surfaces	1
8	Introduction to Computer Aided Drafting	3

Unit	Content	Hours
	PRACTICAL PART	
1	LINES, LETTERING, DIMENSIONING, SCALES; Plain scale, Diagonal	6
2	GEOMETRICAL CONSTRUCTION AND CURVES; Construction of polygons, Parabola, Hyperbola, Ellipse.	6
3	PROJECTION OF POINTS, LINES, SURFACES; Orthographic projection- 1st and 3rd angle projection, Projection of lines and surfaces– Hexagon	3
4	PROJECTION OF SOLIDS; Cube, Pyramid, Prism, Cylinder, Cone	6
5	DRAWING ISOMETRIC VIEW FROM ORTHOGONAL/ SECTIONAL VIEWS OF SIMPLE SOLID OBJECTS	3
6	FULL AND HALF SECTIONAL VIEWS OF SOLIDS	3
7	DEVELOPMENT OF SURFACES:Prism, Cylinder, Cone.	3
8	COMPUTER AIDED DRAFTING (Using AutoCAD and/or similar softwares) Introduction: Cartesian and Polar coordinate system, Absolute and Relative coordinates; Basic editing commands: Line, Point, Trace, Rectangle, Polygon, Circle, Arc, Ellipse, Polyline; Editing methods; Basic object selection methods, Window and crossing window, Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror; Display commands: Zoom, Pan, Redraw, Regenerate; Simple dimensioning and text, Simple exercises.	6

RESOURCES:

1. Narayana, K.L. and Kannaiah, P. Text Book of Engineering Drawing"Engineering Graphics", ScitechPublication
2. Bhatt, N.D. "Elementary Engineering Drawing", Charotar Book Stall, Anand, 1998
3.Lakshminarayanan, V. and VaishWanar, R.S., "Engineering Graphics", Jain Brothers, New Delhi,1998
4.Chandra, A.M. and Chandra Satish, "Engineering Graphics", Narosa, 1998
5. Jolhe, "Engineering Graphics", Tata McGraw-Hill- WBUT Series
6. Gill, P.S., "A Text Book of Engineering Drawing", Katson Publishing House (Kataria and Sons)
7.Venugopal, K., "Engineering Drawing & Graphics + AutoCAD", New Age International
8. Ventaka Reddy K., "Text Book of Engineering Drawing (2nd Edition)", BS Publication.

Course Title: Basic Electrical & Electronic Engineering -1	**Code: ES191**
Type of Course: Practical	**Course Designation:**
Semester: 1st	**Contact Hours: 3P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (Convenor of DAB)**

Pre-requisites: Knowledge of Physics in Class XII.

Course Outcomes (CO's)

On completion of the course students will be able to

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
ES191.CO1	**Determine** the characteristics of different lamps to estimate their performance.	K5: Determine
ES191.CO2	**Evaluate** the network theorems to justify their application.	K5:Evaluate
ES191.CO3	**Design** series ,parallel R-L-C circuit to estimate their performance.	K6:Design
ES191.CO4	**Apply** the concept of basic electronic components ,equipments to choose them for specific circuit.	K3:Apply
ES191.CO5	**Evaluate** diode operation to interpret its performance as rectifier and regulator.	K5:Evaluate
ES191.CO6	**Design** of transistor based circuits to estimate their characteristics.	K6:Design

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3		3	2		3			3	3	3	2
CO2	3	3	3	3		2	1		3			3	3	2	2
CO3	3	3	3	3		3	1		3			3	3	2	2
CO4	3	3	3	3		3	3		3			3	3	3	2
CO5	3	3	3	3		2	1		3			3	3	2	2
CO6	3	3	3	3		2	1		3			3	3	2	2
AV	3	3	3	3		2.5	1.5		3			3	3.00	2.33	2.00

G															

University Syllabus :

Unit	Content
Basic Electrical Engineering Laboratory - I	
1	Characteristics of Fluorescent lamps
2	Characteristics of Tungsten and Carbon filament lamps
3	(a) Verification of Thevenin's theorem. (b) Verification of Norton's theorems.
4	Verification of Maximum power theorem.
5	Verification of Superposition theorem
6	Study of R-L-C Series circuit
7	Study of R-L-C parallel circuit

Unit	Content
Basic Electronics Engineering Laboratory- I	
1	Familiarisation with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes,
2	Transistors (BJT) and electronic equipment like DC power supplies, multimeters etc.
3	Familiarisation with measuring and testing equipment like CRO, Signal generators etc.
4	Study of I-V characteristics of Junction diodes.
5	Study of I-V characteristics of Zener diodes.
6	Study of Half and Full wave rectifiers with Regulation and Ripple factors.
7	Study of I-V characteristics of BJTs

RESOURCES:

1. A Textbook of Basic Electrical and Electronics Engineering Paperback – 2013 by J.B. Gupta (Author)
2. A Manual of Laboratory Experiments and Workshop Practice: Incorporating Step-by-step Design of Circuits Using Discrete Semiconductor Devices Paperback – Import, 28 Nov 2011
3. by B. Somanathan Nair (Author), S. R. Deepa (Author)
4. Getting Started in Electronics by Forrest.M.Mims
5. A Manual of Laboratory Experiments and Workshop Practice: Incorporating Step-by-step Design of Circuits Using Discrete Semiconductor Devices Paperback – Import, 28 Nov 2011
6. by B. Somanathan Nair (Author), S. R. Deepa (Author)
7. Electrical And Electronics Engineering Materials (Uptu) Paperback – 2011
8. by S.O.Pillai (Author), Sivakami (Author)

Course Title: Language Laboratory	**Code: HU181**
Type of Course: Sessional	**Course Designation:**
Semester: 1st	**Contact Hours: 2P/week**
Continuous Assessment: 40 marks	**Final Exam: 60 Marks**
Writer: Course Coordinator	**Approved by HoD (Convenor of DAB)**

Pre-requisites: Knowledge of Basic English Language in Class XII.

