

PARUL UNIVERSITY - FACULTY OF ENGINEERING & TECHNOLOGY

SYLLABUS FOR 1st Sem BTech PROGRAMME

Chemistry (03103101)

Type of Course: BTech

Prerequisite: Knowledge of fundamental concepts of chemistry and some basic concepts related to practicals up to 12th science level.

Rationale: Knowledge of chemistry is essential for all Engineering branch because chemistry finds application in all the branches of engineering and it develops scientific temperament and analytical capability of engineering students. Comprehension of basic chemistry, physics & mathematics concepts enables the students to solve engineering problem logically and develop scientific approach.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
3	0	2	4	60	30	20	20	20	150

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	General Chemistry: Introduction to Chemical Sciences, Development of Chemistry through ages and particularly in relevant field of Engineering, Then and Now Chemistry in Industries (Impact on nature & everyday life and further modification through Green approaches (Green Chemistry)), Approach to Chemical Bonding, Types of Bonds, Importance of Organic Molecules, Structural Representation of Organic Molecules, Classification & Nomenclature of Organic molecules.	15%	8
2	Water Technology: Introduction, Sources of water Impurities, Hard and Soft Water, Degree of Hardness, Types of Hardness, Scale and Sludge Formation in boiler and its prevention. Caustic embrittlements, Softening of water, Properties of drinking water, Break-point chlorination, Desalination of Brackish water.	15%	8
3	Fuel and Combustion: Definition, types of fuel and their advantages and disadvantages. Calorific Value, Characteristics of good fuel. Analysis of coal – ultimate and proximate analysis, LPG, Natural gas, Biogas, Refining of Petroleum by Fractional distillation.	15%	8
4	Refractory, Abrasives and Insulators: Definitions of Refractory, Abrasives and Insulators. Properties of refractory. Classification of refractory. Classification, properties and uses of abrasives. Classification, properties and uses of Insulators.	15%	8
5	Electrochemistry: Laws of Electrolysis and their applications. Difference between Galvanic and Electrolytic cells, E.M.F. Galvanic cells, Free Energy changes in cells, Reversible electrode potentials, Single electrode potential and its determination. Nernst Equation and its derivation, Reference (Hydrogen and Calomel) electrode. EMF series and its applications. Primary and Secondary cells, Electrochemical cell.	25%	10

6	Corrosion: Introduction to Corrosion, Theories of corrosion, factors affecting corrosion, Protection of metals from corrosion – organic and inorganic materials, Inhibitors, Cathodic protection.	10%	6
7	Chemistry in nanotechnology & biotechnology: By latest research advancements in field.	5%	4

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. ENGINEERING CHEMISTRY (TextBook)
JAIN & JAIN; DHANPAT RAI
2. ENGINEERING CHEMISTRY
O.P AGRAWAL; KHANNA
3. Organic Chemistry
Bahl and Bahl; S Chand & Co. Ltd, New Delhi
4. Engineering Chemistry
N. Krishnamurthy, P. Vallinaygam and D. Madhavan; Prentice Hall of India Pvt. Ltd. New Delhi
5. ESSENTIAL OF PHYSICAL CHEMISTRY
BAHL & TULI; SCHAND & CO.
6. ENGINEERING CHEMISTRY
B. SIVSANKAR; TATA MACGRAWHILL
7. ENGINEERING CHEMISTRY
MARRY JANE & SHULT; CENCAGE LEARNING

Course Outcome:

After Learning the course the students shall be able to:

- After learning the course the students shall be able to:
- Students will gain the knowledge about different fields of chemistry
- Students will able to use basic concepts of chemistry in industry.
- Students will gain the knowledge about the latest applications of technology.

List of Practical:

1. To determine the moisture content in coal.
2. To determine Alkalinity of a given Water Sample
3. Estimation of water Hardness from tap water.
4. Determination of Saponification Value of Oil.
5. To study rates of corrosion in different medium.
6. To determine viscosity of given polymer solution using Ostwald viscometer.
7. To determine concentration of unknown solution spectrophotometrically

Elements Of Civil Engineering (03104102)

Type of Course: BTech

Prerequisite: Knowledge of Physics and Mathematics upto 12th Science

Rationale: Basic Civil Engineering knowledge is essential for all engineers

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)	Credit	Examination Scheme	Total
--------------------------------	--------	--------------------	-------

L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
3	0	2	4	60	30	20	20	20	150

