CMR TECHNICAL CAMPUS
UGC AUTONOMOUS
B.Tech. I Year Syllabus (w. e. f. A.Y. 2020-21)

CSE (DS)

I SEMESTER

S. No	Course Code	Course Title	L	T	P	Credits
1	20MA101BS	Algebra and Calculus	3	1	0	4
2	20AP102BS	Applied Physics	3	1	0	4
3	20EC103ES	Basic Electrical & Electronics Engineering	3	1	0	4
4	20ME104ES	Engineering Graphics	2	0	4	4
5	20AP105BS	Applied Physics Lab	0	0	3	1.5
6	20EC106ES	Basic Electrical & Electronics Engineering Lab	0	0	3	1.5
7	20EC107ES	Basic Elements of Engineering Technology Lab	0	0	2	1
8	20MC108ES	Environmental Science	3	0	0	0
		Induction Programme				
Total Credits			**14**	**3**	**12**	**20**

II SEMESTER

S. No.	Course Code	Course Title	L	T	P	Credits
1	20MA201BS	Ordinary Differential Equations and Vector Calculus	3	1	0	4
2	20CH202BS	Engineering Chemistry	3	1	0	4
3	20CS203ES	Programming for problem solving	3	1	0	4
4	20EN204HS	English	2	0	0	2
5	20ME205ES	Engineering Workshop	0	0	3	1.5
6	20CH206BS	Engineering Chemistry Lab	0	0	3	1.5
7	20EN207HS	English Language and Communication Skills Lab	0	0	3	1.5
8	20CS208ES	Programming for problem solving Lab	0	0	3	1.5
Total Credits			**11**	**3**	**12**	**20**

20MA101BS: Algebra and Calculus

B.Tech. I SEM

L	T	P	C
3	1	0	4

Course Objectives: To learn

- Types of matrices and their properties, rank of the matrix, consistency and solving the system of linear equations.
- Concept of Eigen values and eigenvectors and to reduce the Quadratic form to Canonical form.
- Concept of Sequences and nature of the series.
- Geometrical approach to the mean value theorems and their application to the mathematical problems and evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative, finding maxima and minima of function of two and three variables.

Course Outcomes: After learning the contents of this paper the student must be able to

- Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations.
- Find the Eigen values and Eigen vectors and reduce the quadratic form to canonical form using orthogonal transformations.
- Analyze the nature of convergence of sequence and series.
- Solve problems involving mean value theorems and evaluate the improper integrals using Beta and Gamma functions.
- Find the extreme values of functions of two variables with/ without constraints.

UNIT-I: Matrices **10L**

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew-Hermitian; Orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; System of linear equations; solving system of Homogeneous and Non-Homogeneous equations. Gauss -elimination method; Gauss Seidel Iteration Method.

UNIT-II: Eigen values and Eigen vectors **10L**

Linear Transformation and Orthogonal Transformation: Eigen values and Eigenvectors and their properties: Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding inverse and power of a matrix by Cayley-Hamilton Theorem; Quadratic forms and nature of the Quadratic Forms; Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

UNIT-III: Sequences & Series **10L**

Sequence: Definition of a Sequence, limit; Convergent, Divergent and Oscillatory sequences. Series: Convergent, Divergent and Oscillatory Series; Series of positive terms; Comparison test, p-test, D-Alembert's ratio test; Raabe's test; Cauchy's Integral test; Cauchy's n^{th} root test.
Alternating series: Leibnitz test; Alternating Convergent series: Absolute and Conditionally Convergence.

UNIT-IV: Calculus **12L**

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem(without proof) with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem(without proof), Taylor's series of single variable.Definition of improper integral: Beta and Gamma functions and their applications.

UNIT-V: Multivariable calculus (Partial Differentiation and applications) **8L**

Definitions of Limit and continuity. Partial Differentiation; Euler's Theorem; Total derivative;

Jacobian; Functional dependence & independence, Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

TEXTBOOKS:

- B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
- Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9thEdition, Pearson, Reprint, 2002.

REFERENCES:

- N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi publications, Reprint, 2008.
- Higher Engineering Mathematics, (11th Reprint), Ramana B.V., Tata McGraw Hill New Delhi,2010.
- Engineering Mathematics – I,T.K.V.Iyengar,B. Krishna Gandhi &Others, Edition S.Chand 2013.

20AP102BS: Applied Physics

B.Tech. I SEM

L	T	P	C
3	1	0	4

Course Objectives:

- Students will demonstrate skills in scientific inquiry, problem solving and laboratory techniques.
- Students will be able to demonstrate competency and understanding of the concepts found in Quantum Mechanics, Semiconductor physics, Wave optics, lasers, Fiber optics, dielectric and magnetic properties and a broad base of knowledge in physics.
- The graduates will be able to solve non-traditional problems that potentially draw on knowledge in multiple areas of physics.
- To study applications in engineering like lasers, transformer core and electronic devices

Course Outcomes: Upon graduation

- The student would be able to learn the fundamental concepts on Quantum behaviour of matter in its micro state.
- The knowledge of fundamentals of Semiconductor physics, Lasers and fibre optics enable the students to apply to various systems like pn junction diodes, transistors, communication and so on.
- The students can gain knowledge on the optical phenomena like Interference and diffraction.
- Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
- The course also helps the students to be exposed to the magnetic materials and dielectric materials.

UNIT-I: Quantum Mechanics **10L**

Introduction to quantum physics, Black body radiation, Planck's law, de-Broglie's hypothesis, Wave-particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.

