



NAGARJUNA

COLLEGE OF ENGINEERING & TECHNOLOGY

An Autonomous College under VTU

VISION

Leadership and Excellence in Education.

MISSION

To fulfill the vision by imparting total quality education replete with the philosophy of blending human values and academic professionalism.

***Syllabus: I & II Sem B.E.
Outcome Based Education Curricula***

Scheme and Syllabus

With effect from Academic Year

2018-19

Scheme of Study - First Semester – Physics Cycle

Sl. No	Course Code	Course	Teaching Dept.	L:T:P (Hrs/week)	Total Credits	Marks
1	18MAT11	Engineering Mathematics-I	MAT	3:2:0	4	100
2	18PHY12	Engineering Physics	PHY	3:0:0	3	100
3	18CEF13	Civil Engineering Foundation	CV	3:0:0	3	100
4	18CED14	Computer Aided Engineering Drawing	ME	2:0:4	4	100
5	18ELN15	Basic Electronics (IC)	EC	2:0:2	3	100
6	18PHL16	Engineering Physics Laboratory	PHY	1:0:2	2	100
7	18CSD17	Communication Skill Development -I	HSS	0:2:0	1	100
Total				14:4:8	20	700

Scheme of Study - First Semester – Chemistry Cycle

Sl. No	Course Code	Course	Teaching Dept.	L:T:P (Hrs/week)	Total Credits	Marks
1	18MAT11	Engineering Mathematics-I	MAT	3:2:0	4	100
2	18CHE12	Engineering Chemistry (IC)	CHE	3:0:2	4	100
3	18CCP13	Computer Concepts and C Programming	CS/IS	3:0:0	3	100
4	18MEF14	Mechanical Engineering Foundation (IC)	ME	2:0:2	3	100
5	18ELE15	Basic Electrical Engineering (IC)	EC	2:0:2	3	100
6	18CPL16	Computer Programming Laboratory	CS/IS	1:0:2	2	100
7	18CSD17	Communication Skill Development-I	HSS	0:2:0	1	100
Total				14:4:8	20	700

IC – Integrated Course

L – Lecture

T-Tutorials

P-Practical

S – Self Study

Scheme of Study – Second Semester – Physics Cycle

Sl. No	Subject Code	Subject	Teaching Dept.	L:T:P (Hrs/week)	Total Credits	Marks
1	18MAT21	Engineering Mathematics-II	MAT	3:2:0	4	100
2	18PHY22	Engineering Physics	PHY	3:0:0	3	100
3	18CEF23	Civil Engineering Foundation	CV	3:0:0	3	100
4	18CED24	Computer Aided Engineering Drawing (IC)	ME	2:0:4	4	100
5	18ELN25	Basic Electronics (IC)	EC	2:0:2	3	100
6	18PHL26	Engineering Physics Laboratory	PHY	1:0:2	2	100
7	18CSD27	Communication Skill Development-II	HSS	0:2:0	1	100
Total				14:4:8	20	700

Scheme of Study - Second Semester – Chemistry Cycle

Sl. No	Course Code	Course	Teaching Dept.	L:T:P (Hrs/week)	Total Credits	Marks
1	18MAT21	Engineering Mathematics-II	MAT	3:2:0	4	100
2	18CHE22	Engineering Chemistry (IC)	CHE	3:0:2	4	100
3	18CCP23	Computer Concepts and C Programming	CS/IS	3:0:0	3	100
4	18MEF24	Mechanical Engineering Foundation (IC)	ME	2:0:2	3	100
5	18ELE25	Basic Electrical Engineering (IC)	EC	2:0:2	3	100
6	18CPL26	Computer Programming Laboratory	CS/IS	1:0:2	2	100
7	18CSD27	Communication Skill Development-II	HSS	0:2:0	1	100
Total				14:4:8	20	700

IC – Integrated Course

L – Lecture

T-Tutorials

P-Practical

S – Self Study

Engineering Mathematics-I

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
18MAT11	3:2:0	4	CIE:50 SEE:50	3 Hours	BS

Course Objectives:

This course will enable students to:

- Learn the basic mathematical skills for engineering subjects.
- Understand the concept of mathematical modeling of systems using differential equations.
- Get the basics of linear algebra in solving system of equation.
- Use multiple integrals in finding area and volume of the different geometry.

Syllabus

Module – I

Differential calculus-I: Revision of differentiation. Taylor’s and Maclaurin’s series for functions of one variable - (statements only) - problems. Polar curves-angle between radius vector and tangent, length of the perpendicular from pole on the tangent, angle between two polar curves-problems, pedal equations for polar curves-problems. Derivative of arc lengths in Cartesian, parametric and polar forms (without proof) - problems. **08 Hours**

Module – II

Differential calculus-II: Curvature and Radius of Curvature in Cartesian, parametric, polar and pedal forms-problems. Partial derivatives: Basic problems, total derivatives, partial derivatives of composite functions - problems. Jacobian definition and simple problems. **08 Hours**

Module – III

Integral calculus

Multiple integrals: Evaluation of double and triple integrals. Evaluation of double integrals by changing the order of integration and changing into polar coordinates.

Beta and Gamma functions: Definition, relations and simple problems. **08 Hours**

Module – IV

Linear algebra: Rank of the matrix by elementary transformations (Echelon form only), solutions of system of linear equations - Gauss elimination method and Gauss Seidel method. Linear transformations. Eigen values and Eigen vectors of a square matrix - problems. Rayleigh’s power method to find the largest Eigen value and corresponding Eigen vector - problems. Cayley - Hamilton theorem - problems.

08 Hours

Module – V

Differential equations and its applications: Solutions of ordinary differential equations of first order and first degree: Bernoulli's equations, Exact differential equations. Applications of Differential equations: Orthogonal trajectories, Newton's law of cooling. Nonlinear differential equations: Introduction to general and singular solutions; Solvable for 'p' only; Clairaut's and reducible to Clairaut's equation only.

08 Hours

Course Outcomes:

On completion of this course, students will be able to:

- Express functions of single variable in the series form, determine the characteristics of polar curves.
- Determine the radius of curvature in different curves, and finding partial derivatives of the different functions.
- Evaluate the multiple integrals by using various methods and improper integrals using Beta and Gamma functions.
- Evaluate the system of linear equations and compute Eigen values and Eigen vectors.
- Solve the ordinary differential equations as applied to various engineering applications.

Text Books:

1. Dr. B.S. Grewal: "Higher Engineering Mathematics", (Chapters: 2,4,5,7,11,12), 43rd Edition, Khanna Publishers, New Delhi, 2014, ISBN-13: 9788174091956.
2. N.P. Bali and Dr. Manish Goyal: "A Text Book of Engineering Mathematics", (Chapters: 3,5,6,11,12,15), Laxmi Publications (P) Ltd., New Delhi, 9th Edition, 2014, ISBN-13: 9788131808320.

Reference Books:

1. Erwin Kreyszig: "Advanced Engineering Mathematics", 9th Edition, Wiley Pvt. Ltd., New Delhi, India, 2011, ISBN-13: 9788126531356.
2. H.K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics", 3rd Revised Edition S. Chand and Company Private Limited, New Delhi, 2014, ISBN-13: 9788121938907.