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	INTRODUCTION: Branches of Civil Engineering, Scope of Civil Engineering, Role of Civil Engineer in Society, Impact of infrastructural development on economy of country.	5%	3
2	SURVEYING: Object and Uses of Surveying, Primary Divisions in Surveying, Fundamental Principles of Surveying, Classification of Surveying, Plans and Maps, Scales, Types of Graphical Scales, Units of Measurements	5%	2
3	LINEAR MEASUREMENTS: Methods of Linear Measurements, Instruments used in Chaining, Chain Surveying, Ranging, Obstacles in Chaining, Errors in Chaining & Corrections, Tape Corrections, Conventional Symbols	10%	4
4	ANGULAR MEASUREMENTS: Types of Compass, Method of Using a Compass, Bearing & It's Measurements, Whole Circle Bearing and Reduced Bearing, Computation of Angles, Types of meridians and bearings, Declination and DIP, Compass traversing and correction of bearings for Local Attraction, Chain and Compass Surveying Field Work	10%	5
5	LEVELLING: Types of Compass, Method of Using a Compass, Bearing & It's Measurements, Whole Circle Bearing and Reduced Bearing, Computation of Angles, Types of meridians and bearings, Declination and DIP, Compass traversing and correction of bearings for Local Attraction, Chain and Compass Surveying Field Work	12%	6
6	MAPPING AND CONTOURING: Mapping, Contours, Characteristics of contours of different terrains and application of contour maps, Methods of Contouring	6%	3
7	MINOR EQUIPMENTS AND MODERN TOOLS OF SURVEYING: Introduction to Theodolite, Introduction to Electromagnetic Distance Measuring Instruments, Introduction to Total Station, Introduction to Global Positioning System, Introduction to Remote sensing, Introduction to Geographical Information System (GIS)	5%	2
8	BULIDING PLANNING: Elements of a Building, Basic Requirements of a Building Planning, Planning Suitable Orientation, Planning for Energy Efficiency, Planning for Suitable Utility, Planning for Meeting Other Requirements	5%	2
9	FOUNDATIONS: Dimensions of Foundation, Conventional Spread Footings, R.C.C. Footings, Grillage Footing, Arch Foundation, Pile Foundations, Foundations in Black Cotton Soil	8%	4
10	SUPER STRUCTURES: Types of Super Structures Based on the Method of Load Transfer, Walls, Stone Masonry, Brick Masonry, Plastering, Pointing, Flooring, Roof, Doors and Windows, Lintels, Stairs	7%	3
11	DAMPNESS AND ITS PREVENTION: Causes of Dampness, Ill-Effects of Dampness, Requirements of an Ideal Material for Damp Proofing, Materials for Damp Proofing, Methods of Damp Proofing	5%	2
12	TRADITIONAL BUILDING MATERIALS: Introduction, Types and Properties of Stones, Bricks, Lime, Cement, Timber	5%	3
13	MORTARS: Introduction, Types and Properties of Sand, Cement Mortar, Lime Mortar, Mud Mortar, Special Mortar, Tests on Mortar	5%	3

14	CONCRETE: Introduction, Types and Properties of Plain Concrete, Reinforced Cement Concrete (R.C.C.), Reinforced Brick Concrete (RBC), Prestressed Concrete (PSC), Pre-cast concrete, Fiber-Reinforced Concrete (FRC), Cellular Concrete, Ferro-Cement	5%	3
15	MISCELLANEOUS BUILDING MATERIALS: Introduction, Types and Properties of Glass, Plastics, Bitumen, Asbestos, Paints, Distempers, Varnishes, Solid and Hollow Concrete Blocks, Roofing and Flooring Tiles	5%	3

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Basics of Civil Engineering (TextBook)
S S Bhavikatti; New Age International Publishers.
2. Surveying Vol. I
Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain; Laxmi Publication; 16th Edition
3. Surveying and Leveling
R. Subramanian; Oxford University
4. Surveying and Leveling
N. N. Basak; Tata McGraw Hill Education, Pvt. Ltd. New Delhi.
5. Surveying Vol. I
S. K. Duggal; Tata McGraw Hill Publication New Delhi
6. Elements of Civil Engineering
Dr. R.K. Jain and Dr. P.P. Lodha; McGraw Hill Education India Pvt. Ltd.
7. Building Construction
Dr. B. C. Punmia, Ashokkumar Jain, Arunkumar Jain; Laxmi Publications Delhi
8. Building Construction and Construction Material
G.S.Birdie and T.D. Ahuja; Dhanpat Rai Publishing

Course Outcome:

After Learning the course the students shall be able to:

1. Understanding of application and use of Civil Engineering in practical life.
2. Exposure to concepts of surveying and mapping.
3. Design small buildings and drawing plan and elevation.
4. Understand Global positioning system, remote sensing & GIS.
5. Understand construction materials like Stone, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete and bitumen.