UNIT-II: Semiconductor Physics **10L**

Introduction to semiconductors, calculation of intrinsic carrier concentration and extrinsic carrier concentration, Dependence of Fermi level on carrier concentration and temperature, Carrier transport: diffusion and drift currents, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction transistor(BJT): construction and operation.

UNIT-III: Wave Optics **10L**

Introduction, Huygen's principle, Superposition of waves, Interference of light by wave front splitting and amplitude splitting, Young's double slit experiment, Interference in thin films by reflection-Cosine law, Newton's rings, Michelson's interferometer, Frunhofer diffraction due to single slit and double slit, Diffraction grating- resolving power.

UNIT-IV: Lasers and Fibre Optics **8L**

Lasers: Introduction, Characteristics of Lasers, Einstein's coefficients, absorption, spontaneous emission, stimulated emission, population inversion, Pumping, lasing action, Types of Lasers: Ruby laser, He-Ne laser, semiconductor laser, Applications of laser.

Fibre Optics: Introduction, working principle of optical fibre, construction of optical fibre, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibres, Losses associated with optical fibres, optical fibres in communication system.

UNIT-V: Dielectric and Magnetic Properties of Materials **12L**

Dielectric Properties: Introduction to dielectrics, Polarisation, Permittivity and Dielectric constant, classification of polarizabilities, calculation of polarizabilities: electronic polarizability, ionic polarizability, Internal fields in a solid, Clausius-Mossotti equation, Ferroelectrics and Piezoelectrics, applications of dielectric materials.

Magnetic Properties: Magnetisation, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, soft and hard magnetic materials, Applications of magnetic materials.

TEXT BOOKS

1. Applied Physics, B K Pandey, S. Chaturvedi, T Vijaya Krishna, T Madhu mohan, Cengage publisher

2. Engineering Physics, M K Harbola, Cengage publisher

REFERENCE BOOKS:

1. Engineering Physics, B.K.Pandey, S. Chaturvedi, Cengage Learning

2. Engineering Physics by Dr M N Avadhanulu, S-Chand publications

20EC103ES: Basic Electrical & Electronics Engineering

B.Tech. I SEM

L	T	P	C
3	1	0	4

Course Objectives:

- To introduce the concepts of electrical circuits and its components
- To understand magnetic circuits, DC circuits and AC single phase & three phase circuits
- To study and understand the different types of DC/AC machines and Transformers.
- To import the knowledge of various electrical installations.
- To introduce the concept of power, power factor and its improvement.
- To introduce the concepts of diodes & transistors, and
- To impart the knowledge of various configurations, characteristics and applications.

Course Outcomes:

- To understand and analyze basic Electrical circuits
- To study the working principles of Electrical Machines
- To introduce components of Low Voltage Electrical Installations
- To identify and characterize diodes and various types of transistors.

UNIT – I **10L**

D.C. CIRCUITS: Electrical circuit elements (R, L and C), voltage and current sources, KVL&KCL, analysis of simple circuits with dc excitation.

A.C. CIRCUITS: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits RL, RC, RLC series combination. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT – II **10L**

TRANSFORMERS: Working principle of Single-phase transformer, equivalent circuit, losses in transformers, efficiency, O.C. and S.C. Tests, Three-phase transformer connections.

ELECTRICAL INSTALLATIONS: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing.

UNIT – III **10L**

ELECTRICAL MACHINES: Construction and working principle of DC generators, types, emf equation, working principle of DC motors, Torque equation and Speed control of DC shunt motors, Construction and working principle of Three-phase Induction motor, Torque- slip Characteristics

UNIT – IV **08L**

P-N JUNCTION AND ZENER DIODE: Principle of Operation Diode equation, Volt-Ampere characteristics, Static and dynamic resistances, Diode Capacitance-Diffusion and Transition capacitance, a Zener diode characteristics and applications.

RECTIFIERS: P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, Bridge Rectifier, Simple problems.

UNIT – V **10L**

BIPOLAR JUNCTION TRANSISTOR (BJT): Construction, Principle of Operation, Amplifying Action, Common Emitter, Common Base and Common Collector configurations, Comparison of CE, CB and CC configurations. SCR-Construction, Operation and V-I characteristic.

TEXTBOOKS:

1. Basic Electrical and electronics Engineering –M S Sukija TK Nagasarkar Oxford University
2. Basic Electrical and electronics Engineering-D P Kothari. I J Nagarath, McGraw Hill Education
3. Principles of Electrical Engineering and Electronics – V.K. Mehta, Rohit Mehta, S.Chand Publications
4. Electronic Devices and circuits – S. Salivahanan, N.Suresh Kumar, McGraw Hill

REFERENCE BOOKS:

1. Electronic Devices and Circuits – R. L. Boylestad and Louis Nashelsky, PEI/PHI, 9th Ed, 2006.
2. Millman's Electronic Devices and Circuits – J. Millman and C. C. Halkias, Satyabrata Jit, TMH, 2/e, 1998.
3. Engineering circuit analysis- by William Hayt and Jack E. Kemmerly, McGraw Hill Company, 6^{th} edition.
4. Network Theory by N. C. Jagan& C. Lakshminarayana, B.S. Publications.
5. Network Theory by Sudhakar, Shyam Mohan Palli, TMH.
6. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
7. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

20ME104ES: Engineering Graphics

B.Tech. I SEM

L	T	P	C
2	0	4	4

Course Description:
A picture speaks thousands of words. A messages conveyed by a picture or a sign is much effective than a message conveyed by words. The human beings used the language of drawing to convey their ideas since before the start of civilization. With progress of science and technology, human felt the need for a standardized drawing that could be understood globally. The standardized graphical language was then termed as *Engineering Drawing.*
The languages of engineering drawing can be effectively used if its grammar is mastered along with use of Auto CAD drawing software. This grammar refers to the use of standard conventions, notations and the methods used in technical drawing. The course aims the students to learn the Auto Cad so that they can draw and make best use of it in drawing of engineering graphics.