Course Outcomes (CO's) of Language Laboratory

On completion of the course, students will be able to

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
HU181: CO1	Understand Basics of Spoken variety of English Language as used in Electronics & related fields	K2: Understanding
HU181: CO2	Apply basic Rules of English Grammar Skill for Speaking correctly in Electronics & related fields	K3: Applying
HU181: CO3	Apply basic Rules of English Grammar Skill for Presentation in Electronics & related fields	K3: Applying
HU181: CO4	Apply basic Rules of English Grammar Skill for Writing correctly in Electronics & related fields	K3: Applying
HU181: CO5	Apply basic English Language Skill for Responding Verbally & Nonverbally in Electronics & related fields	K3: Applying
HU181: CO6	Demonstrate basic English Language Skill for Technical Writing in Electronics & related fields	K2: Understanding

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1										3		3	1	1	1
CO2										3		3	1	1	1
CO3										3		3	1	1	1
CO4										3		3	1	1	1
CO5										3		3	1	1	1
CO6										3		3	1	1	1
AVG	0	0	0	0	0	0	0	0	0	3	0	3	1.00	1.00	1.00

University Syllabus :

Unit	Content	Hrs/Unit
1	Honing 'Listening Skill' and its sub skills through Language Lab Audio device;	3
2	Honing 'Speaking Skill' and its sub skills;	2
3	Helping them master Linguistic/Paralinguistic features (Pronunciation/Phonetics/Voice modulation/ Stress/ Intonation/ Pitch &Accent) of connected speech**;**	2
4	Honing 'Conversation Skill' using Language Lab Audio –Visual input; Conversational Practice Sessions (Face to Face / via Telephone, Mobile phone & Role Play Mode**);**	2
5	Introducing 'Group Discussion' through audio –Visual input and acquainting them with key strategies for success;	2
6	GD Practice Sessions for helping them internalize basic Principles (turn- taking, creative intervention, by using correct body language, courtesies & other soft skills) of GD;	4
7	Honing 'Reading Skills' and its sub skills using Visual / Graphics/Diagrams /Chart Display/Technical/Non Technical Passages; Learning Global / Contextual / Inferential Comprehension;	2
8	Honing 'Writing Skill' and its sub skills by using Language Lab Audio –Visual input; Practice Sessions	2

RESOURCES:

- Dr. D. Sudharani: Manual for English Language LaboratoryPearson Education (WB edition), 2010Board of Editors: Contemporary Communicative English for Technical Communication Pearson Longman, 2010

Course Title: Extra Curricular Activities **(NSS/NCC/NSO etc)**	**Code: XC 181**
Type of Course: Sessional	**Course Designation: Compulsory**
Semester: 1st	**Contact Hours: 2P/week**
Continuous Assessment: 40 Marks	**Final Exam: 60 Marks**
Writer: Course coordinator	**Approved by HoD(Convenor of DAB)**

Pre-requisites: Some basic knowledge of environmental protection and other extracurricular activities.

Course Outcomes:

On completion of the course students will be able to

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
XC181:CO1	Create awareness in social issues.	K6:Creating
XC181:CO2	Collaborate in mass education program.	K6:Creating
XC181:CO3	Develop some proposals for local slum area development and waste disposal.	K6:Creating
XC181:CO4	Plan environmental awareness.	K5:Evaluating
XC181:CO5	Collaborate in relief and rehabilitation work during natural calamities.	K6:Creating
XC181:CO6	Plan production oriented programmes.	K5:Evaluating

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	2	-	3	2	-	3	3	2	2	2	3	3
CO2	2	2	1	1	1	3	2	1	3	3	2	2	1	2	3
CO3	3	3	3	2	3	3	2	1	3	3	2	2	3	3	3
CO4	2	2	2	2	3	3	2	-	3	3	2	2	1	3	3
CO5	3	2	2	2	3	3	2	1	3	3	2	2	3	2	3
CO6	2	1	2	3	2	3	2	-	3	3	3	2	2	3	3

AVG	2.16	2	1.83	2	2.4	3	2	1	3	3	2.16	2	2	2.66	3

University Syllabus:

Unit	Content
1	a) Creating awareness in social issues b) Participating in mass education programmes c) Proposal for local slum area development d) Waste disposal e) Environmental awareness f) Production Oriented Programmes g) Relief & Rehabilitation work during Natural calamities
2	Creating awareness in social issues: 1. Women's development – includes health, income-generation, rights awareness. 2. Hospital activities – Eg. writing letters for patients, guiding visitors 3. Old age home – visiting the aging in-mates, arranging for their entertainment. 4. Children's Homes - visiting the young in-mates, arranging for their entertainment 5. Linking with NGOs to work on other social issues. (Eg. Children of sex-workers) 6. Gender issues- Developing an awareness, to link it with Women's Cell of college
3	Participating in mass education programmes 1.Adult education 2. Children's education Proposal for local slum area development One or two slums to be identified and according to the needs, activities to be developed and proposals and reports are to be submitted. Environmental awareness
4	• Resource conservation – Awareness to be developed on water, energy, soil. • Preservation of heritage monuments- Marches, poster campaigns • Alternative energy consciousness amongst younger school-children. • Plantation and beautification- Plantation of trees, their preservation and upkeep, developing NSS parks. • Waste disposal- Proper methods of domestic waste disposal. Production Oriented Programmes
5	Working with people and explaining and teaching improved agricultural practices Rodent control land pest control practices; Soil-testing, soil health care and soil conservation; Assistance in repair of agriculture machinery; Work for the promotion and strengthening of cooperative societies in villages; Assistance and guidance in poultry farming, animal husbandry, care of animal health etc.;
6	Popularization of small savings andAssistance in procuring bank loans Relief & Rehabilitation work during Natural calamities Assisting the authorities in distribution of rations, medicine, clothes etc.; Assisting the health authorities in inoculation and immunization, supply of medicine etc.; Working with the local people in reconstruction of their huts, cleaning of wells, building roads etc.; Assisting and working with local authorities in relief and rescue operation; Collection of clothes and other materials, and sending the same to the affected areas;

Course Title: Engineering Thermodynamics & Fluid Mechanics	**Code: ME201**
Type of Course:Theory	**Course Designation: Compulsary**
Semester: 2nd	**Contact Hours: 3P+1T/week**
Continuous Assessment: 25 marks **Attendance :5 marks**	**Final Exam:70Marks**
Writer: Course coordinators	**Approved by HoD (Convenor of DAB)**

Pre-requisites: Basic knowledge of Mathematics and Physics.