E-Resources:

1. <http://nptel.ac.in/courses.php?disciplineID=111>
2. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))



Engineering Physics

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
18PHY12/22	3:0:0	3	CIE:50 SEE:50	3 Hours	BS

Course Objectives:

This course will enable students to:

- Understand the concepts of Laser and its applications in various fields.
- Get the knowledge of solid state physics.
- Learn the concepts of quantum mechanics.
- Gain the knowledge of Optical fibers and electrical conductivity in metals.
- Acquire the knowledge of elastic and dielectric properties of materials.

Syllabus

Module – I

LASER: Interaction of radiation with matter (induced absorption, spontaneous emission and stimulated emission), Einstein coefficients, Expression for Energy density. Requirements of lasing system, Conditions for Laser action (metastable state, population inversion). Construction and working of He-Ne laser, Applications of laser. Basic Principle of Holography, recording and reconstruction of Image on Hologram and applications of holography. **08 Hours**

Module – II

Crystal Structure: Space lattice, Bravais lattice, Unit cell, Primitive cell, Lattice Parameters, Seven Crystal systems, Miller indices, Expression for inter-planar spacing in terms of Miller indices, Atomic packing factor for SC, BCC & FCC, Crystal structure of Diamond, Quartz crystal and its applications. Bragg's law, Determination of wave-length of X-rays using Bragg's X-ray spectrometer. **07 Hours**

Module – III

Quantum Mechanics: Wave Particle dualism, de-Broglie hypothesis, Matter waves. Davission–Germer Experiment. Heisenberg's uncertainty principle and its application (Non-existence of electron in nucleus). Wave function, Properties and physical significance of wave function, Probability density and Normalization of wave function. Setting up of one dimensional time independent Schrodinger's wave equation. Eigen values and Eigen functions. Applications of Schrodinger's wave equation. Energy Eigen values and Eigen functions for a particle in one dimensional potential well of infinite height. **08 Hours**

Module – IV

Optical Fibers: Principle of optical fiber, Angle of acceptance, Numerical aperture (derivation), Types of Optical fibers. Attenuation, Application: Point to point communication system. Advantages of optical fiber communication.

Quantum free electron theory of metals: Review of classical free electron theory, mention assumptions and failures. Assumptions of quantum free electron theory, density of states, Fermi-Dirac statistics(qualitative), Fermi level, Fermi energy, Fermi factor, dependence of Fermi factor on temperature and effect on occupancy of energy levels, success of quantum free electron theory. **08 Hours**

Module – V

Dielectric materials: Polar and non polar dielectrics, Electronic polarization, dielectric susceptibility, relation between polarization and dielectric constant, Polarizability, types of polarization, internal fields in a solid, Clausius-Mossotti equation, frequency dependence of dielectric constant, applications of dielectrics.

Elasticity: Introduction, Stress, Strain, Hooke's law, Young's modulus, bulk modulus, Rigidity modulus (qualitative), Poisson's ratio. Experimental determination of Young's modulus of a rectangular bar as single cantilever beam. **08 Hours**

Course Outcomes:

On completion of this course, students will be able to:

- Use principles of Laser for engineering applications.
- Apply the knowledge of crystal structure to study various engineering materials.
- Demonstrate the knowledge of formulation of quantum mechanical equations to solve engineering problems.
- Develop firm understanding of optical fibers and electrical conductivity in metals.
- Apply the concepts of elastic and dielectric properties of materials to engineering applications.

Text Books:

1. Dr. M N Avadhanulu, Dr. P G Kshirsagar: "Text Book of Engineering Physics", (Chapters: 10,14,20,24,33), S Chand & Company Ltd., New Delhi, 2014, ISBN: 9788121908177.
2. Prof. S P Basavaraju: "Engineering Physics", (Chapters: 1-4,6,7,9), 2nd Edition, Subhash Stores, Bangalore, 2015, ISBN-13: 9789383214501.

Reference Books:

1. M. Ali Omar: “Elementary Solid State Physics”, (Chapters 1,6), Pearson Education, 2013, ISBN-13: 9788177583779.
2. Ajoy Ghatak: “Optics”, (Chapters: 21,26,27), 5th Edition, Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi, 2013, ISBN-13: 9781259004346.
3. Wiley Precise Text: “Engineering Physics”, (Chapters: 3,8,13,15), 1st Edition, Wiley India Pvt. Ltd, New Delhi, 2014, ISBN-13: 9788126543151.
4. R. K. Gaur and S. L. Gupta: “Engineering Physics”, (Chapters: 7,31,32,56-58), Dhanpat Rai Publications, 2012, ISBN-13: 9788189928223.

E-Resources:

1. http://www.markfox.staff.shef.ac.uk/PHY332/phy332_notes.pdf
2. <http://nptel.ac.in/courses/115101010/>



Civil Engineering Foundation

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
18CEF13/23	3:0:0	3	CIE:50 SEE:50	3 Hours	EFC

Course Objectives:

This course will enable students to:

- Identify the different fields of Civil Engineering, infrastructure development and Smart city Concepts.
- Know the Importance of Civil Engineering Mechanics and Force system.
- Analyze the Equivalent Force-Couple System and Non-Concurrent Force System.
- Solve the Equilibrium of Concurrent and Non Concurrent Forces and Numerical solutions of Support Reactions.
- Understand the concept of Centroid and Moment of Inertia.

Syllabus

Module – I

Introduction to Civil Engineering: Scope of different fields of civil engineering- surveying Building materials, Construction technology, Geotechnical engineering, Structural engineering, Hydraulics, Water resources and irrigation engineering, Transportation Engineering, Environmental engineering etc.

Types of Infrastructure: Types of infrastructure, Role of civil engineer in the infrastructural development, effect of infrastructural facilities on socio-economic development of a country.

Roads: Classification of roads and their functions, Comparison of flexible and rigid pavements (advantages and limitations).

Bridges: Types of bridges and culverts, RCC, Steel and composite bridges.

Dams: Different types of dams based on material, structural behaviour and functionality with simple sketches.

Smart Cities: Concept, Features, Advantages and limitations.

06 Hours

Module – II

Introduction to Civil Engineering Mechanics: Basic idealizations of particle, Continuum and Rigid body and its characteristics. Types of Forces. Classification of Force System.

Introduction to SI Units, Couple, Moment of a Couple. Characteristics of Couple, Moment of a Force. Equivalent Force - Couple System. Numerical Problems on Moment of Forces and Couples and Equivalent Force-Couple System. **06 Hours**

Module – III

Analysis of Force System: Concurrent Force System-Composition of Forces- Definition of Resultant. Composition of Coplanar - Concurrent Force system. Parallelogram Law of Forces Principle of Resolved Parts. Numerical Problems on Composition of Coplanar Concurrent Force System.

Non-Concurrent Force System: Composition of Coplanar - Non-Concurrent Force System. Varignon's Principle of Moments. Numerical problems on Composition of Coplanar Non-Concurrent Force System. **08 Hours**

Module – IV

Equilibrium of Concurrent and Non Concurrent Forces: Equilibrium of Forces- Definition of Equilibrant, Conditions of Static Equilibrium for Different Force Systems, Lami's Numerical Problem on Equilibrium of Coplanar - Concurrent and Non-Concurrent Force Systems.