Prerequisites: Knowledge of simple geometrical theorems and constructional procedure.

Course leaning outcomes:
After successful completion of the course, students will be able to,

1. Determine the location of the location and orientation of point, line, and plane with respect to reference planes to draw their projection.
2. Develop the project of various types of solids in various conditions.
3. Develop section views and true shape section of various types of solids.
4. Identify the need of development of lateral surfaces and the same in engineering drawing.
5. Develop orthographic views of an object to convert pictorial view into two-dimension (2D) view.
6. Develop isometric view to convert two dimension (2D) view to pictorial view.

UNIT- I
INTRODUCTION TO ENGINEERING DRAWING: 10L
Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Involute. Scales – Plain, Diagonal and Vernier Scales. Introduction to CAD Software commands and practice.

UNIT - II
ORTHOGRAPHIC PROJECTIONS: 10L
Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.—Auxiliary Planes.

UNIT –III 10L
Projections of Regular Solids – Auxiliary Views.

UNIT- IV
Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere. Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone

UNIT –V 10L
ISOMETRIC PROJECTIONS:
Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions –

Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts.Conversion of Isometric Views to Orthographic Views and Vice-versa

Note: - The End Semester Examination will be conducted by using Auto Cad Software.

TEXTBOOKS:

1. Engineering Drawing N.D. Bhatt / Charotar
2. Engineering Drawing / N. S. Parthasarathy and Vela Murali/ Oxford

REFERENCE BOOKS:

1. Engineering Drawing / Basant Agrawal and McAgrawal/ McGraw Hill
2. Engineering Drawing/ M. B. Shah, B.C. Rane / Pearson.
3. Computer Aided Engineering Drawing – K Balaveera Reddy et al – CBS Publishers

20AP105BS: Applied Physics Lab

B.Tech. I SEM

L	T	P	C
0	0	3	1.5

List of Experiments:

1. Torsional pendulum:

   To determine the rigidity modulus of the material of the given wire using torsional pendulum.
2. Newton's rings:

   To determine the radius of curvature of the lens by forming Newton's rings.
3. Dispersive power:

   To determine the dispersive power of prism by using spectrometer.
4. LCR Circuit:

   To determine quality factor and the resonant frequency of LCR circuit.
5. a. To study the V-I characteristics of LASER sources.

   b. Plot V-I characteristics of light emitting diode.
6. Optical fibre:

   a. To determine the bending losses of Optical fibres

   b. To determine the Numerical aperture of a given fibre.
7. R-C Circuit:

   To determine the time constant of R-C circuit.
8. Solar Cell:

   To study the V-I Characteristics of solar cell.
9. Stewart – Gee's experiment:

   Determination of magnetic field along the axis of a current carrying coil.
10. Energy gap of P-N junction diode:

    To determine the energy gap of a semiconductor diode.

Note: Minimum 8 experiments are to be performed

20EC106ES: Basic Electrical & Electronics Engineering Lab

B.Tech. I SEM

L	T	P	C
0	0	3	1.5

SECTION A: ELECTRICAL ENGINEERING:

1. Verification of KCL and KVL.
2. Verification of Ohms Law.
3. Three-phase transformer: Verification of Relationship between voltages and currents.(Star –Star, Star – Delta, Delta – star, Delta - Delta)
4. Load Test on Single-phase transformer.
5. Brake test on DC shunt motor.
6. OC and SC tests on Single-phase transformer.
7. Brake test on 3-phase Induction motor.
8. No Load Characteristics of 3 phase Alternator.

SECTION B: ELECTRONICS ENGINEERING:

1. Study and operation of
   (i) Multi-meters (ii) Function Generator (iii) Regulated Power Supplies
2. PN Junction Diode Characteristics (Forward bias, Reverse bias)
3. Zener Diode Characteristics
4. Study of CRO.
5. Transistor CE Characteristics
6. Rectifier without Filters (Full wave & Half wave)
7. Rectifier with Filters (Full wave & half wave).

Note: Total 10 experiments are to be conducted.
(Five experiments from PART-A, Five experiments from PART-B)

20EC107ES: Basic Elements of Engineering Technology Lab

B.Tech. I SEM

L	T	P	C
0	0	2	1

Objectives:

- Exploring different engineering technologies and their applications.
- Student should be able to understand IT Networking, Protocols and Computations.
- Understanding the principle of IoT and its architecture.
- Knowledge towards Assembling and testing of robots.
- Understanding functionality of 3D printers and their application.
- Developing team work and insight towards different disciplines of Engineering.

Module I: Network & Computing

PC Hardware: Identify the peripherals of a computer, components in a CPU and its functions. Block diagram of the CPU along with the configuration of each peripheral, disassemble and assemble the PC back to working condition. Install MS Windows / Linux on the personal Computer / Laptop and dual boot configuration.

Connectivity Boot Camp: Connecting to their Local Area Network and access the Internet. Configuration of the TCP/IP setting, access the websites and email.