Course Outcomes (CO's) of Engineering Thermodynamics &FluidMechanics

On completion of the course students will be able to

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
ME201:CO1	Analyze the work and heat interactions associated with a prescribed process path and to perform an analysis of a flow system	K4: Analyzing
ME201:CO2	Define the fundamentals of the first and second laws of thermodynamics and explain their application.	K1: Remembering
ME201:CO3	Determine the changes in thermodynamics properties of substance.	K5: Evaluating
ME201:CO4	Evaluate the performance of energy conversion devices and their differences.	K5: Evaluating
ME201:CO5	Identify the fluid properties and relationship between them	K3: Applying
ME201:CO6	Understand the principles of continuity, momentum, and energy and application in different measuring devices.	K2: Understanding

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**	**PSO 3**
CO1	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-

CO2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	-	-	1	1	-	-	-	-	-	-	-	-	-
CO4	2	2	1	-	1	1	2	1	-	-	1	1	-	1	-
CO5	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	2	2	1	-	1	1	2	1	-	-	1	1	-	1	-
AV G	2	2	1	0	1	1	2	1	0	0	1	1	0	1.00	0

University Syllabus :

Unit	Content	Hrs/Unit
1	**Basic Concepts of Thermodynamics** Introduction: Microscopic and Macroscopic viewpoints. Definition of Thermodynamic systems: closed, open and isolated systems. Concept of Thermodynamics state; state postulate. Definition of properties: intensive, extensive & specific properties. Thermodynamic equilibrium Thermodynamic processes; quasi-static, reversible & irreversible processes; Thermodynamic cycles. Zeroth law of thermodynamics. Concept of empirical temperature. **Heat and Work** Definition & units of thermodynamic work. Examples of different forms of thermodynamic works; example of electricity flow as work. Work done during expansion of a compressible simple system Definition of Heat; unit of Heat Similarities & Dissimilarities between Heat & Work **Ideal Equation of State, processes; Real Gas** Definition of Ideal Gas; Ideal Gas Equations of State. Thermodynamic Processes for Ideal Gas; P-V plots; work done, heat transferred for isothermal, isobaric, isochoric, isentropic &polytropic processes. Equations of State of Real Gases: Vander Waal's equation; Virial equation of state. **Properties of Pure Substances** p-v & P-T diagrams of pure substance like H2O Introduction to steam table with respect to steam generation process; definition of saturation, wet & superheated status. Definition of dryness fraction of steam, degree of superheat of steam.	8L+3T
2	**1st Law of Thermodynamics** Definition of Stored Energy & Internal Energy, 1st Law of Thermodynamics for cyclic processes, Non Flow Energy Equation ,Flow Energy & Definition of Enthalpy, Conditions for Steady State Steady flow: Steady State Steady Flow Energy Equation	4L+3T
3	**2nd Law of Thermodynamics**	6L+3T

	Definition of Sink, Source Reservoir of Heat. Heat Engine, heat Pump & Refrigerator; Thermal efficiency of Heat Engines & co-efficient of performance of Refrigerators, Kelvin – Planck &Clausius statements of 2nd Law of Thermodynamics,Absolute or Thermodynamic scale of temperature, ClausiusIntegral,Entropy,Entropy change calculation for ideal gas processes,Carnot Cycle & Carnot efficiency,PMM-2; definition & its impossibility	
4	Otto cycle; plot on P-V, T-S planes; Thermal efficiency. Diesel cycle; plot on P-V, T-S planes; Thermal efficiency **Rankine cycle of steam** h-s chart of steam (Mollier's Chart). Simple Rankine cycle plot on P-V, T-S, h-s planes. Rankine cycle efficiency with & without pump work	6L+3T
5	**Properties & Classification of Fluids** Ideal & Real fluids .Newton's law of viscosity; Newtonian and Non-Newtonian fluids. Compressible and Incompressible fluids **Fluid Statics** Pressure at a point **Measurement of Fluid Pressure** Manometers : simple & differential U-tube Inclined tube **Fluid Kinematics** Stream line, laminar & turbulent flow, external & internal flow, Continuity equation **Dynamics of ideal fluids** Bernoulli's equation, Total head; Velocity head; Pressure head, Application of Bernoulli's equation **Measurement of Flow rate: Basic principles** Venturimeter, Pilot tube, Orifice meter	9L+3T

RESOURCES:

1. Engineering Thermodynamics - P K Nag, 4th edn, TMH.
2. References:
3. "Fundamentals of Thermodynamics" 6e by Sonntag & Van Wylin published by Wiley India.
4. Engineering Thermodynamics – Russel &Adeliyi (Indian edition), OUP
5. Engineering Thermodynamics – Onkar Singhh, New Age International Publishers Ltd.
6. Basic Engineering Thermodynamics – R Joel, 5th Ed., Pearson
7. Fluid Mechanics and Hydraulic Machines - R K Bansal
8. Introduction to Fluid Mechanics and Fluid Machines - S. K. Som and G. Biswas. 2nd edn, TMH

Course Title: Mathematics-2	**Code: M 201**
Type of Course: Theory	**Course Designation: Compulsuary**
Semester: 2nd	**Contact Hours: 3P+1T/week**
Continuous Assessment: 25 marks **Attendance :5 marks**	**Final Exam:70Marks**
Writer: Course Coordinators	**Approved by HoD (Convenor of DAB)**

Pre-requisites: Basic knowledge of Physics of Class XII

Course Outcomes (CO's) of Mathematics-2

On completion of the course students will be able to

CO number	CO Statements	Bloom's Revised Knowledge Level
M 201.CO1	Understand theOrdinary differential equations (ODE)- First order and first degree	K2:Understand
M 201.CO2	Apply the knowledge to solve ODE- Higher order and first degree	K3:Apply
M 201.CO3	Analyze Basics of Graph Theory	K4:Analyze
M 201.CO4	Determine minimal spanning tree using DFS, BFS, Kruskal's and Prim's algorithms.	K5: Evaluate
M 201.CO5	Apply the knowledge to evaluate LT, Solution of linear ODE with constant coefficients (initial value problem) using LT.	K3:Apply
M 201.CO6	Evaluate improper integrals using LT, LT of periodic and step functions	K5: Evaluate

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	**3**	**3**	**3**	**3**									**1**		
CO2	**3**	**3**	**3**	**2**									**1**		
CO3	**3**	**3**	**2**	**2**									**2**		
CO4	**3**	**3**	**3**	**2**									**2**		

CO5	**3**	**2**	**2**	**1**									**3**		
CO6	**3**	**2**	**2**	**1**									**3**		
AVG	**3**	**2.667**	**2.5**	**1**	0		0	0	0	0	0	0	**2**	**0**	**0**

University Syllabus :

Module	Content	Hrs/Unit
1	**Ordinary differential equations (ODE)- First order and first degree:** Exact equations, Necessary and sufficient condition of exactness of a first order and first degree ODE (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli's equation. General solution of ODE of first order and higher degree (different forms with special reference to Clairaut's equation).	5
2	**ODE- Higher order and first degree:**General linear ODE of order two with constant coefficients, C.F. & P.I., D-operator methods for finding P.I., Method of variation of parameters, Cauchy-Euler equations, Solution of simultaneous linear differential equations.	6
3	**Basics of Graph Theory:** Graphs, Digraphs, Weighted graph, Connected and disconnected graphs, Complement of a graph, Regular graph, Complete graph, Subgraph,; Walks, Paths, Circuits, Euler Graph, Cut sets and cut vertices, Matrix representation of a graph, Adjacency and incidence matrices of a graph, Graph isomorphism, Bipartite graph.	10
4	**Tree**: Definition and properties, Binary tree, Spanning tree of a graph, Minimal spanning tree, properties of trees, Algorithms: Dijkstra's Algorithm for shortest path problem, Determination of minimal spanning tree using DFS, BFS, Kruskal's and Prim's algorithms.	6
5	**Improper Integral:** Basic ideas of improper integrals, working knowledge of Beta and Gamma functions (convergence to be assumed) and their interrelations. **Laplace Transform (LT):** Definition and existence of LT, LT of elementary functions, First and second shifting properties, Change of scale property; LT of f(t) t , LT of ( ) n t f t , LT of derivatives of f(t) , L.T. of $\int f(u)du$. Evaluation of improper integrals using LT, LT of periodic and step functions, Inverse LT**:** Definition and its properties; Convolution Theorem (statement only) and its application to the evaluation of inverse LT, Solution of linear ODE with constant coefficients (initial value problem) using LT.	13