List of Practical:

1. Introduction to Surveying Instruments
2. Chain surveying and taking offsets
3. Compass Surveying
4. Determination of height using dumpy level by HI and Rise & Fall method.
5. Differential levelling using dumpy level
6. Introduction to theodolite.
7. Finding area of irregular shape using Planimeter
8. Design of a simple residential building.

Type of Course: BTech

Prerequisite:

Rationale:

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
2	0	0	2	60	-	20	20	-	100

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	ENVIRONMENTAL HEALTH AND QUALITY OF LIFE: Environmental education: Objective and scope, Impact of technology on the environment Environmental disasters: Case studies, Global environmental awareness to mitigate stress on environment.	9%	3
2	ECOLOGY AND ECOSYSTEM: Interdependence of organisms, Structure and function of an ecosystem, Ecological pyramids, Pyramid of number, Pyramid of energy and pyramid of biomass, Ecological footprint of engineering project, Importance of biodiversity	14%	4
3	POPULATION GROWTH AND STATE OF NATURAL RESOURCES: Population Explosion : Causes, Effects and Control, International initiative in population related issues, Urbanization, Growth of the world's large cities Water resources: Sources of water, Stress on water resources, The story of Cherapunji, Energy resources: Classification, advantages, limitations and future scope of conventional and non-conventional resources Natural resources: Renewable resources, nonrenewable resources, destruction versus conservation.	14%	5
4	POLLUTION PREVENTION: Air & Noise pollution - Sources & their Effects, Case studies of Major Catastrophes, Structure and composition of atmosphere Water, Soil, Thermal& Marine Pollution: The story of fluoride contamination, Eutrophication of lakes, control measures Measuring water quality: Water quality index, Waste water treatment (general) primary, secondary and tertiary stages Municipal Solid waste management: Sources and effects of municipal waste, Bio medical waste, Hazardous waste	24%	8
5	GLOBAL ENVIRONMENTAL CHALLENGES & LATEST DEVELOPMENTS: Climate Change, Global Warming and Green House Effect, Acid Rain, Depletion of Ozone layer, Variation in concentrations of GHG gases in ambient air during last millennium, Role of Environmental Information. System(ENVIS) in India and similar programs run by EPA(USA), Role of soft tools like Quantum GIS, Autodesk Building Information Modeling (BIM) and City Finance Approach to Climate-Stabilizing Targets (C-FACT), Life Cycle Assessment, Bioinformatics and Optimization tools for sustainable development.	20%	6
6	ENVIRONMENTAL LEGISLATION AND ENVIRONMENTAL PROTECTION: Environmental Acts and Regulations: List of major prevalent environmental acts in India, EIA, ISO: 14001, Environmental Ethics	9%	4
7	LATEST ISSUES: Based on latest developments in India and abroad	10%	2

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Environmental Studies (TextBook)
R.Rajagopalan; Oxford University Press; 2009
2. Environmental Studies
Erach Bharucha; Universities Press India Pvt Ltd, Hyderabad; Second
3. Basics of Environmental Studies
U K Khare; Tata McGraw Hill
4. Environmental Studies
Anindita Basak; Drling Kindersley India Pvt. Ltd Pearson
5. Environmental Sciences
Daniel B Botkin & Edward A Keller,; John Wiley & Sons
6. Environmental Studies
Benny Joseph; TMH publishers
7. Environmental Studies
Dr. Suresh K Dhameja; S.K Kataria & Sons New Delhi
8. Air Pollution
M N Rao , H .V N Rao; McGraw Hill Publishing Company Limited, New Delhi
9. Environmental Engineering
Howard S. Peavy, Donald R. Rowe, George Tchobanoglous; McGraw Hill

Course Outcome:

After Learning the course the students shall be able to:

1. Understand the natural environment and its relationships with human activities.
2. Characterize and analyze human impacts on the environment.
Integrate facts, concepts, and methods from multiple disciplines and apply to environmental problems.
3. Acquire practical skills for scientific problem-solving, including familiarity with laboratory and field instrumentation, computer applications, statistical and modelling techniques.
4. Understand and implement scientific research strategies, including collection, management, evaluation, and interpretation of environmental data.
5. Design and evaluate strategies, technologies, and methods for sustainable management of environmental systems and for the remediation or restoration of degraded environments.