Web Browsers, Surfing the Web: Customize web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Module II: Internet of Things

Overview of IoT and Architecture: Brief History, evolution of IoT, Architecture, trends in the Adoption of IoT, Societal Benefits of IoT, Risks, Privacy, Security, Embedded Systems Components, Micro-controller Architecture and Properties and Installing and Setting up the Arduino and Raspberry Pi (RPi) development environment. Build Simple IoT Applications by using Arduino or RPi.

Module III: Robotics

Introduction, Different types of robots, Components of a Robot, Working principle of robots, Applications of robots in various fields, Innovation challenges, Scope of robotics research & its current trends, assembling and testing of Robot.

Module IV: 3D Printing

Introduction, Product Design & Development, 3D Scanning & Printing using different types of materials. Components of 3D Printer, Applications of 3D printed products in various fields, Hands on Experience on 3D printing Machines.

Module V: Case Studies

Students has to submit a report by doing a study on various Engineering applications related to Manufacturing, Retail, Automotive, Logistics, Healthcare, Entertainment and E-Governance.

REFERENCE BOOKS:

1. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)
2. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
3. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547.
4. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759
5. Ashitava Ghoshal, Robotics-Fundamental Concepts and Analysis', Oxford University Press, Sixth impression, 2010.
6. Deb S R.and DebS., ―Robotics Technology and Flexible Automation‖, Tata McGraw Hill Education Pvt. Ltd, 2010.
7. Mikell P Groover, ―Automation, Production Systems, and computer integrated Manufacturing‖, Prentice Hall, 2001.
8. Chee Kai Chua, Kah Fai Leong, 3D Printing and Additive Manufacturing: Principles and Applications: Fourth Edition of Rapid Prototyping.
9. Andreas Gebhardt, Understanding Additive Manufacturing: Rapid Prototyping, Rapid Tooling, Rapid Manufacturing

20MC108ES: Environmental Science

B.Tech. I SEM

L	T	P	C
3	0	0	0

Course Objectives:

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I: **10L**

Ecosystems:

Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II: **5L**

Natural Resources: Classification of Resources:

Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III: **7L**

Biodiversity And Biotic Resources:

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV: **13L**

Environmental Pollution and Control Technologies:

Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control**

technologies: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC - GOI Initiatives.

UNIT-V: 7L

Environmental Policy, Legislation & EIA:

Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS.Publications.

20MA201BS: Ordinary Differential Equations and Vector Calculus

B.Tech. II SEM

L	T	P	C
3	1	0	4

Course Objectives: To learn

- Methods of solving the differential equations of first and higher order.
- Applications of first order ordinary differential equations (Orthogonal trajectories, Newton's law
- of cooling, Natural growth and Decay)
- Evaluation of surface areas and volumes of revolution of curves.
- The physical quantities involved in engineering field related to the vector valued functions.
- The basic properties of vector valued functions and their applications to line, surface and
- Volume integrals.

Course Outcomes: After learning the contents of this paper the student must be able to

- Identify whether the given differential equation of first order is exact or not.
- Solve higher order differential equation and apply the concept of differential equation to real World problems.
- Evaluate the multiple integrals and apply the concept to find area and volumes of revolution of curves.
- Evaluate Gradient, Divergence and Curl of vector differential operator.
- Evaluate the line, surface and volume integrals and converting them from one to another.

UNIT-I: First Order Differential Equations and Applications **12L**

Formation of Differential Equation, Differential Equations of first order and first degree: Variable Separable, Homogeneous Differential Equations, Exact Differential Equation-Reducible to exact, Linear and Bernoulli's equations.

Applications**:** Orthogonal trajectories, Newton's law of cooling, Law of natural growth and decay.

UNIT-II: Higher Order Differential Equations **10L**

Linear Differential Equations of Second and Higher Order with constant coefficients: Non-Homogeneous terms of the type f(x) =e^{ax}, sinax, cos$a$x, polynomial in x, $e^{ax}(x)$ and x(x); Method of variation of parameters; Cauchy Homogeneous Linear equation .

UNIT-III: Multivariable Calculus (Integration) **10L**

Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double. Applications of definite integrals to evaluate surface areas and volumes of revolutions of curves (Only in Cartesian coordinates).

UNIT-IV: Vector Differentiation **8L**

Vector Differentiation**:** Scalar and vector point functions, Gradient, Divergence, and Curl. Directional derivatives, tangent plane and normal line, vector identities scalar potential functions, Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration **10L**

Vector Integration: Line Integral, Work done by force, surface and volume integrals.

Vector integral theorems: Green's, Stoke's and Gauss divergence theorems (without proof) and their applications.

TEXT BOOKS:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 42 nd Edition, 2012
2. R.K. Jain, S.R.K. Iyengar, Advanced Engineering Mathematics, 4th Ed., Narosa Publishing House, New Delhi,2014.
3. T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganathan and M.V.S.S.N.Prasad, Engineering Mathematics.

REFERENCES:

1. E. Kreyszig, Advanced Engineering Mathematics, 9th Ed Wiley ,2012.
2. B.V. Ramana , Engineering Mathematics, 4th Ed., Tata McGraw Hill, New Delhi,2009.
3. A textbook of Engineering Mathematics, Ninth Edition by N. P. Bali, Dr Manish Goyal.