Support Reactions: Types of Loads and Supports. Statically Determinate Beams. Numerical Problems on Support Reactions for Statically Determinate Beams with Point Loads (Normal and Inclined), Uniformly Distributed Loads and Varying Loads. **08 Hours**

Module – V

Centroid and Centre of Gravity: Definition, Derivation of expressions for Centroidal distances of simple planar laminas like Rectangle, Triangle, Quarter and Semicircle. Determination of Centroidal distances of Compound Laminas.

Moment of Inertia: Introduction, Definition, Theorems of Perpendicular and Parallel Axis. Concept of Axis of Symmetry, Derivation of expressions for Moment of Inertia of simple planar laminas like Rectangle, Triangle, Quarter, Semicircle and Circle. Definition of Polar Moment of Inertia, Radius of Gyration. Determination of Moment of Inertia. Polar Moment of Inertia, Radius of Gyration of Compound Laminas about Centroidal Axis and about any Specified Reference Line. **08 Hours**

Course Outcomes:

On completion of this course, students will be able to:

- Explain the importance of Civil engineering, its scope of study, knowledge about roads, bridges and dams.
- Familiarize with the concepts of smart cities.
- Apply the concepts and principles of force system to a given coplanar concurrent force system.
- Apply the concepts and principles of mechanics to a given coplanar-non concurrent force system.
- Compute centre of gravity and moment of inertia for a given lamina.

Text Books:

1. F. P. Beer and E. R. Johnston: “Vector Mechanics for Engineers - Volume I - Statics”, (Chapters: 1-5,7,9), 9th Edition Tata McGraw Hill, 2011, ISBN-13: 9780077402280.
2. S. S. Bhavikatti: “Elements of Civil Engineering and Engineering Mechanics”, (Chapters: 1-5,8), 5th Edition, New Age International Private Limited, New Delhi, 2015, ISBN-13: 9788122430035.

Reference Books:

1. P. G. Varghese: “A Textbook Building Materials”, (Chapters: 1,3,19), 2nd Edition, PHI Learning Publication, April 2015, ISBN-10: 8120328485.
2. Neville A. M and Brooks J. J: “Concrete Technology”, (Chapters: 1,2), 2nd Edition, ELBS Edition, London, 2010, ISBN-13: 9788131705360.
3. M.G. Shah, C.M. Kale and S.Y. Patki: “Building Drawing”, (Chapter: 1), 5th Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2012, ISBN-13: 9780074638767.

E-Resources:

1. <http://elearning.vtu.ac.in/CV1323.html>
2. <http://moud.gov.in/model>
3. https://en.wikipedia.org/wiki/smart_city
4. www.labour.gov.hk/eng/public/os/D/Constructionsite.pdf



Computer Aided Engineering Drawing

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
18CED14/24	2:0:4	4	CIE:50 SEE:50	3 Hours	EFC

Course Objectives:

This course will enable students to:

- Understand the importance of engineering drawing as a means of communication.
- Use CAD software to produce engineering drawings.
- Apply the concept of orthographic and isometric projections.
- Draw the Development of lateral surfaces of solids.

Syllabus

Module – I

Introduction to Computer Aided Sketching: Introduction, Drawing Instruments and their uses, BIS conventions, Lettering, Dimensioning and free hand practicing. Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity, etc.

Introduction to orthographic projections and Principle planes. Concept of projections of points and projection of straight lines.

Orthographic Projection of Plane Surfaces: Introduction, Projections of plane surfaces–triangle, square, rectangle, pentagon, hexagon and circle, planes in different positions by change of position method only **09 Hours**

Module – II

Orthographic Projection of Simple Solids: Introduction, Projections of regular prism, pyramid, tetrahedron and hexahedron in simple positions. **09 Hours**

Module – III

Orthographic Projections of Solids: Projections of pyramids inslant edge and slant triangular face resting positions. Projection of cylinders and cones in different positions. **09 Hours**

Module – IV

Development of Lateral Surfaces of Solids: Development of lateral surfaces of regular prisms, pyramids, cylinders and cones resting with base on HP, their frustums and truncations. **09 Hours**

Module – V

Isometric Projection (using Isometric scale only): Introduction, Isometric scale, Isometric projection of cube, prisms, pyramids, cylinders, cones, spheres, hemispheres and combination of two solids. **09 Hours**

Course Outcomes:

On completion of this course, students will be able to:

- Draw the front, top and side views of points and lines.
- Produce the orthographic projection of plane surfaces.
- Visualize and draw the orthographic projections of simple solids in various positions.
- Develop the lateral surfaces of solids
- Create the isometric projections of simple objects.

Text Books:

1. N.D. Bhat and V.M. Panchal: “Engineering Drawing”, (Chapters: 1-5), 49th Edition, Charotar Publishing House, Gujarat, 2008, ISBN-10: 8185594589.
2. Basant Agrawal and C M Agrawal: “Engineering Drawing”, (Chapters: 1-4,7-11,13,15), 2nd Edition, McGraw Hill Education India Pvt. Ltd., 2013, ISBN-13: 9781259062889.

Reference Books:

1. S. Trymbaka Murthy: “Computer Aided Engineering Drawing”, (Chapters: 5-8,10,11), 3rd Edition, I.K. International Publishing House Pvt. Ltd., New Delhi, 2010, ISBN-13: 9789380578606.
2. Luzadder Warren J., Duf John M: “Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production”, (Chapters: 4,5,10,11), Eastern Economy Edition, Prentice-Hall of India Pvt. Ltd., New Delhi, 2005, ISBN-13: 9780133384277.
3. M.H. Annaiah: “Computer Aided Engineering Drawing”, (Chapters: 1-6), 4th Edition, New Age International Publisher, New Delhi, 2010, ISBN-13: 9788122427790.

E-Resources:

1. <https://www.youtube.com/watch?v=hET58JV-oZI>
2. <https://www.youtube.com/watch?v=ZFRcAfBSEhQ>

Conducting classes: Classes may be conducted in two slots per week, of 3 Hours each (Instruction 1 Hour + Sketching and Practice 2 Hours.)

Scheme of Evaluation
Continuous Internal Evaluation (CIE)

CIE-1	-	30 Marks
CIE-2	-	30 Marks
Surprise Test	-	10 Marks
Submission of Sketch Books	-	30 Marks
Total	-	100 Marks

Semester End Examination (SEE)

Two Questions shall be set from each module. Students have to answer any one question from each module. Only manual sketching for Module I and II. For Modules III and IV, the students have to produce the drawings on computer and take the print outs. For Module V, both manual sketching and computer printout is essential.



Basic Electronics (IC)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
18ELN15/25	2:0:2	3	CIE:50 SEE:50	3 Hours	EFC

Course Objectives:

This course will enable students to:

- Understand the working of Semiconductor Diodes, Zener Diodes and its applications.
- Describe the working of Transistors and Oscillators.
- Learn the basics of number systems and Digital Electronic Fundamentals.
- Describe the working of OPAMPs and their applications.
- Understand the basics principles of Communication Systems.