Fundamentals Of Electrical Engineering (03106101)

Type of Course: BTech

Prerequisite: Knowledge of Physics and Mathematics up to 12th science level.

Rationale: The course provides introductory treatment of the field of Electrical Engineering to the students of various branches of engineering.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
3	0	2	4	60	30	20	20	20	150

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	Work, Power, Energy: Electrical Current, Voltage, Power and Energy; Sources of Electrical Energy – Independent and Dependent Source, Heating Effect of Electric Current and Joule's law, Thermal Efficiency.	4%	2
2	D. C. Circuits: Classification of electrical networks, Ohm's law, Kirchhoff's law and their applications for network solutions. Simplifications of networks using series and parallel combinations and star-delta conversions.	10%	5
3	Batteries and Cells: Introduction of Batteries; The Simple cell, E.M.F and internal resistance of a cell; Primary and Secondary cells, Cell capacity; Types of batteries: Lead Acid, Ni-Cd and Ni-MH batteries, current capacity and cell ratings.	4%	2
4	Electromagnetism: Magnetic effect of an electric current, right hand thumb rule, Concept of m.m.f., flux, flux density, reluctance, permeability and field strength, their units and relationships. Simple series and parallel magnetic circuits, comparison of electrical and magnetic circuit, force on current carrying conductors placed in magnetic field, force between two parallel linear conductors, hysteresis loop and Loss, Steinmetz exponent, Fleming's left hand rule. self and mutual inductance, coefficient of couplings. Examples based on theory.	17%	8
5	Electrostatics: Electrostatics field, electric flux density, electric field strength, absolute permittivity, relative permittivity, capacitance and capacitor, composite dielectric capacitors, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors and time constant, examples based on theory.	8%	4
6	AC fundamentals: Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of instantaneous, peak (maximum), average and R.M.S. values, frequency, cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasors, examples based on theory.	13%	6
7	Single phase A.C. Circuits: Study of A.C. circuits consisting of pure resistance, pure inductance, pure capacitance and corresponding voltage-current phasor diagrams and waveforms. Development of concept of reactance, study of series R-L, R-C, R-L-C circuit and resonance, study of parallel R-L, R-C and R-L-C circuit, concept of impedance, admittance, conductance and susceptance in case of above combinations and relevant voltage-current phasor diagrams, concept of active, reactive and apparent power and power factor, examples based on theory.	27%	13
8	Polyphase A.C. Circuits: Polyphase A.C. Circuits: Concept of three-phase supply and phase sequence. Voltages, currents and power relations in three phase balanced star-connected loads and delta-connected loads along with phasor diagrams, Power and power factor measurement in balanced three phase circuits (one, two and three wattmeter methods), examples based on theory.	17%	8

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Electrical Technology (TextBook)
B. L. Theraja; S. Chand
2. Problems in Electrical Engineering
Parker Smith; CBS Publishers
3. Electrical Technology
Surinder Bali; Pearson
4. Electrical Estimating & Costing

Surjit Singh; Dhanpat Rai & Co.

5. Electrical Safety, Fire Safety Engineering
S. Rao; Khanna Publications

Useful Links:

<http://www.electricaltechnology.org/>

<http://www.electricaleasy.com/>

<http://www.ustudy.in/>

<http://www.pbs.org/>

<https://www.coursera.org/>

www.electrical4u.com/

electrical-engineering-portal.com/

www.mastersportal.eu/disciplines/34/electrical-engineering.html

http://study.com/directory/category/Engineering/Electrical_Engineering_and_Electronics.html
www.csanyigroup.com/

www.eeweb.com/

www.electricalengineeringschools.org/

engineering.electrical-equipment.org

Course Outcome:

After Learning the course the students shall be able to:

After learning the course the students shall be able to:

1. Recognize importance of electrical energy and its day to day applications.
2. Understand the role of resistor, capacitor and inductor and their behavior.
3. Understand electrical current, potential difference, power and energy, sources of electrical energy.
4. Perform qualitative comparison between AC and DC system, single phase and three phase systems.
5. Understand & to solve basic electrical circuits.