20CH202BS: Engineering Chemistry

B.Tech. II SEM

L	T	P	C
3	1	0	4

Course Objectives:

- To bring adaptability to the concepts of chemistry and to acquire the required skills to become a perfect engineer.
- To impart the basic knowledge of atomic, molecular and electronic modifications which makes the student to understand the technology based on them.
- To acquire the knowledge of electrochemistry, corrosion and water treatment which are essential for the engineers and in industry.
- To acquire the knowledge about fuels, cement, lubricants and refractories which are essential for an engineer.
- To impart the knowledge of stereochemistry and synthetic aspects useful for understanding reaction pathways.

Course Outcomes:

The basic concepts included in this course will help the student to gain:

- The knowledge of atomic, molecular and electronic changes related to Conductivity
- The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments.
- The required skills to get clear concepts on fuels, cement, lubricants and refractories.
- The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.

UNIT-I: **10L**

Molecular structure and Theories of Bonding: Atomic and Molecular orbitals

Linear Combination of Atomic Orbitals (LCAO), molecular orbitals of diatomic molecules, molecular orbital energy level diagrams of N_2, O_2, O_2^-, CO, NO and F_2 molecules. π-molecular orbitals of butadiene and benzene.

Crystal Field Theory (CFT): Salient Features of CFT–Crystal Field Splitting of transition metal ion d-orbitals in Tetrahedral, Octahedral and square planar geometries.

UNIT-II: **8L**

Water Chemistry: (08 Hours)

Introduction-hardness of water-Causes of hardness-Types of hardness: temporary and permanent-expression and units of hardness-Estimation of hardness of water by complexometric method. Potable water and its specifications. Steps involved in treatment of water–Disinfection of water by chlorination and ozonization. Boiler feed water and its treatment-Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water-Ion exchange process. Desalination of water-Reverse osmosis. Numerical problems.

UNIT –III: **12L**

Electrochemistry and corrosion:

Electrochemistry: Electrochemical cells-electrode potential, standard electrode potential, types of electrodes-calomel, Quinhydrone and glass electrode. Nernst equation- Determination of pH of a solution by using glass electrode. Electrochemical series and its applications. Numerical problems.

Batteries: Primary (Lithium cell) and secondary batteries (Lead-acid storage battery and Lithium ion battery).

Corrosion: Causes and effects of corrosion-theories of corrosion: chemical and electrochemical corrosion-mechanism of electrochemical corrosion, Types of corrosion: Galvanic, water-line and pitting corrosion. Factors affecting rate of corrosion, Corrosion control methods-Cathodic

protection-Sacrificial anodic and impressed current cathodic protection. Surface coatings-metallic coating methods: Hot dipping, Electroplating and Electroless plating of Nickel.

UNIT – IV: **10L**

Stereochemistry, Reaction Mechanism and synthesis of drug molecules.

Stereochemistry: Isomerism: structural and stereo isomers, configurations, symmetry and chirality. Enantiomers, diastereomers, optical activity and absolute configuration. Conformational analysis of n-butane.

Reaction Mechanism: Substitution reactions: Nucleophilic substitution reactions: Mechanism of SN^1, SN^2 reactions. Electrophilic and nucleophilic addition reactions: Addition of HBr to propene. Markownikoff and anti Markownikoff's additions. Grignard addition of carbonyl compounds. Elimination reactions: Dehydrohalogenation of alkylhalides-Saytzeff's rule. Oxidation reactions: Oxidation of alcohols using $KMnO_4$ and chromic acid. Reduction reactions: reduction of carbonyl compounds using $LiAlH_4$ & $NaBH_4$.

Drug molecules: Structure, synthesis and pharmaceutical applications of Paracetamol and Aspirin.

UNIT-V: **10L**

Spectroscopic techniques and applications.

Introduction to spectroscopy, electromagnetic spectrum**:** Principles of electronic magnatic spectroscopy spectroscopy-Lambert –Beer's Law, selection rules: Woodward–Fieser rule. Chromophore, auxochrome and various shifts. Applications of electronic spectroscopy. Principle and selection rules of vibrational and rotational spectroscopy. Applications of vibrational and rotational spectroscopy. Basic concepts of Nuclear magnetic resonance Spectroscopy, chemical shift and splitting pattern of NMR signals. Applications of NMR: Introduction to Magnetic resonance imaging.

TEXT BOOKS:

1. Engineering Chemistry by P. C Jain and M. Jain, Dhanpat Rai Publications, New Delhi, 16th Edition.
2. Text book of Engineering chemistry by Jaya shree Anireddy, Wiley Publications.
3. Engineering Chemistry by Prasanta Rath, B. Rama Devi, Ch. Venkata Ramana Reddy, Subhendu Chakroborty, Cengage Publications, New Delhi-2018.
4. A Textbook of Engineering Chemistry by Dr. Bharathi Kumari Yalamanchili, VGS Techno Series (R18 Syllabus)
5. A Textbook of Engineering Chemistry by Shashi Chawla, Dhanpat Rai Publications, New Delhi.

REFERENCES:

1. Engineering Chemistry by S. S. Dara, S. Chand & Company Ltd, New Delhi.
2. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, New Delhi.
3. Engineering Chemistry by B. Sivasankar, Tata McGraw Hill Education Pvt. Ltd., New Delhi.

20CS203ES: Programming For Problem Solving

B.Tech. II SEM

L	T	P	C
3	1	0	4

Course Objectives:

- To learn the fundamentals of computers.
- To understand the various steps in program development.
- To learn the syntax and semantics of C programming language.
- To learn the usage of structured programming approach in solving problems.