RESOURCES:

1. Advanced Engineering Mathematics, Erwin Kreyszig, (Wiley Eastern)
2. Graph Theory: V. K. Balakrishnan, (Schaum's Outline, TMH)
3. A first course at Graph Theory: J. Clark and D. A. Holton (Allied Publishers LTD)
4. Introduction to Graph Theory: D. B. West (Prentice-Hall of India)
5. Graph Theory: N. Deo (Prentice-Hall of India)
6. Engineering Mathematics: B.S. Grewal (S. Chand & Co.)
7. Higher Engineering Mathematics: John Bird (4th Edition, 1st Indian Reprint 2006, Elsevier)
8. Calculus: Strauss, Bradley and Smith (3PrdP edition, Pearson Education)
9. Engineering Mathematics (Volume 2): S. S. Sastry (Prentice-Hall of India)
10. Advanced Engineering Mathematics, 3E: M.C. Potter, J.L. Goldberg and E.F. Abonfadel (OUP), Indian Edition
11. An Introduction to Differential Equations, R.K. Ghosh and K.C.Maity (New Central Book Agency .

Course Title: Physics- 1	**Code: PH 201**
Type of Course:Theory	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 3L+1T/ week**
Continuous Assessment: 25 marks **Attendance :5 marks**	**Final Exam:70Marks**
Writer: Course Coordinators	**Approved by HoD (Convenor of DAB)**

Pre-requisites: Basic knowledge of Physics of Class XII

Course Outcomes (CO's) of Physics I

On completion of the course students will be able to

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
PH 201.CO1	**Apply** basic concepts of mechanics	K3: Applying
PH 201.CO2	**Discuss** Physical optics and **analyze** principles of lasers with applications	K2: Understanding
PH 201.CO3	**Categorize** di electric and magnetic properties of materials	K4:Analyzing
PH 201.CO4	**Analyze** and apply Electromagnetic laws in Engineering	K4:Analyzing
PH 201.CO5	**Differentiate** between Classical Physics and Quantum Physics by introducing Planck's law	K2: Understanding
PH 201.CO6	**Apply** wave particle duality in real life problems followed by simple quantum mechanics calculations	K3: Applying

Mapping of COs with POs and PSOs (Course Articulation Matrix):

CO-PO mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3.0	2.0	1.0	-									2		
CO2	1.0	3.0	2.0	-									2		
CO3	3.0	2.0	1.0	1.0									2		
CO4	1.0	3.0	2.0	-									2		
CO5	1.0	3.0	2.0	0.0									2		
CO6	-	1.0	3.0	2.0									2		
Averag e	1.8	2.3	1.8	1.0	0	0	0	0	0	0	0	0	2.00	0	0

University Syllabus :

Unit	Content	Hrs/Unit
1	**Oscillation:** 1.1 Simple harmonic motion Preliminary concepts. Superposition of SHMs in two mutually perpendicular directions, Lissajous figures**.**	8

	1.2 Damped vibration: Differential equation and it's solution, Logarithmic decrement, Quality factor**.** 1.3 Forced vibration: Differential equation and it's solution, Amplitude and velocity resonance, Sharpness of resonance, Application in L-C-R Circuit**.**	
2	**Optics 1:** 2.1 Interference of electromagnetic waves: Conditions for sustained interference, double slit as example. Qualitative idea of Spatial and temporal interference, Conservation of energy and intensity distribution, Newton's ring**.** 2.2 Diffraction of Light: Frensel and Franhoufer class. Franhaufer diffraction for single and double slits. Intensity distribution of N slits and plane transmission grating, Missing orders, Rayleigh criterion. Resolving power of grating and microscope.	8
3	**3.1 Polarization:** General concepts of Polarization, Plane of vibration and plane of polarization, Qualitative discussion of plane, Circularly and elliptically polarized light, Polarization through reflection and Brewsters law, Double refraction, Ordinary and extraordinary rays, Nicol's prism, Polarized light, Half waved plate and quarter waved plate**.** 3.2 **Laser**: Spontaneous and simulated emission of radiation, Population inversion, Einstein's A & B coefficient, Optical resonator and condition necessary for active laser action. 3.3 **Holography:** Theory of holography, viewing hologram, Applications**.**	11
4	**Quantum Physics:** 4.1 Concepts of mass and velocity, equivalence, momentum relation, blackbody radiation, Rayleigh jeans law, Ultraviolet catastrophe, Wiens' law, Plancks, radiation law, Derivation of Wien's displacement law, and stephens law from plancks radiation law. Rayleigh's jeans law and Wiens law as Planck's radiation law. Compton Effect. 4.2 Wave particle duality and de Broglie's hypothesis: Concept of matter waves, Davison-Germer experiment, Concept of waves packet and Heisenberg's uncertainty principle.	9
5	**Crystallography:** 5.1 Elementary idea of crystal structure: lattice, basis, unit cell, Fundamental types of lattices, Bravis lattice, simple cubic lattice, Miller indices and miller planes. Coordination number and atomic packing factor**.** 5.2 X Rays: Origin of characteristic and continuous X Rays, Braggs Law , Determination of Lattice constant**.**	6

RESOURCES:

1. B Dutta Roy
2. R. K. Kar
3. Mani and Mehta
4. Arthur Baiser

Physics I
Vibration and Waves
a) Kingsley and Frey
b) D.P.Choudhury
c) N. K. Bajaj
d) K. Bhattacharyya
e) R. P. Singh
f) A. B. Gupta (College Physics Vol II)
h) Chattopadhyay &Rakshit (Vibration, Waves, Acoustics)

Optics
a) Moler(Physical Optics)
b) A.K.Ghatak
c)E.Hechit (Optics)
d)F.A.Henkins and H.E.White

e)ChitraRanjanDasgupta(Degree Physics Vol-3)