List of Practical:

1. To Study About Safety, Electric Shock, First Aid for Electric Shock and Other Hazards of Electrical Laboratories & Safety Rules.
2. To Perform and Solve Electrical Networks With Series and Parallel Combinations of Resistors Using Kirchhoff's Laws.
3. To Observe the Effect of Temperature on Resistance of Metal and Plot the Graph of Resistance vs. Temperature.
4. To Perform Charging and Discharging of Capacitor and Plot the Graph of Voltage vs. Time.
5. To Obtain Inductance, Power and Power Factor of the Series R-L Circuit With AC Supply Using Phasor Diagram.
6. To Obtain Capacitance, Power and Power Factor of the Series R-C Circuit With AC Supply Using Phasor Diagram.
7. To Obtain Inductance, Capacitance, Power and Power Factor of the Series R-L-C Circuit With AC Supply Using Phasor Diagram.
8. Determination of Resonant Frequency, Bandwidth and Q Factor for RLC Network in Series and Parallel Resonance.
9. Verification of Current and Voltage Relations in Three Phase Balanced Star and Delta Connected

Loads

10. Measurement of Active and Reactive Power in Balanced Three Phase Circuit Using Two-Watt Meter Method.
11. To Study about Grounding, Importance of Grounding and Equipments of Grounding for Safety.

Workshop - Electrical (03106102)

Type of Course: BTech

Prerequisite: Knowledge of physics and Mathematics up to 12th Science level.

Rationale: The workshop practice helps students to develop and enhance relevant technical hand skills required to test electrical and electronics circuits for solving day to day industrial as well domestic real life problems.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
0	0	2	1	0	80	0	0	20	100

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	Electrical Component: Types of switches, relays, fuses, MCB, ELCB. Types of wires and Gauges, Sockets and Earthings, Load lamps.	15%	5
2	Basic Passive Components: Types of passive elements and identification: Resistors, capacitors, Inductors and their power ratings, Value identification through color coding.	15%	5
3	Power Supply and Multimeter: Operating principle of Power supply, Operating principle of Multimeter measuring various parameters like voltage, current, continuity, resistance, capacitance etc.	20%	6
4	Active components: Types of active components and symbolic representations, Interpreting data sheet of various active components like PN junction diode, Zener diode, BJT, Power Transistor, Fixed voltage IC Regulators etc., Identification and measurement	20%	6
5	Function Generator and CRO: Basics of Function Generator, Specifications of Function Generator and operating ranges of various parameters of available functions, operating principle of CRO, Specifications of CRO and Operating	30%	10

	ranges of various param		
--	-------------------------	--	--

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. A course in electrical & Electronic measurement and instrumentation (TextBook)
A.K.Sawhney; Dhanpat Rai
2. Basic Electrical Engineering
D.R.Mehta; Nirav Publication

Useful Links:

1. www.digilentinc.com/classroom/realanalog
2. www.electronics-project-design.com
3. www.electronicsforu.com/EFYLinux/Circuit
4. www.electronicsforu.com/EFYLinux/Lab
5. www.virhistory.com
6. www.basicwire.com
7. www.radioelectronics.com

Course Outcome:

After Learning the course the students shall be able to:

1. Identify, Measure and test Different electrical and electronics components.
2. Interpret the datasheet of a component(active or passive component or IC).
3. Understand operation and testing of various measuring equipments.
4. Prepare PCB Layout ,Understand Fabrication and component soldering.

List of Practical:

1. Identification and symbolic representation of Electrical components.
2. Identification and symbolic representation of basic passive components.
3. To understand working and specifications of DC regulated Power supply
4. Functional working of multi-meter and its applications
5. Identification, symbolic representation and testing of various electronics components
6. Understanding of working and specifications of CRO and Function generator
7. Understanding soldering techniques and practicing proper soldering and de-soldering
8. Understanding materials used for PCB manufacturing and its applications.
9. Overview of PCB layout designing and fabrication.
10. Understanding of working principle of DSO and its applications.

Open Ended Problems:

- (1) Forward and reverse biased PN Junction diode.
- (2) Design of Half wave rectifier using diode.
- (3) Design of Full wave rectifier using diode.
- (4) Design of Bridge Rectifier using diode.
- (5) Design of Clipper circuit.
- (6) Design of Clamper circuit.
- (7) Design of Low pass filter.