Course Outcomes: The student will learn

- To write algorithms and to draw flowcharts for solving problems.
- To convert the algorithms/flowcharts to C programs.
- To code and test a given logic in C programming language.
- To decompose a problem into functions and to develop modular reusable code.
- To use arrays, pointers, strings and structures to write C programs.
- Searching and sorting problems.

UNIT - 1: Introduction to Programming **12L**

Introduction to components of a computer system: disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming

Introduction to C Programming Language: variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments Bitwise operations: Bitwise AND, OR, XOR and NOT operators.

Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, do- while loops I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr. Command line arguments

UNIT - II: Arrays, Strings, Structures and Pointers **10L**

Arrays: one and two dimensional arrays, creating, accessing and manipulating elements of arrays

Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings

Structures: Defining structures, initializing structures, unions, Array of structures

Pointers: Idea of pointers, Defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self referential structures in linked list (no implementation), Enumeration data type.

UNIT - III: Pre processor and File handling in C **9L**

Pre processor: Commonly used Pre processor commands like include, define, undef, if, ifdef, ifndef

Files: Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

UNIT - IV: Function and Dynamic Memory Allocation 9L

Functions: Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, Passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types

UNIT - V: Introduction to Algorithms: 10L

Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc.

Basic searching in an array of elements (linear and binary search techniques),

Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms), Basic concept of order of complexity through the example programs

TEXT BOOKS:

1. Byron Gottfried, Schaum'sOutline of Programming with C,McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rdEdition)

REFERENCE BOOKS:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language,Prentice Hall of India
2. R.G. Dromey, How to solve it by Computer, Pearson (16thImpression)
3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
4. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4thEdition

20EN204HS: English

B.Tech. II SEM

L	T	P	C
2	0	0	2

INTRODUCTION

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training students to acquire language skills, the syllabus of English has been designed to develop linguistic, communicative and critical thinking competencies of Engineering students.

In English classes, the focus should be on the enhancement of skills in the areas of vocabulary, grammar, reading and writing. For this, the teachers should use the prescribed text for detailed study. The students should be encouraged to read the texts leading to reading comprehension and different passages may be given for practice in the class. The time should be utilized for working out the exercises given after each excerpt, and also for supplementing the exercises with authentic materials of a similar kind, for example, newspaper articles, advertisements, promotional material etc. The focus in this syllabus is on skill development and also on personality development fostering ideas and practice of language skills and exhibiting the right values and ethics in various contexts and cultures.

Learning Objectives: The course will help to

- Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar, Reading and Writing skills.
- Equip students to study academic subjects more effectively and critically using the theoretical and practical components of English syllabus.
- Develop Study Skills and Communication Skills in formal and informal situations.
- Integrate Value Education and Ethics.

Course Outcomes: Students should be able to

- Use English Language effectively in spoken and written forms.
- Comprehend the given texts and respond appropriately.
- Communicate confidently and assertively in various contexts and different cultures.
- Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

UNIT –I: **8L**

'Mokshagundam Visvesvaraya' from the prescribed text book by JNTUH 'Epitome of Wisdom' - Maruthi Publications.

Vocabulary Building: The Concept of Word Formation -The Use of Prefixes and Suffixes.

Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.

Reading: Reading and Its Importance- Techniques for Effective Reading.

Basic Writing Skills: Sentence Structures - Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – **Paragraph writing** – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

UNIT –II: **8L**

'Ancient Architecture in India' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Synonyms and Antonyms.

Grammar: Identifying Common Errors in Writing with Reference to Noun - Pronoun Agreement and Subject-verb Agreement.
Reading: Improving Comprehension Skills – Techniques for Good Comprehension.
Writing: Format of a Formal Letter - **Writing Formal Letters-** Letter of Complaint, Letter of Requisition, Job Application with Resume.

UNIT –III: 9L

'Blue Jeans' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary- Homonyms, Homophones, One-word substitutes.
Grammar- Misplaced Modifiers and Tenses.
Reading-Reading poem 'Stopping by Woods on a Snowy Evening' by Robert Frost.
Writing- Note-making, Information Transfer.

UNIT –IV: 8L

'What Should You Be Eating' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Standard Abbreviations and Acronyms in English.
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Comprehension- Intensive Reading and Extensive Reading.
Writing: Essay Writing-Précis Writing.

UNIT –V: 10L

'How a Chinese Billionaire Built Her Fortune' from the prescribed textbook 'English for Engineers' published by Cambridge University Press.

Vocabulary: Technical Vocabulary
Grammar: Common Errors in English
Reading: Reading Comprehension-Exercises for Practice
Writing: Technical Reports- Introduction – Characteristics of a Report - Categories of Report - Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report.

PRESCRIBED TEXTBOOK:

Sudarshana, N.P. and Savitha, C. (2018). English for Engineers. Cambridge University Press.

REFERENCES:

1. Epitome of Wisdom – Maruthi Publications
2. English Grammar by David Green
3. Swan, M.(2016). Practical English Usage. Oxford University Press.
4. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.
5. Wood, F.T. (2007).Remedial English Grammar. Macmillan.
6. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
7. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.
8. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

20ME205ES: Engineering Workshop

B.Tech. II SEM

L	T	P	C
0	0	3	1.5

Course Objective:

Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops. This course intends to impart basic know-how of various hand tools and their use in different sections of manufacturing. Irrespective of branch, the use of workshop practices in day to day industrial as well domestic life helps to dissolve the problems.