Quantum Physics
2. Eisberg and Rensickis published by Wiley India.
3. A.K.Ghatak and S.Lokenathan
4. S.N.Ghosal (Introductory Quantum Mechanics)
5. E.E.Anderson(Modern Physics)
6. Haliday, Resnick &Krane : Physics Volume 2 is Published by Wiley India
7. Binayak Dutta Roy[Elements of Quantum Mechanics]

Crystallography
1. S.O.Pillai(a. Solid State Physics. B. Problems in Solid State Physics)
2. A.J.Dekker
3. Aschroft and Memim
4. Ali Omar
5. R.L.Singhal
6. Jak Tareen and TrnKutty(Basic Course in Crystallography)

Laser and Holography

1. A. K. Ghatakand Thyagarajan(Laser)
2. Tarasov(Laser)
3. P. K. Chakraborty(Optics)
4. B. Ghosh and K. G. Majumdar(Optics)
5. B. B. Laud(Laser and Non-Linear Optics)
6. Bhattacharyya[Engineering Physics] Oxford

Course Title: Basic Computation & Principles of Computer Programming	**Code: CS 201**
Type of Course: Theory	**Course Designation: Compulsary**
Semester: 2nd	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 marks **Attendance :5 marks**	**Final Exam:70Marks**
Writer: Course Coordinators	**Approved by HoD (Convenor of DAB)**

Pre-requisites: Knowledge of Computer Fundamentals and Basic C programming.

Course Outcome (CO's) of Basic Computation & Principles of Computer Programming

On completion of the course students will be able to

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
CS201.CO1	To Analyze the problem and formulate algorithms for them.	K4:Analyze
CS201.CO2	To translate the algorithms to programs (in C language).	K2:Translate
CS201.CO3	To understand the correct syntax of logical expression, branch instruction, iteration,	K2:Understand
CS201.CO4	Apply array and pointer to solve problem.	K3:Apply
CS201.CO5	To understand the use of , function, recursion.	K2: Understand
CS201.CO6	Build analytical skill.	K6:Build

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3	2	1	1	1	1	1	2	2	3	3	-
CO2	3	3	3	3	-	1	1	1	1	1	2	2	3	3	-
CO3	3	3	3	3	-	-	-	-	1	1	-	2	2	2	-
CO4	3	3	3	3	-	-	-	-	1	1	-	2	2	2	-
CO5	3	3	3	3	-	-	-	-	1	1	-	2	2	2	-
CO6	3	3	3	3	-	-	-	-	1	1	-	2	2	2	-
AV G	3	3	3	3	2	1	1	1	1	1	2	2	2.33	2.33	0

University Syllabus :

Module	Content	Hrs/Unit
1	**Fundamentals of Computer:** History of Computer, Generation of Computer, Classification of Computers Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & OutputDevices	15

	Binary & Allied number systems representation of signed and unsigned numbers. BCD, ASII. Binary Arithmetic & logic gates Assembly language, high level language, compiler and assembler (basic concepts) Basic concepts of operating systems like MS DOS, MS WINDOW, UNIX, Algorithm & flow chart	
2	**C Fundamentals:** The C character set identifiers and keywords, data type & sizes, variable names, declaration, statements	3
3	**Operators & Expressions:** Arithmetic operators, relational and logical operators, type, conversion, increment and decrement operators, bit wise operators, assignment operators and expressions, precedence and order of evaluation. Input and Output: Standard input and output, formatted output -- printf, formatted input scanf.	5
4	**Flow of Control:** Statement and blocks, if - else, switch, loops - while, for do while, break and continue, go to and labels	2
5	**Fundamentals and Program Structures:** Basic of functions, function types, functions returning values, functions not returning values, auto, external, static and register variables, scope rules, recursion, function prototypes, C pre-processor, command line arguments**.**	6
6	**Arrays and Pointers:** One dimensional arrays, pointers and functions, multidimensional arrays.	6
7	**Structures Union and Files:** Basic of structures, structures and functions, arrays of structures, bit fields, formatted and unformatted files	5

GATE syllabus (If applicable for GATE):

GATE syllabus content	Mapping unit of university syllabus
Programming in C. Recursion. Arrays	Module 2, Module 3, Module 4, Module 5, Module 6

RESOURCES:

1. Introduction To Computing (TMH WBUT Series), E. Balagurusamy, TMH
2. Kerninghan, B.W. The Elements of Programming Style
3. Yourdon, E. Techniques of Program Structures and Design
4. Schied F.S. Theory and Problems of Computers and Programming

Course Title: Basic Electrical &Electronic Engineering-II	**Code: ES 201**
Type of Course: Theory	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 3L+1T/week**
Continuous Assessment: 25 marks **Attendance :5 marks**	**Final Exam:70Marks**
Writer: Course Coordinators	**Approved by HoD (Convenor of DAB)**

Prerequisite: Basic knowledge of Knowledge of Basic Electrical & Electronic Engineering – 1

Course Outcome ofBasic Electrical & Electronic Engineering-II

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
ES201.CO1	**Understand** the basic concept of electrostatic to explain the electrical properties of capacitors.	K2: Understand
ES201.CO2	**Analyze** different DC machine to classify DC generators , DC motors.	K4:Analyze
ES201.CO3	**Understand** the concept of Single phase transformer, Three phase induction motor, three phase system to interpret associated parameters.	K2: Understand
ES201.CO4	**Understand** the basic concept of Field Effect Transistor to classify the characteristics of JFET & MOSFET.	K2: Understand
ES201.CO5	**Apply t**he concept of positive , negative feedback to construct various oscillators and amplifiers circuits.	K3: Apply
ES201.CO6	**Understand** the basic concept of digital electronics to explain number systems, Boolean algebra and logic gates.	K2: Understand

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	3	3	2	-	-	2	1	-	-	-	-	2	3	1	1
CO2	3	2	1	-	-	2	1	-	-	-	-	1	2	1	1
CO3	3	3	2	-	-	2	2	-	-	-	-	1	3	2	1
CO4	3	3	2	-	-	2	2	-	-	-	-	3	3	2	2
CO5	3	3	3	-	-	3	3	-	-	-	-	3	3	3	2
CO6	3	3	3	-	-	3	3	-	-	-	-	3	3	3	2
AV G	3.00	2.83	2.17	0	0	2.33	2.00	0	0	0	0	2.17	2.83	2.00	1.50