Syllabus

Module – I

Semiconductor Diodes and Applications: PN- junction diode, Equivalent circuit of a diode, Zener diode, Zener diode as a voltage regulator, Rectification - Half wave rectifier, Full wave rectifier, Bridge rectifier. **06 Hours**

Module – II

BJT and Applications: Construction and working of a transistor, Transistor configurations (CE, CB, CC), BJT as a switch, BJT as an amplifier. Feedback amplifiers - Principle, Properties and advantages of negative feedback. Oscillators - Barkhausen's criteria for oscillation, RC phase shift oscillator. **06 Hours**

Module – III

Digital Electronics fundamentals: Difference between analog and digital signals, Number system – Binary, Decimal, Octal and Hexadecimal and conversion from one base to another base. Addition and subtraction using 1's and 2's complements, Boolean algebra, Basic and Universal gates, Half adder, Full adder. **06 Hours**

Module – IV

Operational Amplifiers and Applications: Introduction to OP-AMPs, Differential Amplifier Configurations, Ideal Characteristics, OP-AMP parameters - CMRR, PSRR, Slew Rate, Input offset voltage, Bias Current, Frequency response, Pin Configuration of 741 OP-AMP. Applications - Inverting/Non-inverting amplifier, Adder, Voltage follower, Integrator, Differentiator, Comparator. **06 Hours**

Module – V

Communication Systems: Introduction, Elements of Communication Systems, Modulation, Need for modulation, Amplitude Modulation, Spectrum Power, Frequency modulation, comparison of AM and FM. **05 Hours**

List of Experiments:

Hardware experiments:

1. Verification of all logic gates
2. Simplification of Boolean expression and verify using gates
3. Inverting amplifier using OP-AMP
4. Non inverting amplifier using OP-AMP

Virtual Lab experiments:

5. Half-wave rectifier
6. Full-wave rectifier

Demonstration experiments:

7. RC phase shift oscillator
8. AM modulation

Course Outcomes:

On completion of this course, students will be able to:

- Analyze the characteristics and working of Semiconductor Diode and analyze its use in rectification and regulation.
- Describe the operation of BJT as an Amplifier/Switch and its use in various circuits.
- Identify different number systems, convert from one base to another base, understand the working of different logic gates and design logic circuits using them.
- Analyze and design OP-AMP circuits for basic mathematical operations.
- Apply the principles of amplitude modulation, frequency modulation.

Text Books:

1. David A Bell: “Electronic Devices and Circuits”, (Chapters: 1-3), 5th Edition, Oxford University Press, New Delhi, 2014, ISBN-13: 9780195693409.
2. Kothari. D.P., and I. J. Nagrath: “Basic Electronics”, (Chapters: 4,5), 2nd Edition, McGraw Hill Education (India) Private Limited, 2017, ISBN-13: 9789332901582.

3. George Kennedy: "Electronic Communication Systems", 4th Edition, TMH, 1993, ISBN-13: 9780074636824.

Reference Books:

1. Boylestad .R.L., and Louis. Nashlesky: "Electronic Devices and Circuit Theory", 10th Edition, Pearson Education, 2012, ISBN-13: 9788131764956.
2. Thomas L. Floyd: "Digital Fundamentals", 3rd Edition, UBS, 2001, ISBN-13: 9788185274591.

E-Resources:

1. <http://www.vlab.co.in>
2. <http://www.basicelectronics.iitkgp.ernet.in>



Engineering Physics Laboratory

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
18PHL16/26	1:0:2	2	CIE:50 SEE:50	3 Hours	BS

Course Objectives:

This course will enable students to:

- Acquire experimental skills and understand the importance of Physics in practical applications.
- Apply the fundamental concepts of laser and semiconductor physics to understand the characteristics, properties and applications of devices and materials.
- Learn the basics of data acquisition, interpretation and analysis.
- Understand the concepts of physical measurements and limits of precision in measurements.

Syllabus

List of Experiments:

1. Laser Diffraction (Determination of wavelength of laser using diffraction grating.)
2. Photodiode characteristics (Study the V-I characteristics of Photodiode)
3. Fermi Energy of copper (Determination of Fermi energy of copper)
4. Dielectric constant (Determination of dielectric constant of a dielectric material)
5. LCR circuits (Determination of resonance frequency, quality factor in a Series and Parallel LCR circuit)
6. Black Box (To identify and determine the values of unknown passive components (L,C&R))
7. Single Cantilever (Determination of Young's modulus of a given material bar)
8. Verification of Stefan's law (Verification of Stefan's law of black body radiation)

Virtual Lab experiments:

1. Torsional Pendulum (Determination of rigidity modulus of the suspension wire of a torsional pendulum)
2. Numerical aperture (To find the numerical aperture of a given optical fiber and hence to find its acceptance angle)

Course Outcomes:

On completion of this course, students will be able to:

- Apply the knowledge of optics to determine the wavelength of laser.
- Analyze the characteristics of photo diode.
- Apply the knowledge of properties of materials in various applications.
- Develop skills to choose the appropriate electric and electronic components in practical applications.
- Understand measurement technology, usage of new instruments in real time applications in engineering studies.

E-Resources:

1. vlab.amrita.edu/index.php?sub=1&brch=280&sim=1518&cnt=1
2. vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1



Communication Skill Development - I

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
18CSD17	0:2:0	1	CIE:50 SEE:50	3 Hours	HSS

Course Objectives:

This course will enable students to:

- Introduce basics of communication and equip with introductory presentation skills using visual aids.
- Empower with essentials of English grammar necessary for fluent and effective communication.
- Enable effective understanding of Engineering subjects through enhanced vocabulary skills.

Syllabus

Module – I

Essentials of the Communication Process and its types: Introduction to communication; Benefits of good communication skills; The communication process; Ethical communication; Characteristics of a good communicator; Types of communication. **06 Hours**

Module – II

Basics of the English Language and its Grammar: History of English; English grammar: Words (Parts of speech, Spelling rules, Determiners, Paragraphs, Punctuation marks, Structure of a sentence, Basic sentence types); Classification of inflection; Forms of inflection; Inflection of nouns (Number, Gender); Inflection of verbs (Tense, Person, Voice); Inflection of adjectives (Degree). **06 Hours**

Module – III

Introduction to Etymology and Development of Vocabulary: Test Your Present Vocabulary Etymology in English language; Start building your vocabulary; Personality Types. **06 Hours**

Module – IV

Common Errors in English Language: Categories of errors; Grammar error; Word choice error; Pronunciation error; Punctuation error; Spelling error; Test Your Grammar. **08 Hours**

Module – V

Presentation Skills: Introduction; Talking vs Presenting; The deadly sins; Overcoming nervousness; Attention and interest (Visual aids, Humor, Eye contact, Voice, Movement, Analogies, Human interest, Conviction and enthusiasm, Body language); Presentation steps. **08 Hours**

Course Outcomes:

On completion of this course, students will be able to:

- Understand the dynamics of communication and display the ability to participate in simple group discussions.
- Discover the practical aspects of the basics of English language grammar and identify the common errors in English language.
- Illustrate an understanding of the science of etymology and adapt to developing the vocabulary through this method.