I. (Two experiments each from any six trades of the following)

1. Carpentry
2. Fitting
3. Tin-smithy
4. House-wiring
5. Foundry
6. Plumbing
7. Welding
8. Black smithy

II. Trades for Demonstration and Exposure:

1. Power tools
2. Machine Tools- Operations on Lathe.

Course Outcomes: On completion of the course, students will be able to

1. Create the different patterns with desired shape and size by using wood.
2. Align and assemble different components to create a product by fitting operations.
3. Fabricate the given material to desired product in a particular pattern by tin smithy.
4. Explain the basic principles of electrical systems in day-to-day applications.
5. Mould the component to desire pattern and shape by black smithy.
6. Create the object by casting process using molten metal.
7. Assemble the components with permanent joint by welding process.
8. Describe the process, transfer of fluid or gases from one place to another place by connecting set of pipes with different requirements in plumbing process

TEXT BOOK:

1. P Kannaiah and K L Narayana, Workshop Manual, Scitech publishers, Second Edition.

20CH206BS: Engineering Chemistry Lab

B.Tech. II SEM

L	T	P	C
0	0	3	1.5

Course Objectives: The course consists of experiments related to the principles of chemistry required for engineering student. The student will learn:

- Estimation of hardness and chloride content in water to check its suitability for drinking purpose.
- To determine the rate constant of reactions from concentrations as a function of time.
- The measurement of physical properties like surface tension and viscosity.
- To synthesize the drug molecules and check the purity of organic molecules by thin layer chromatographic (TLC) technique.

Course Outcomes: The experiments will make the student gain skills on:

- Determination of parameters like hardness and chloride content in water.
- Estimation of rate constant of a reaction from concentration – time relationships.
- Determination of physical properties like surface tension and viscosity.
- Calculation of R_f values of some organic molecules by TLC technique.

List of Experiments:

1. Determination of total hardness of water by complexometric method using EDTA.
2. Determination of chloride content of water by Argentometry.
3. Estimation of HCl by Conductometric titrations.
4. Estimation of Acetic acid by Conductometric titrations.
5. Estimation of HCl by Potentiometric titrations.
6. Estimation of Fe2+ by Potentiometry using KMnO4.
7. Determination of rate constant of acid catalysed hydrolysis of methyl acetate.
8. Synthesis of Aspirin.
9. Thin layer chromatography calculation of Rf values. Ex; ortho and para-nitro phenols.
10. Determination of acid value of coconut oil.
11. Estimation of ferrous iron in cement by colorimetric method.
12. Determination of viscosity of given solvent by using Ostwald's viscometer.
13. Determination of partition coefficient of acetic acid between n-butanol and water.
14. Determination of surface tension of a give liquid using stalagmometer.

Note: Any 12 experiments are to be performed References

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg (R. Chand & Co., Delhi).
2. An introduction to practical chemistry, K.K. Sharma and D. S. Sharma (Vikas publishing, N. Delhi).
3. Vogel's text book of practical organic chemistry 5^{th} edition.
4. Text book on experiments and calculations in engineering chemistry–S.S. Dara.

20EN207HS: English Language and Communication Skills Lab

B.Tech. II SEM

L	T	P	C
0	0	3	1.5

The Language Lab focuses on the production and articulation of sounds of the English language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

Course Objectives:

- To facilitate computer-assisted multi-media instruction enabling individualized and independent language learning.
- To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm.
- To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking.
- To improve the fluency of students in Spoken English and neutralize their mother tongue influence.
- To familiarize the students to the concept of group discussions and interviews and train them through mock sessions.

Learning Outcomes: Students will be able to attain

- Better understanding of nuances of English language through audio- visual experience and group activities.
- Neutralization of accent for intelligibility.
- Speaking skills with clarity and confidence which in turn enhances their employability skills.

Syllabus: English Language and Communication Skills Lab (ELCS) shall have two parts:

- Computer Assisted Language Learning (CALL) Lab
- Interactive Communication Skills (ICS) Lab

Listening Skills

Objectives:

1. To enable students develop their listening skills so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions Students should be given practice in listening to the sounds of the language, to be able to recognize them and find the distinction between different sounds, to be able to mark stress and recognize and use the right intonation in sentences.
   - Listening for general content
   - Listening to fill up information
   - Intensive listening
   - Listening for specific information

Speaking Skills

Objectives:

1. To involve students in speaking activities in various contexts
2. To enable students express themselves fluently and appropriately in social and professional contexts
   - Oral practice: Just A Minute (JAM) Sessions
   - Role play – Individual/Group activities
   - Group discussions and Mock interviews

Exercise – I

CALL Lab:

Understand*:* Listening Skill-Its Importance- Purpose-Process-Types-Barriers of Listening.

Practice**:** Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

Understand*:* Communication at Work Place- Spoken vs. Written language.

Practice*:* Ice-Breaking Activity and JAM Session- Greetings - Introducing Oneself and Others - Taking Leave.

Exercise – II

CALL Lab:

Understand: Minimal Pairs- Consonant Clusters- Past Tense Markers and Plural Markers.

Practice: Differences in British and American Pronunciation.

ICS Lab:

Understand: Features of Good Conversation – Non-verbal Communication.

Practice: Situational Dialogues – Role-Play (face-to-face & telephonic) - Expressions in Various Situations.

Exercise – III

CALL Lab:

Understand: Structure of Syllables – Word Stress - Weak Forms and Strong Forms in Context – Rhythm

Practice: Basic Rules of Word Accent – Stress Shift.