- (8) Design of Band pass filter.
- (9) LDR Characteristics.
- (10) LED Characteristics.
- (11) Zener diode as a voltage regulator.
- (12) +5V dc regulated power supply using LM7805.
- (13) -5V dc regulated power supply using LM7905.
- (14) +12V dc regulated power supply using LM7812.
- (15) -12V dc regulated power supply using LM7912.
- (16) Water level indicator

Fundamentals Of Programming (03108101)

Type of Course: BTech

Prerequisite: Requires Basic Knowledge of Computer

Rationale: This course is design to provide basic ideas of computer programming. This course also makes help to understand programming language. It will help to develop their logical abilities.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
3	0	2	4	60	30	20	20	20	150

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	Number System: Introduction and type of Number system, Conversion between number system, Arithmetic operations on number system, Signed and unsigned number system Software, Computer Languages and Computer Program	2%	2
2	Introduction to 'C' Programming: Features of C language, structure of C Program, Flow Charts and Algorithms Types of errors, debugging, tracing/stepwise execution of program, watching variables values in memory.	3%	3
3	Constants, Variables and data Types: Character Set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of Variables, Assigning values to variables, typedef, and Defining symbolic constants.	5%	3
4	Operators and Expression: Introduction to Operators and its types, Evaluation of expressions, Precedence of arithmetic operators, Type conversions in expressions, Operator precedence and associativity.	10%	3
5	Management Input and Output Operators: Introduction, reading a character, writing a character, formatted input, formatted output.	5%	2
6	Control structure in C: Decision Making & branching: Decision making with If & If .. Else statements, If .. Else statements (Nested Ladder), The Switch & goto statements, The turnery (?) Operator Looping: The while statement, The break statement & The Do.. While	15%	8

	loop, The FOR loop, Jump within loops – Programs		
7	Array: Introduction, One-dimensional arrays, Two-dimensional arrays, arrays, Concept of Multidimensional arrays.	10%	3
8	String: string , string storage , Built-in-string functions	10%	3
9	User-Defined Functions: Concepts of user defined functions, prototypes, definition of function, parameters, parameter passing, calling a function, recursive function, Macros, Pre-processing.	10%	5
10	Structure and Unions: Introduction, Structure definition, declaring and initializing Structure variables, Accessing Structure members, Copying & Comparison of structures, Arrays of structures, Arrays within structures, Structures within Structures, Structures and functions, Unions	10%	5
11	Pointers: Basics of pointers, pointer to pointer, pointer and array, Pointer to array, array of pointers , functions returning a pointer	10%	5
12	Dynamic memory allocation: Introduction to Dynamic memory allocation, malloc(), calloc(), free(), realloc()	5%	3
13	File Management in C: Introduction to file management and its functions	5%	3

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Programming in ANSI C (TextBook)
E. Balagurusamy; Tata McGraw Hill; 5th
2. C Programming: Test Your Skills
Ashok Kamthane; First Edition
3. Computer Fundamentals
P.K. Sinha; BPB Publications
4. Programming with C
Byron Gottfried; Tata McGraw Hill Education; Third Edition
5. C The Complete Reference
Herbert Schildt; 4th Edition
6. Let Us C
Yashavant P. Kanetkar; Tata McGraw Hill; 10th

Course Outcome:

After Learning the course the students shall be able to:

1. Understand Concepts of computer programming language.
2. Develop the algorithms for solving Engineering problems.
3. Write, compile and debug programs with C compiler

List of Practical:

1. Practical Set-1: Basic Programming
2. Practical Set-2 :Control Structure
3. Practical Set-3 : Array & String Manipulation
4. Practical Set-4 : User Defined Function
5. Practical Set-5 : Structure
6. Practical Set-6 : Pointer
7. Practical Set-7 : File Handling

Information & Communication Technology (03108102)

Type of Course: BTech

Prerequisite: Requires Basic Knowledge of Computer

Rationale: This course is design to provide basic knowledge of computer components. This course helps in learning problem solving process of information and communication technology.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
3	0	0	3	60	0	20	20	0	100