Text Books:

1. Betty Schramper Azar: “Basic English Grammar”, 3rd Edition, Pearson Longman, 2005.
2. Norman Lewis: “Word Power Made Easy”, Revised and expanded Edition, Goyal Publishers, 2012.
3. David A Peoples: “Presentations Plus”, John Wiley & Sons, 1992.

Reference Books:

1. Raymond Murphy: “English Grammar in Use”, Cambridge.
2. Wren and Martin: “High School English Grammar & Composition”, Chand & Co.
3. Nancy Duarte: “Slide:ology”, O’Reily Media.

E-Resources:

1. <http://www.orelt.col.org> (Open resources for English Teaching (ORELT))
2. <http://www.chompchomp.com> (Grammar Bytes)
3. <http://www.fluentu.com/english> (FluentU)



Engineering Chemistry (IC)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
18CHE12/22	3:0:2	4	CIE:50 SEE:50	3 Hours	BS

Course Objectives:

This course will enable students to:

- Impart the fundamental concepts of engineering chemistry.
- Explore knowledge in engineering chemistry for building technical competence in industries, research and development.
- Enlighten the applications of engineering chemistry in a comprehensive, economic, environmental and social context.
- Understand the basics of polymer and its applications.

Syllabus

Module – I

Electrochemistry and Battery Technology

Electrochemistry: Introduction, Derivation of Nernst equation for single electrode potential and numerical problems. Types of electrodes: metal-metal ion, metal-metal salt ion, gas, amalgam, redox and ion selective. Reference electrodes - calomel electrode, Ag-AgCl electrode. Determination of pH using Glass electrode, Measurement of electrode potential using calomel electrode, Electrolyte concentration cells.

Battery technology: Introduction, Classification of batteries – primary, secondary and reserve batteries, battery characteristics - cell potential, capacity, cycle life and shelf life.

Classical batteries - Construction, working & applications of Lead acid battery & Li-ion battery.

Fuel cell - Introduction, difference between conventional cell and fuel cell, limitations and advantages. Construction, working and applications of $\text{CH}_3\text{OH-O}_2$ fuel cell.

08 Hours

Module – II

Corrosion Science and Metal Finishing

Corrosion Science: Introduction, electrochemical theory of corrosion, types of corrosion - differential metal corrosion, differential aeration corrosion - pitting and water line corrosion, stress corrosion (caustic embrittlement in boilers), Factors affecting the rate of corrosion: Nature of metal, Nature of corrosion product, ratio

of anodic and cathodic areas. Nature of medium - pH , Conductivity and temperature. Corrosion control: metal coatings – galvanization and tinning, cathodic protection - sacrificial anodic and impressed current methods.

Metal finishing: Introduction, Technological importance, Electroplating, Factors influencing the nature of electro deposit- Current density, plating bath - concentration of metal ion, complexing agents, pH , temperature, throwing power. Electroplating of decorative Cr. Electroless plating –Introduction, electroless plating of copper, manufacture of PCB by electroless plating of copper. **08 Hours**

Module – III

Chemical fuels and Photovoltaic cells

Chemical fuels: Introduction, classification, Calorific value-gross and net calorific values, determination of calorific value of a solid/liquid fuel using Bomb calorimeter and numerical problems. Petroleum cracking: Introduction, Reformation of petrol, Petrol knocking – mechanism and their ill effects, anti-knocking agents, Fuel rating system – Octane and Cetane number, catalytic converter, Biodiesel.

Photovoltaic cells: Introduction, Photovoltaic cells – construction, working & advantages, Design: modules, panels & arrays. Doping of silicon by diffusion technique (n & p type), zone refining. **08 Hours**

Module – IV

Water technology: Impurities in the water, Hardness - definition, types of hardness and its determination by EDTA method, Alkalinity - determination by phenolphthalein and methyl orange indicator. Determination of dissolved (DO) oxygen by Winkler's method. Biological Oxygen Demand (BOD) - definition, determination and numerical problems. Chemical Oxygen Demand (COD) - definition determination and numerical problems. Sewage treatment - Primary treatment, Secondary treatment by activated sludge and tertiary treatment. Potable water - softening of water by ion exchange process, Desalination of sea water by reverse osmosis. **08 Hours**

Module – V

Polymers and Instrumental methods of analysis

Polymers: Introduction, types of polymerization, Addition and condensation, mechanism of polymerization- free radical mechanism taking vinyl chloride as an example. Glass transition temperature (T_g): Significance of T_g . Structure property relationship: crystallinity, tensile strength, elasticity & chemical resistivity. Conducting polymers: Introduction and applications of conducting polyaniline.

Instrumental methods of analysis: Theory, Instrumentation and applications of potentiometry, Conductometry (strong acid vs strong base, strong acid vs weak base), Colorimetry and Determination of Specific conductivity of Soil. **08 Hours**

List of Experiments:

1. Determination of Total Hardness of a sample of water using disodium salt of EDTA.
2. Determination of Chemical Oxygen Demand (COD) of the given industrial waste water sample.
3. Conductometric estimation of an acid mixture (HCl & CH₃COOH) using standard NaOH solution.
4. Potentiometric estimation of FAS using standard K₂Cr₂O₇ solution.
5. Determination of total alkalinity of water sample.

Virtual Lab Experiments

6. Soil Analysis-Determination of Specific conductivity of Soil.
7. Spectrophotometric estimation of metal ions.
8. Acid-Base titration of strong acid v/s strong base.
9. Determination of viscosity coefficient of a given liquid using Ostwald's viscometer.
10. Measurement of electrode potential (EMF) with respect to metal electrodes.

Course Outcomes:

On completion of this course, students will be able to:

- Use the knowledge of electrochemistry in analysis of water and familiarize with the selection criteria for commercial battery systems according to different applications.
- Investigate the ill effects of corrosion by adopting the appropriate remedial measures and modification of surface properties of metals to develop resistance to corrosion.
- Differentiate between various forms of energy.
- Identify water contamination and take appropriate preventive measures.
- Use the knowledge of Polymers and analytical techniques in the material selections for engineering applications.

Text Books:

1. Palanna O. G: "Engineering Chemistry", (Chapters: 1-8), 1st Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2011, ISBN-13: 9780071068345.
2. Mahesh B, and Roopashree B: "Engineering Chemistry", (Chapters: 1-3,5), 2nd Edition, Sunstar Publisher, Bangalore, 2015, ISBN-13: 9789385155-70-3.
3. Kulkarni V. R. and Ramakrishna Reddy K: "Engineering Chemistry", (Chapters: 1-10), 1st Edition, New Age International Publishers, New Delhi, 2016, ISBN-13: 9788122439908.

Reference Books:

1. Kuriacose J. C. and Rajaram J: "Chemistry in Engineering and Technology", (Chapters: 13-19), 5th Edition, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010, ISBN-13: 9780074517352.
2. Puri, Sharma and Pathania: "Principles of Physical Chemistry", (Chapters: 22-24,28), 44th Edition, Vishal Publishing Co., Jalandhar, 2011, ISBN-10: 8188646741.
3. G H Jeffery, J Bassett, J Mendham and R C Denny: "Vogel's text book of quantitative inorganic analysis", (Chapters: 2,3,10,13,15,17), 5th Edition, Addison Wesley Longman Inc., New York, 1989, ISBN-13: 981235882X.