ICS Lab:

Understand: Exposure to structured talks - How to make Formal Presentations.

Practice: Power Point Presentations.

Exercise – IV

CALL Lab:

Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).

Practice: Rising Tones and Falling Tones- Neutralization of accent.

ICS Lab:

Understand: Importance of Team work as a team leader and a team player

Practice: Group Discussion

Exercise - V

CALL Lab:

Understand: Listening for general & specific details.

Practice: Listening Comprehension Tests.

ICS Lab:

Understand*:* Interview Skills.

Practice: Mock Interviews

1. **Minimum Requirement of infrastructural facilities for ELCS Lab:**

- **Computer Assisted Language Learning (CALL) Lab:** The Computer Assisted Language Learning Lab has to accommodate 30 students with 30 systems, with one Master Console, LAN facility and English language learning software for self- study by students.

  System Requirement (Hardware component):

- Computer network with LAN facility (minimum 30 systems with multimedia) with the following specifications:
  i) Computers with Suitable Configuration
  ii) High Fidelity Headphones

2. Interactive Communication Skills (ICS) Lab:

- The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public-Address System, an LCD and a Projector.

20CS208ES: Programming For Problem Solving Lab

B.Tech. II SEM

L	T	P	C
0	0	3	1.5

[Note:The programs may be executed using any available Open Source/ Freely available IDE Some of the Tools available are:
CodeLite: https://codelite.org/
Code::Blocks: http://www.codeblocks.org/
DevCpp : http://www.bloodshed.net/devcpp.html
Eclipse: http://www.eclipse.org This list is not exhaustive and is NOT in any order of preference]

Course Objectives: The students will learn the following:

- To work with an IDE to create, edit, compile, run and debug programs
- To analyze the various steps in program development.
- To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
- To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
- To Write programs using the Dynamic Memory Allocation concept.
- To create, read from and write to text and binary files

Course Outcomes: The candidate is expected to be able to:

- formulate the algorithms for simple problems
- translate given algorithms to a working and correct program
- correct syntax errors as reported by the compilers
- identify and correct logical errors encountered during execution
- represent and manipulate data with arrays, strings and structures
- use pointers of different types
- create, read and write to and from simple text and binary files
- modularize the code with functions so that they can be reused

Practice sessions:

a. Write a simple program that prints the results of all the operators available in C (including pre/ post increment, bitwise and/or/not , etc.). Read required operand values from standard input.
b. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values form standard input.

Simple numeric problems:

a. Write a program for fiend the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.
d. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
e. 5 x 1 = 5
f. 5 x 2 = 10
g. 5 x 3 = 15

h. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Expression Evaluation:

a. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula s = ut+(1/2)at^2 where u and a are the initial velocity in m/sec (= 0) and acceleration in m/sec^2 (= 9.8 m/s^2)).
b. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)
c. Write a program that finds if a given number is a prime number
d. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
e. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
f. Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
g. Write a C program to find the roots of a Quadratic equation.
h. Write a C program to calculate the following, where x is a fractional value.
i. 1-x/2 +x^2/4-x^3/6
j. Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x^2+x^3+…….+x^n. For example: if n is 3 and x is 5, then the program computes 1+5+25+125.

Arrays and Pointers and Functions:

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
c. Write a C program that uses functions to perform the following:
d. Addition of Two Matrices
e. ii. Multiplication of Two Matrices
f. iii. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
g. Write C programs that use both recursive and non-recursive functions
h. To find the factorial of a given integer.
i. ii. To find the GCD (greatest common divisor) of two given integers.
j. iii. To find x^n
k. Write a program for reading elements using pointer into array and display the values using array.
l. Write a program for display values reverse order from array using pointer.
m. Write a program through pointer variable to sum of n elements from array.

Files:

a. Write a C program to display the contents of a file to standard output device.
b. b. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
c. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
d. Write a C program that does the following:
It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function) Now the

program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function) The program should then read all 10 values and print them back.

e. Write a C program to merge two files into a third file (i.e., the contents of the firs t file followed by those of the second are put in the third file).

Strings:

a. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
b. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
c. Write a C program that uses functions to perform the following operations:
d. To insert a sub-string in to a given main string from a given position.
e. ii. To delete n Characters from a given position in a given string.
f. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
g. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn‘t contain ch.
h. Write a C program to count the lines, words and characters in a given text.

Miscellaneous:

a. Write a menu driven C program that allows a user to enter n numbers and then choose between finding the smallest, largest, sum, or average. The menu and all the choices are to be functions. Use a switch statement to determine what action to take. Display an error message if an invalid choice is entered.

b. Write a C program to construct a pyramid of numbers as follows:

```
1        *        1        1        *
1 2      * *      2 3      2 2      * *
1 2 3    * * *    4 5 6    3 3 3    * * *
                           4 4 4 4  * *
                                    *
```

Sorting and Searching:

a. Write a C program that uses non recursive function to search for a Key value in a given List of integers using linear search method.
b. Write a C program that uses non recursive function to search for a Key value in a given Sorted list of integers using binary search method.
c. Write a C program that implements the Bubble sort method to sort a given list of Integers in ascending order.
d. Write a C program that sorts the given array of integers using selection sort in descending order
e. Write a C program that sorts the given array of integers using insertion sort in ascending order
f. Write a C program that sorts a given array of names

Suggested Reference Books for solving the problems:

i. Byron Gottfried, Schaum’s Outline of Programming with C, McGraw-Hill
ii. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
iii. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
iv. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
v. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
vi. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.