University Syllabus : Knowledge of Basic Electrical & Electronic Engineering – 1

Basic Electrical Engineering - II

Module	Content	Hrs/Unit
1	**Electrostatics:** Coulomb's law, Electric Field Intensity, Electric field due to a group of charges, continuous charge distribution, Electric flux, Flux density, Electric potential, potential difference, Gauss's law, proof of gauss's law, its applications to electric field and potential calculation, Capacitor, capacitance of parallel plate capacitor, spherical capacitor, isolated spheres, concentric conductors, parallel conductors. Energy stored in a capacitor.	5
2	**DC Machines:** Construction, Basic concepts of winding (Lap and wave). DC generator: Principle of operation, EMF equation, characteristics (open circuit, load) DC motors: Principle of operation, Speedtorque Characteristics (shunt and series machine), starting (by 3 point starter), speed control (armature voltage and field control**)**	6
3	**Single phase transformer**: Core and shell type construction, EMF equation, no load and on load operation, phasor diagram and equivalent circuit, losses of a transformer, open and short circuit tests, regulation and efficiency calculation**.**	4
4	**3 phase induction motor:** Types, Construction, production of rotating field, principle of operation, equivalent circuit and phasor diagram, rating, torque-speed characteristics (qualitative only). Starter for squirrel cage and wound rotor induction motor. Brief introduction of speed control of 3 phase induction motor (voltage control, frequency control, resistance control)	5
5	**Three phase system**: Voltages of three balanced phase system, delta and star connection, relationship between line and phase quantities, phasor diagrams. Power measurement by two watt meters method.	3
6	**General structure of electrical power system:** Power generation to distribution through overhead lines and underground cables with single lone diagram**.**	1

Basic Electronics Engineering - II:

Module	Content	Hrs/Unit
1	**Field Effect Transistors**: Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD configurations; CMOS: Basic Principles.	5
2	**Feed Back Amplifier, Oscillators and Operational Amplifiers:**	10

	Concept (Block diagram), properties, positive and negative feedback, loop gain, open loop gain, feedback factors; topologies of feedback amplifier; effect of feedback on gain, output impedance, input impedance, sensitivities (qualitative), bandwidth stability; effect of positive feedback: instability and oscillation, condition of oscillation, Barkhausen criteria. Introduction to integrated circuits, operational amplified and its terminal properties; Application of operational Amplifier; inverting and non-inverting mode of operation, Adders, Subtractors, Constant-gain multiplier, Voltage follower, Comparator, Integrator, Differentiator.	
3	**Digital Electronics:** Introduction to binary number; Basic Boolean algebra; Logic gates and function realization with OPAMPs.	5
4	**ADDITIONAL TOPICS:** Fundamentals of Communication Engineering: Elements of a Communication System, Need of modulation, electromagnetic spectrum and typical applications, terminologies in communication systems	

RESOURCES:

1. Basic Electrical engineering, D.P Kothari & I.J Nagrath, TMH, Second Edition
2. Fundamental of electrical Engineering, Rajendra Prasad, PHI, Edition 2005.
3. Basic Electrical Engineering, V.N Mittle& Arvind Mittal, TMH, Second Edition
4. Basic Electrical Engineering, J.P. Tewari, New age international publication
5. Basic Electrical Engineering(TMH WBUT Series), Abhijit Chakrabarti &Sudipta Nath, TMH
6. Electrical Engineering Fundamental, Vincent.D.Toro, Pearson Education, Second Edition.
7. Hughes Electrical & Electronics Technology, 8/e, Hughes, Pearson Education.
8. Basic Electrical Engineering, T.K. Nagsarkar& M.S. Sukhija, Oxford
9. Introduction to Electrical Engineering, M.S. Naidu & S, Kamakshaiah, TMH
10. Basic Electrical Engineering, J.J. Cathey & S.A Nasar, TMH, Second Edition.

Course Title: Physics – 1	**Code: PH291**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 3L/week**
Continuous Assessment: 40 marks	**Final Exam:60Marks**
Writer: Course Coordinators	**Approved by HoD (Convenor of DAB)**

Pre-requisites: Basic knowledge of class XII Physics.

Course Outcome(COs) ofPhysics – 1

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
PH291.CO1	Observe and read data in slide calliper's, screw gauge. Calculate different modulus of elasticity to apply basic knowledge Physics of Elasticity and apply viscosity principle of streamline motion of water to calculate its viscosity coefficient required in fluid mechanics	K5: Evaluating
PH291.CO2	Arrange sequential connection in electrical experiment to verify principles of Kirchhoff's law to verify passive elements of electrical circuit	K5: Evaluating
PH291.CO3	Operate optical instruments to illustrate physical properties of light and to observe spectral lines of light to verify medium specific characteristics. Calculate Rydberg constant by studying Hydrogen spectrum to visualize visible spectra and to assess this empirical fitting parameter as a fundamental physical constant	K5: Evaluating
PH291.CO4	Determine Band Gap and Hall coefficient of a given intrinsic semiconductor and distinguish between different intrinsic semiconductors. Determine the dielectric constant of different capacitors to correlate their usage like insulator and limitation of their usage as a dielectric material.	K5: Evaluating
PH291.CO5	Apply concepts of quantum mechanics to verify Bohr's atomic orbital theory	K3:Applying
PH291.CO6	Determine Planck's constant and Stefan's constant applying modern Physics	K5: Evaluating

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	2	3	1	1									2		
CO2	1	2	3	-									2		
CO3	2	3	2	-									2		
CO4	-	2	3	1									2		

CO5	-	2	1	3									2		
CO6	-	3	1	2									2		
AVG	1.67	2.5	1.8	1.75	0	0	0	0	0	0	0	0	2.00	0	0

University Syllabus :

Unit	Content
1	**Experiments from Higher Secondary knowledge of Physics:** 1. Determination of thermal conductivity of a good conductor by Seals Method 2. Determination of thermal conductivity of a bad conductor by Lee and Charlton's Method 3. Determination of dispersive power of a metal by prism method Use of Carry foster's bridge to determine unknown resistance
2	**Experiments on general properties of matter:** 1. Determination of young's module by flexure method and calculation of blending moment and shear force at a point. 2. Determination of module rigidity by static/ dynamic method Determination of coefficient of viscosity by Poiseulles capillary method
3	**Optics method** 1. Determination of wavelength of light by Newton's ring method 2. Determination of wavelength of light by Frensels'sbiprism method 3. Determination of wavelength of light by Laser diffraction method Determination of numerical aperture and energy losses related to optical fibre experiment.