E-Resources:

1. <http://vlab.amrita.edu/index.php>
2. <http://nptel.ac.in/courses/113108051/>



Computer Concepts and C Programming

Course Code	L:T:P	Credits	Exam marks	Exam Duration	Course Type
18CCP13/23	3:0:0	3	CIE:50 SEE:50	3 Hours	EFC

Course Objectives:

This course will enable students to:

- Understand the basic concepts of computer system and C programming language.
- Impart adequate knowledge on the need of programming languages and problem solving techniques.
- Develop programming skills using the fundamentals and basics of C Language.
- Enable effective usage of arrays, structures, functions, pointers and to implement the memory management concepts.

Syllabus

Module – I

Introduction to Computers: Computer Systems, Computer Languages, System Development.

Introduction to the C Language: C Programs, Identifiers, Types, Variables, Constants, Input/ Output, Programming Examples. **08 Hours**

Module – II

Structure of a C Program: Expressions, Precedence and Associativity, Evaluating Expressions, Type Conversion, Statements, Sample Programs.

Functions: Designing Structured Programs, Functions in C, User defined functions, Scope.

Selection-Making Decision: Logical Data and Operators. **08 Hours**

Module – III

Selection-Making Decision (Cont'd): Two-way Selection, Multi-way Selection.

Repetition: Concepts of a loop, Pretest and Post-test loops, Initialization and updating, Loops in C, Loop Examples, Other Statements related to looping, Recursion-Designing Recursive functions, Example Programs. **08 Hours**

Module – IV

Arrays: Concepts, Using Arrays in C, Sorting, Searching, Two-dimensional Arrays.

08 Hours

Module – V

Strings: String Concepts, C Strings, Array of Strings, String Manipulation functions.

Structures: Structure Type Declaration, Initialization, Accessing Structures. **08 Hours**

Course Outcomes:

On completion of this course, students will be able to:

- Develop programs using the basic elements like arrays, strings and looping concepts in programming.
- Apply code reusability with the help of user defined functions.
- Illustrate and apply the concepts of functions and strings in C.
- Evaluate expressions using C operators.
- Construct the programs using structures and pointers.

Text Book:

1. Behrouz A. Forouzan: “Computer Science: A Structured programming approach using C”, (Chapters: 1-6,8,11,12), 3rd Edition, Thomson India Edition, India, 2009, ISBN-13: 9788131507629.

Reference Books:

1. Brian W. Kernighan and Dennis Ritchie: “The C Programming Language”, 2nd Edition, PHI, 2015, ISBN-13: 9789332549449.
2. Peter Norton: “Introduction to Computers”, 7th Edition, Tata McGraw Hill, 2017, ISBN-13: 9780070671201.
3. Byron Gottfried, Schaum’s: “Programming with C”, 2nd Edition, Schaum’s Outlines, Tata McGraw-Hill Publishing Company Limited, New Delhi, 2000, ISBN-13: 9780070240353.
4. Yashvant Kanetkar: “Let Us C”, 14th Edition, 2016, ISBN-13: 9788183331630.

E-Resources:

1. www.tutorialspoint.com/cprogramming_tutorial.pdf
2. <http://phy.ntnu.edu.tw/~cchen/pdf/ctutor.pdf>
3. <http://www.literateprogramming.com/ctraps.pdf>



Mechanical Engineering Foundation (IC)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
18MEF14/24	2:0:2	3	CIE:50 SEE:50	3 Hours	EFC

Course Objectives:

This course will enable students to:

- Impart the fundamental concepts related to Mechanical Engineering and Renewable energy resources.
- Expose the students to the working of various prime-movers.
- Understand the working principle of Refrigeration and Air-conditioning systems.
- Introduce the students to the various materials and metal joining methods.
- Provide basic knowledge of various machine tools and robots.

Syllabus

Module – I

Energy Resources: Non-renewable and renewable energy resources.

Solar Power: Solar Radiation, Solar constant (definition only), Solar Thermal energy harvesting, Ex: liquid flat plate collectors, solar ponds (principle of operation only), Solar photovoltaic principle.

Wind Power: Principle of operation of a typical windmill.

Hydro Power: Principles of electric power generation from hydropower plants.

Nuclear Power: Principles of Nuclear power plants.

Steam Formation and applications of steam: Classification of boilers, Applications of steam. **06 Hours**

Module – II

Turbines and IC Engines

Steam turbines: Classification, Principle of operation of Impulse and reaction turbines.

Gas turbines: Classification, Working principles and operations of Open cycle and Closed cycle gas turbines.

Water turbines: Classification, Principles and operations of Impulse and reaction turbines. **Internal Combustion Engines:** Classification, I.C. Engines parts, 2 Stroke and 4 stroke Petrol engines, 4 stroke diesel engines. PV diagrams of Otto and Diesel cycles. **06 Hours**

Module – III

Refrigeration and Air-Conditioning

Refrigerants: properties of refrigerants, list of commonly used refrigerants and alternative refrigerants.

Refrigeration: Definitions - Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, Relative COP, unit of Refrigeration. Principle and working of vapour compression refrigeration and vapour absorption refrigeration.

Air-Conditioning: Principles and applications of air conditioners, Room air conditioner. Simple calculations related to vapour compression refrigeration system, to find out refrigeration effect, power consumption of the compressor and COP **05 Hours**

Module – IV

Engineering Materials and Metal joining processes

Engineering Materials: Introduction to ferrous and non-ferrous materials and composite materials.

Metal Joining Processes: Definitions, classification and method of Soldering, Brazing and Welding. Differences between Soldering, Brazing and Welding. Description of Electric Arc Welding. **05 Hours**

Module – V

Machine Tools and Robotics

Machine Tools: Working principle of lathe, drilling machine and milling machines. Gears and gear train. Applications of gears and gear trains in machine tools. Simple calculations related to simple gear train.

Robotics: Introduction, classification based on robots configuration; Polar, Cylindrical, Cartesian Coordinate and Spherical, Applications, Advantages and disadvantages of Robots. **05 Hours**

List of Experiments

1. Demonstration of fitting tools and processes.
2. Sheet metal development of 2 models (Prism and Pyramid).
3. Demonstration of welding process.
4. Metal joining processes using Soldering.
5. Simple programming of Robots (2 simple programs).
6. Studies on Solar PV system.
7. Performance studies on Refrigeration systems.
8. Studies on Simple gear trains.
9. Studies on Valve and Port timing diagrams.
10. Demonstration of working principle of Water Turbines.

Course Outcomes:

On completion of this course, students will be able to:

- Identify various types of energy sources and evaluate the application of steam.
- Analyze the working principles of various types of prime movers.
- Understand the working principles of refrigeration and Air conditioning systems.
- Recognize various applications of engineering materials and different metal joining methods.
- Understand the metal removal process using different machine tools and importance of Robots and their application.

Text Books:

1. V.K.Manglik: “Elements of Mechanical Engineering”, (Module - I,II,III,IV,V), 1st Edition, PHI Publications, New Delhi, 2014, ISBN-13: 9788120346291.
2. Mikell P.Groover: “Automation, Production Systems & CIM”, (Module-V), 3rd Edition, PHI Publication, New Delhi, 2015, ISBN-13: 9789332549814.
3. K.R.Gopalkrishna: “A Text Book of Elements of Mechanical Engineering”, (Module - I,II,III,IV,V), 35th Edition, Subhash Publishers, Bangalore, 2015.

Reference Books:

1. K.P.Roy, S.K. Hajra Choudhury, Nirjhar Roy: “Elements of Mechanical Engineering”, (Module - II,IV,V) , 7th Edition, Media Promoters & Publishers Pvt. Ltd., Mumbai, 2012.
2. S.K.Garg: “Workshop Technology (Manufacturing Processes)”, (Module - IV,V), 3rd Edition, University Science Press, Bangalore, 2013, ISBN-13: 9788131806975.
3. C.P.Arora: “Refrigeration and Air Conditioning”, (Module - III) Tata McGraw-Hill Publishing Company Ltd, New Delhi, 3rd Edition, 2008, ISBN-13: 9780074630105.
4. G.D.Rai: “Solar Energy Utilization”, (Module - I), 5th Edition, Khanna Publishers, New Delhi, 2014, ISBN-10: 817409134X.

E-Resources:

1. https://www.eia.gov/energyexplained/?page=renewable_home
2. https://en.wikipedia.org/wiki/Internal_combustion_engine
3. <https://www.britannica.com/technology/turbine>
4. http://www.efunda.com/materials/materials_home/materials.cfm
5. <https://en.wikibooks.org/wiki/Robotics>



Basic Electrical Engineering (IC)

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
18ELE15/25	2:0:2	3	CIE:50 SEE:50	3 Hours	EFC

Course Objectives:

This course will enable students to:

- Understand the fundamental concepts of Electrostatics and Electromagnetism.
- Understand the working of DC and AC circuits.
- Highlight the importance of transformers in transmission and distribution of electric power.
- Understand the working principle and applications of AC and DC machines.
- Emphasize the effects of electric shock and precautionary measures.

Syllabus

Module – I

DC Circuits: Ohm's law, Kirchhoff's current law, Kirchhoff's voltage law- applications of these law for the analysis of series, parallel and series parallel resistive circuits excited by independent voltage sources, Mesh analysis, Illustrative examples.

06 Hours

Module – II

Electromagnetism: Definitions of Magnetic force, flux, flux density, reluctance, magnetomotive force (mmf). Faraday's Laws, Lenz's laws, Fleming's Rules, Induced emf's and inductances, concept of coefficient of coupling, Energy stored in magnetic field, Illustrative examples.

05 Hours

Module – III

Single Phase AC Circuits: Generation of sinusoidal AC voltage, definition of average value, rms value, form factor and peak factor of sinusoidally varying voltage and current, phasor representation of alternating quantities. Analysis with phasor diagram of R, L, C, R-L, R-C, R-L-C circuits and series, parallel. Real power, reactive power, apparent power and power factor. Illustrative examples.

06 Hours

Module – IV

Transformers: Principle of operation and construction of single phase transformers (core and shell type). Emf equation, Efficiency condition for maximum efficiency, power losses and illustrative examples.

Three Phase Circuits: Necessity and advantages of three phase systems, generation of three phase power. Relationship between line and phase values of balanced star and delta connections.

Power in balanced three phase circuits, measurement of power by two-wattmeter method. Determination of power factor using wattmeter readings. Illustrative examples.

06 Hours

Module – V

DC and AC Machines: Electro-mechanical energy conversion machines, importance of DC machines, need for three phase synchronous generator, introduction to induction motors, concept of rotating magnetic field in induction motor, working principle of induction motors, construction of induction motors, slip and its importance, Illustrative examples.

Electrical safety and wiring: Safety measures in Electrical system, Two way and Three way position control switch.

06 Hours

List of experiments:

1. Verification of Ohm's law.
2. Verification of Kirchhoff's law.
3. RLC series AC Circuit.
4. Verification of voltage and current distribution in both series and parallel circuits.

Study Experiments:

1. Study the characteristics of a Fluorescent tube.
2. Study experiment on domestic wiring and TWO way & THREE way Control of a lamp.

Virtual Lab Experiments:

1. Analysis of current flowing in series and parallel RL circuit.
2. Analysis of current flowing in series and parallel RC circuit.
3. Analysis of current flowing in series and parallel LC circuit.
4. To plot the frequency and current characteristic of series and parallel RLC circuits.

Course Outcomes:

On completion of this course, students will be able to:

- Analyze the behaviour of DC circuits.
- Understand the basic concepts of Electromagnetism.
- Analyze Single phase AC circuits and to determine power and power factor of these circuits.
- Solve three phase AC circuit problems and apply principles to determine parameters for single phase transformer.
- Explain the construction of AC, DC machines and to gain the fundamental knowledge of wiring and Earthing.

Text Book:

1. Kulshreshtha D.C: “Basic Electrical Engineering”, (Chapters: 1-5), 1st Edition, McGraw - Hill Education, 2012, ISBN-13: 9780071328968.

Reference Books:

1. Theraja. B.L: “Fundamentals of Electrical Engineering and Electronics”, Reprint Edition 2013, S.Chand & Company Ltd., ISBN-13: 9788121926607.
2. Rajendra Prasad: ‘Fundamentals of Electrical Engineering’, 2nd Edition, Prentice Hall of India, Pvt. Ltd., New Delhi, 2009, ISBN-13: 9788120339286.

E-Resources:

1. <http://vlab.amrita.edu/index.php>
2. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=108105053>
3. <http://nptel.ac.in/syllabus/syllabus.php?subjectId=108108076>
4. <http://nptel.ac.in/courses/108108076/>



C Programming Laboratory

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
18CPL16/26	1:0:2	2	CIE:50 SEE:50	3 Hours	EFC

List of Programs	
Sl. No.	PART-A
1	<p>a. For producing a certain product in manufacturing company, suppose the total costs are represented by a quadratic equation. Design a C program to find the roots of the quadratic equation, for non-zero coefficients.</p> <p>b. The three pupils from a training academy are to be selected for the army, navy and air force. Design a C program using branching statements to find the tallest candidate selected for the army, second tallest to the navy and third tallest to air force.</p>
2	<p>a. Design a C program to find greatest (GCD) & least (LCM) number of arrangements using Euclid's algorithm to make use of every balloon.</p> <p>b. Software company issues bonus to its employees on leap years. Given a year design a C program to find whether the employee is due for bonus or not using ternary operator.</p>
3	A criminal leaves a four digit number as his calling card. Design an algorithm and develop a C program to test the four digit number left by the criminal is palindrome or not.
4	A detective finds a clue at crime scene. Develop a C program to search the found clue in his database which helps to find the criminal.
5	The books in the library are randomly placed on the shelves. Design a C program that sorts the books based on ISBN (use bubble sort to implement the program).
6	Design a C program to search and display student details in a college database, using the student's USN (using binary search technique).
7	Design, develop and execute a program in C to read two matrices A(m x n) and B(p x q) and compute the product of A and B.
8	<p>You are given two envelopes, each containing money. Design, develop and execute a program in C to swap two envelopes using methods:</p> <p style="margin-left: 40px;">a. Call by value.</p> <p style="margin-left: 40px;">b. Call by reference</p>

9	Design a C program for a private bus seating arrangement where only a senior citizen should occupy a seat, where the seat number is a prime number. Check whether the seat is occupied by senior citizen or not (Prime number).
10	The company is maintaining employee database. Using structures design a C program that accepts the details such as Employee_ID, Employee name and Basic, DA and HRA of employees and prints their details along with their gross salary.