Course Title: Workshop Practice	**Code: ME292**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 3L+1T/week**
Continuous Assessment: 40 marks	**Final Exam:60Marks**
Writer: Course Coordinators	**Approved by HoD (Convenor of DAB)**

Course Outcome(COs) ofWorkshop Practice

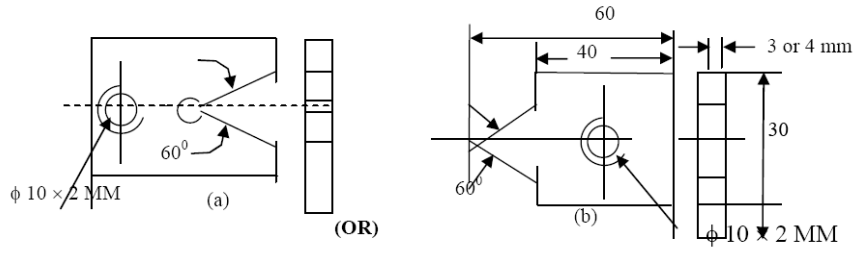
CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
ME292.CO1	Understanding the applications of hand tools and machine tools.	K2: Understanding
ME292.CO2	Comprehend the safety measures required to be taken while using the tools.	K2: Understanding
ME292.CO3	Select the appropriate tools required to manufacture an object of predetermined shape and size considering least wastage and cost.	K3: Applying
ME292.CO4	Fabricate components with their own hands.	K6: Creating
ME292.CO5	Confident on practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.	K4: Analyzing
ME292.CO6	By assembling different components, able to produce small devices of their interest.	K3: Applying

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	1	-	1	-	-	-	-	-	-	-
CO3	1	-	-	-	-	1	-	1	1	-	-	-	-	-	-
CO4	1	-	-	-	-	-	2	-	2	1	1	-	-	1	-
CO5	1	-	-	-	-	-	2	-	2	1	1	1	-	-	-

CO6	1	-	-	-	-	-	2	-	2	1	2	1	-	1	-
AVG	1	0	0	0	0	1	2	1	1.75	1	1.333	1	0	1.00	0

University Syllabus :

Unit	Content
1	**A. THEORETICAL PART** 1. INTRODUCTION TO MANUFACTURING; Socio-economic role, Definition, Major grouping and Examples **[1L]** 2. ENGINEERING MATERIALS; Classification / Major grouping, Physical, Chemical and Mechanical properties, Applications **[1L]** 3.DIFFERENT CONVENTIONAL MANUFACTURING PROCESSES MAINLY COVERING BASIC PRINCIPLES, DIFFERENT METHODS AND GENERAL APPLICATIONS; Manufacturing by forming /shaping from solid (input) to solid (product); Forging, Rolling, Drawing, Extrusion; Press tool work- Bending, Shearing, Drawing and Coining. – **[3L]** 4. FORMING / SHAPING FROM LIQUID TO SOLID- CASTING; General principles, General classification or Types of casting; Sand mould casting- procedural steps and requirements; Pattern, Mould, Melting, Pouring, Solidification, Extracting and Fettling. Other casting processes (for larger volume and quality); Centrifugal casting, Investment casting, Die casting. **[3L]** 5. JOINING PROCESSES; Welding (Permanent Joining)- General classification and basis; Gas welding, Arc welding, Friction welding and Resistance welding, w.r.t. Principle, Requirements, Relative Advantages and Applications; Brazing and soldering. **[2L]** 6. REMOVAL (MACHINING) PROCESS; Principle and purpose of machining, Machining requirements, Machine tools- Definition, General classification w.r.t, functional principles and applications; Major machining parameters (and responses)- Speed, Feed and Depth of cut; Tool geometry (Rake, Clearance and Cutting angles), Cutting fluid application; Elementary machining operations- Facing, Centering, Turning, Threading, Drilling, Boring, Shaping and Milling.**[2L]**
2	**B. SCHEDULE OF PRACTICAL CLASSES** Suggested apportionment / weightage: • Machining (and fitting)- 50% (6 days) 18 hrs • Casting (including pattern making moulding and preparation) - 25% (3 days 9hrs) • Welding (gas, arc and resistance) (2 days 6hrs) and Sheet Metal Working (1 day 3hr)- 25% (3 days-9hrs) **FEASIBLE TYPES / MODELS OF ASSIGNMENTS** i) FITTING (in 2 days or 6 hours); Making a gauge from MS plate as shown in Fig.1.  Operations required:

11. Squaring and finishing of the blank by filing
12. Making the Vee-portion by sawing and filing
13. Drilling (in machine) and tapping (hand)

ii) MACHINING (in 3 days or 9 hours); To make a pin as shown in Fig.2 from a 20mm mild steel rod in a lathe.

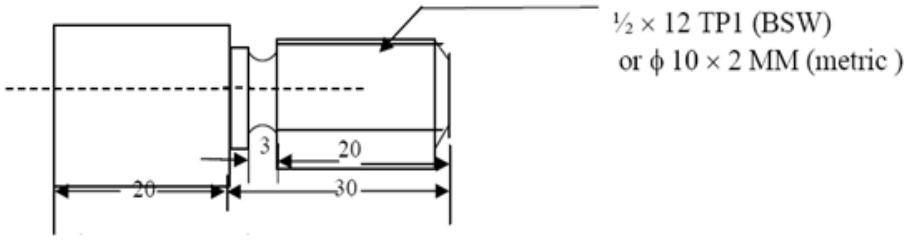


Fig.2: Job for practice on a lathe

iii) MACHINING (in 1 day or 3 hours); To make a MS prism as shown in Fig.3 from a 20mm mild steel rod in a shaping and / or milling machine.

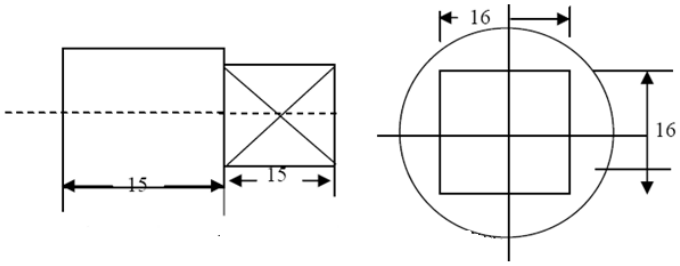


Fig 3. Job for practice on a shaping and/or milling machine

iv) PATTERN MAKING, SAND MOULDING AND CASTING (in 3 classes or 9 hours); To make a wooden pattern and a sand mould with that pattern for casting a cast iron block as shown in Fig.4.

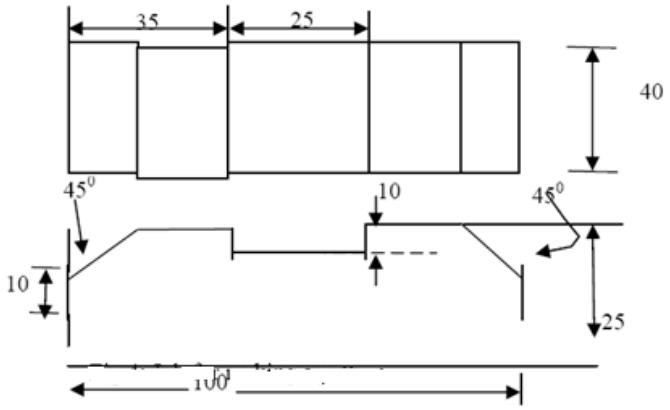


Fig.4: Job for making a pattern

v) WELDING (GAS WELDING) (in 1 class or 3 hours); To join two thin mild steel plates or sheets (1 to 3 mm thick) as shown in Fig. 5 by gas welding.

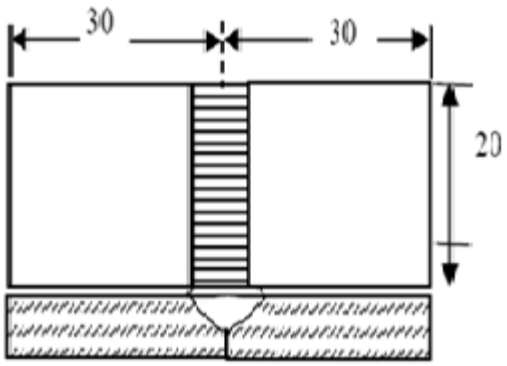


Fig.5: Welding specimen for practice

vi) WELDING (ARC WELDING) (in 1 day or 3 hours); To join two thick (6mm) MS plate as shown in Fig. 5 by arc welding.

vii) SHEET METAL WORK (in 1 day or 3 hours); Forming a cone, for example.

RESOURCES:

1) The Art Of Welding by W.A.Vause
2) Sheet Metal Work by R.E.Wakeford
3) Soldering And Brazing By Tubal Cain
4) https://www.iith.ac.in/files/pdfs/ME101_WorkshopPracticeI_Manual.pdf
5) https://ia600502.us.archive.org/13/items/workshoppractice004349mbp/workshoppractice004349mbp.pdf

Course Title: Basic Computation &Principles of Computer Programming	**Code: CS291**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 3L/week**
Continuous Assessment: 40 marks	**Final Exam:60Marks**
Writer: Course Coordinators	**Approved by HoD (Convenor of DAB)**

Pre-requisites: Basic Knowledge of Computers and C Programming.

Course Outcome (COs) ofBasic Computation & Principles of Computer Programming

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
CS291.CO1	To Analyze the problem and formulate algorithms for them.	K4:Analyze
CS291.CO2	To translate the algorithms to programs (in C language).	K2:Translate
CS291.CO3	To understand the correct syntax of logical expression, branch instruction, iteration,	K2:Understand
CS291.CO4	Apply array and pointer to solve problem.	K3:Apply
CS291.CO5	To understand the use of , function, recursion.	K2:Understand
CS291.CO6	Build analytical skill.	K6:Build

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CO1	2	3	1	1									2		
CO2	1	2	3	-									2		
CO3	2	3	2	-									2		
CO4	-	2	3	1									2		
CO5	-	2	1	3									2		
CO6	-	3	1	2									2		
AV G	1.6 7	2.5	1.8	1.7 5	0	0	0	0	0	0	0	0	2.00	0	0

University Syllabus :

Unit	Content
1	DOS System commands and Editors (Preliminaries) 2. UNIX system commands and vi (Preliminaries)
2	Simple Programs: simple and compound interest. To check whether a given number is a palindrome or not, evaluate summation series, factorial of a number, generate Pascal's triangle, find roots of a quadratic equation Programs to demonstrate control structure: text processing, use of break and continue, etc.
3	Programs involving functions and recursion Programs involving the use of arrays with subscripts and pointers
4	Programs using structures and files

RESOURCES:

1. Programming in C by Balaguruswamy
2. C by Dennis Ritchie.

Course Title: Basic Electrical &Electronic Engineering- II	**Code: ES 291**
Type of Course: Practical	**Course Designation: Compulsory**
Semester: 2nd	**Contact Hours: 3L/week**
Continuous Assessment: 40 marks	**Final Exam:60Marks**
Writer: Course Coordinators	**Approved by HoD (Convenor of DAB)**

Pre-requisites: Knowledge of Basic Electrical & Electronic Engineering- I Lab

Course Outcome (COs) ofBasic Electrical & Electronic Engineering- II

CO Number	CO statement	Knowledge Level of revised Bloom's Taxonomy
ES291.CO1	**Estimate** the performance of ammeter, voltmeter, single phase transformer to evaluate their characteristics	K5: Evaluate
ES291.CO2	**Evaluate** the characteristics of DC shunt generator, motor to compare their performance.	K5:Evaluate
ES291.CO3	**Design** of transitor (BJT,FET) based circuits to estimate their characteristics in different modes	K6: Create
ES291.CO4	**Evaluate** the parameters of OPAMP to estimate its characteristics	K5:Evaluate
ES291.CO5	**Construct** OPAMP circuits to solve specific application.	K6:Create
ES291.CO6	**Design** circuits using logic gates to solve Boolean expressions.	K6: Create

Mapping of COs with POs and PSOs (Course Articulation Matrix):

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2	PSO 3
CO1	3	3	3	3		3	2		3			3	3	3	2
CO2	3	3	3	3		2	2		3			3	3	2	2
CO3	3	3	3	3		3	2		3			3	3	3	2
CO4	3	3	3	3		3	3		3			3	3	3	2
CO5	3	3	3	3		3	3		3			3	3	3	2
CO6	3	3	3	3		3	3		3			3	3	3	2
AVG	3	3	3	3		2.83	2.5		3			3	3.00	2.83	2.00

University Syllabus :

Basic Electrical Engineering- II

Unit	Content
1	Calibration of ammeter and voltmeter.
2	Open circuit and Short circuit test of a single phase Transformer.
3	No load characteristics of D.C shunt Generators
4	Starting and reversing of speed of a D.C. shunt
5	Speed control of DC shunt motor.
6	Measurement of power in a three phase circuit by two wattmeter method.

Basic Electronics Engineering Laboratory-II

Unit	Content
1	Study of I-V characteristics of Field Effect Transistors.
2	Determination of input-offset voltage, input bias current and Slew rate of OPAMPs.
3	Determination of Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
4	Study of OPAMP circuits: Inverting and Non-inverting amplifiers, Adders, Integrators and Differentiators.
5	Study of Logic Gates and realization of Boolean functions using Logic Gates.
6	Study of Characteristic curves for CB, CE and CC mode transistors.

RESOURCES:

1. A Textbook of Basic Electrical and Electronics Engineering Paperback – 2013 by J.B. Gupta (Author)
2. A Manual of Laboratory Experiments and Workshop Practice: Incorporating Step-by-step Design of Circuits Using Discrete Semiconductor Devices Paperback – Import, 28 Nov 2011 by B. Somanathan Nair (Author), S. R. Deepa (Author)