PART-B

Mini project using C concepts like Arrays, Structures and User defined functions.

NOTE: All lab programs should be executed in **UBUNTU / LINUX** platform only.

Assessment Method:

SEE: Students has to execute any one program given by the examiner and another from PART B.



Communication Skill Development - II

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
18CSD27	0:2:0	1	CIE:50 SEE:50	3 Hours	HSS

Course Objectives:

This course will enable students to:

- Enable easy comprehension of technical subjects through refined listening skills.
- Establish reasonable skills in various genres of creative and technical writing.
- Learn methodologies of participating in various types of formal communication modes.

Syllabus

Module – I

Listening Skills: Listening: the forgotten skill; Stages of listening: Sensing, Interpreting, Evaluating, Responding, Retaining; Reading listener’s nonverbal cues: Signs of listening, Signs of non-listening; Approaches to listening; Barriers to effective listening; Noise: Physical, Psychological, Physiological, Semantic; Making listening easier; How to listen. **06 Hours**

Module – II

Creative Writing: Beginning to write; Reading techniques; Building sentences and paragraphs; Clarity through discipline; Art of condensation; Putting up signposts: Punctuation and Headings; Using a Thesaurus and Dictionary; Genres of creative writing: Letters, Blogs, Short stories, Journals. **06 Hours**

Module – III

Technical Writing: Purposes, types and structures of technical writing genres: Resumes, Reports, Essays, Proposals, Letters, Mind-maps. **04 Hours**

Module – IV

Modes and Mechanics of Formal Communication: Grooming and dressing; Modes of formal communication: Group discussions, Debates, Interviews, Negotiations and Panel Discussions. **06 Hours**

Module – V

Public Speaking: Planning and preparing a speech; Ethics matters; Audience management; Introduction, Body and Conclusion; Understanding and managing anxiety: Situational and Trait; Prepared speech and Extempore. **06 Hours**

Course Outcomes:

On completion of this course, students will be able to:

- Display the ability to listen keenly and comprehend spoken content.
- Demonstrate adequate proficiency in both formal and informal written communication.
- Exhibit ability to participate and contribute in group discussions, debates, interviews, negotiations and panel discussions.

Text Books:

1. Bernard T Ferrari: "Power Listening", Penguin group, 2012.
2. Donald Maass: "The Fire in Fiction", Writer's Digest Books, 2009.
3. Scott Berkun: "Confessions of a Speaker", O'Reilly Media, 2010.

Reference Books:

1. Emilia Hardman: "Active Listening 101", 2012.
2. Larry Brooks: "Story Engineering", Writer's Digest Books.
3. Jason S Wrench, Anna Goding, Danette Ifert Johnson, Bernardo A Attias: "Public Speaking", Creative Commons.

E-Resources:

1. <http://www.mastersincommunication.com/public-speaking/>
2. <https://www.toastmasters.org/>
3. <https://www.ted.com/>



Engineering Mathematics-II

Course Code	L:T:P	Credits	Exam Marks	Exam Duration	Course Type
18MAT21	3:2:0	4	CIE:50 SEE:50	3 Hours	BS

Course Objectives:

This course will enable students to:

- Use the application of mathematical skills in solving engineering problems.
- Fit the curves for the given data.
- Understand the fundamentals of Vector differentiation and integration.
- Learn the applications of partial differential equations.

Syllabus

Module – I

Differential equations-I: Linear differential equations with constant coefficients:- Solution of second and higher order differential equations–by inverse differential operator method, Method of variations of parameter. **08 Hours**

Module – II

Differential equations-II: Solution of simultaneous differential equations of first order. Linear differential equation with variable coefficients: Solution of Cauchy’s and Legendre’s Linear equations. Application of Linear differential equations: Simple Harmonic motion and simple pendulum. **08 Hours**

Module – III

Partial Differential Equations (PDE’s): Formation of PDE–Eliminating the arbitrary constants and arbitrary functions, solutions of non homogeneous PDE by direct integration, Homogeneous PDEs involving derivative with respect to one independent variable only, Method of separation of variables. Solution of one dimensional wave equation, one dimensional heat equation and two dimensional Laplace equations by the method of separation of variables. **08 Hours**

Module – IV

Curve fitting and Statistical methods: Curve fitting by the method of least square: Straight line, parabola and exponential curves, Moments, skewness and kurtosis-problems. Rank correlation, Correlation and regression lines-problems. **08 Hours**

Module – V

Vector Calculus

Vector Differentiation: Scalar and vector fields. Gradient, directional derivative; curl and divergence; solenoidal and irrotational vector fields- problems.

Vector Integration: Line integrals, surface and volume integrals-definition only, Green's theorem in a plane, Stokes' and Gauss-divergence theorem (without-proof) - problems.

*No problems on verification of the theorems.

08 Hours

Course Outcomes:

On completion of this course, students will be able to:

- Solve the higher order linear differential equations using different methods
- Solve simultaneous first order differential equations, linear differential equations with variable coefficients and simple applications.
- Form and solve the partial differential equations with different methods and applications.
- Fit the curve and form the regression lines using the given data and determine different statistical coefficients.
- Find the differentiation of scalar and vector point functions and evaluate vector integrals.

Text Books:

1. Dr. B.S. Grewal: "Higher Engineering Mathematics", (Chapters: 8,13,14,17,18,24,25), 43rd Edition, Khanna Publishers, New Delhi, 2014, ISBN-13: 9788174091956.
2. N.P. Bali and Dr. Manish Goyal, "A Text Book of Engineering Mathematics" (Chapters: 2,7,13,14,16,17,21), 9th Edition, Laxmi Publications (P) Ltd., New Delhi, 2014, ISBN-13: 9788131808320.

Reference Books:

1. Erwin Kreyszig: "Advanced Engineering Mathematics", 9th Edition, Wiley Pvt. Ltd. India, New Delhi, 2011, ISBN-13: 9788126531356.
2. B.V. Ramana: "Higher Engineering Mathematics", Tata McGraw - Hill Publishing Company Limited, New Delhi, 2007, ISBN-13: 9780070634190.
3. H.K. Dass and Er. Rajnish Verma: "Higher Engineering Mathematics", 3rd Edition, S. Chand and Company Private Limited, New Delhi, 2014, ISBN-13: 9788121938907.

E-Resources:

1. <http://nptel.ac.in/courses.php?disciplineID=111>
2. [http://www.class-central.com/subject/math\(MOOCs\)](http://www.class-central.com/subject/math(MOOCs))
3. <http://academicearth.org/>