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	Introduction to Information and Communication Technology: Realizing the importance of information in daily life, Development of the Internet and the WWW , Development of mobile computing and communication devices	5%	3
2	Problem Solving Process: Understanding the problem, Define the problem, ,Define boundaries, Plan solution, Check solution, Top down design and stepwise refinement, Structure charts, Algorithms, Flow charts, Pseudo codes	25%	10
3	The Basic Components of Computer System: Hardware, Software and Firmware , Classification of Hardware, Classification of Software, Proprietary software and Open-source software	5%	3
4	Evolution of Processors: Electronic age of computing, Mainframe, Mini, Micro Computers, Evolution of Micro Processors, Semiconductor Technology, Logic Families & Processor Families, Processor Specifications : No. of Transistors , Buses, CPU Speed ,Number of Registers , Cache memories	10%	5
5	Evolution of Computer Architectures: Stored Program Control concept, Input, Output, Memory, Control Unit and Processing Unit ,Fetch-execute cycle, Central Processing Unit (CPU), Arithmetic and Logic Unit (ALU), Control Unit (CU), CISC and RISC Architectures	10%	5
6	Introduction to Data Types: Decimal representation of numbers (Signed and Unsigned): Integers, Fixed Point and Floating-Point numbers. Number systems used in computing: Binary, Octal, Hexa-decimal, Conversions among number systems. Character Representations : BCD, EBCDIC, ASCII, Unicode	10%	5
7	Type of Memories: Volatile Memories and their characteristics: Registers, Cache Memory, Main Memory – RAM. Non-Volatile Memories and their characteristics: Secondary Storage, Magnetic, Optical, Flash Memory, ROM , BIOS, CMOS	10%	6
8	Introduction To Data Communication: Components of a data communication system, Transmitter, Receiver, Communication medium, Protocols, Analog & Digital Signals, Guided media, Unguided media.	10%	5
9	Introduction to Computer Networks: Definition of computer networks, Network Types: LAN, WAN, MAN, DAN, CAN LAN Topologies: Bus, Star, Ring, Mesh, Hybrid Network models: Peer to peer, Client-server, Virtual Private Networks. Testing methods: Ping and ipconfig	15%	6

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Fundamentals of Computers
V. Rajaraman; Prentice-Hall Of India Pvt. Limited, 2003
2. Computer Fundamentals
P.K. Sinha; BPB Publications
3. Computer Organization
Carl Hamacher; Tata McGraw - Hill Education
4. Data Communication and Networking
Behrouz A. Forouzan

Useful Links:

1. <http://www.bleepingcomputer.com/tutorials>
2. <http://cybersecurityforindia.blogspot.in>
3. <http://ptlb.in/csrdci/wp-content/uploads/2014/01/Cyber-Security-Must-Be-An-International-Issue.pdf>
4. <http://www.howstuffworks.com/>

Course Outcome:

After Learning the course the students shall be able to:

1. Develop life-long skills including the ability to understand and implement new and emerging technologies within a business environment.
2. Analyze, design, implement, test and evaluate Information and Communication Technology (ICT) systems.
3. Enable students to use ICT tools for innovation, research and implementation.

Engineering Graphics (03109101)

Type of Course: BTech

Prerequisite: Zeal to learn the subject.

Rationale: Engineering Graphics is the language of communication for Engineers. Engineering Graphics course provides tools and techniques of communication for various fields of Engineering.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
2	0	4	4	60	30	20	20	20	150

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	INTRODUCTION TO ENGINEERING GRAPHICS: Scope of Engineering Drawing in all Branches of Engineering, Uses of Drawing Instruments and Accessories, Introduction to Drawing Standards BIS-SP-46, Representative Fraction, Types of Scales (Plain and Diagonal Scale), Dimensioning Terms and Notations, Types of Arrowheads, Lines, Lettering, Numbering and Dimensioning.	5%	

2	ENGINEERING CURVES: Classification of Engineering Curves, Application of Engineering Curves, Constructions of Engineering Curves - Conics, Spirals, Involutives and Cycloids with Tangents and Normal.	10%	4
3	PRINCIPLES OF PROJECTIONS: Types of Projections - Oblique, Perspective, Orthographic and Isometric Projections; Introduction to Principal Planes of Projections, Projections of Points located in all four Quadrants; Projections of lines inclined to one of the Reference Plane or inclined to two Reference Planes.	10%	4
4	PROJECTIONS OF PLANES: Projections of various planes – Polygonal, Circular and Elliptical shape inclined to one of the Reference Plane and inclined to two Reference Planes; Concept of Auxiliary Plane of Projections.	10%	4
5	PROJECTIONS OF SOLIDS AND SECTIONS OF SOLIDS: Classifications of basic Solids, Projections of Solids - Right Regular Prism, Pyramid, Cone, Cylinder, Tetrahedron and Cube inclined to one of the Reference Plane and inclined to two Reference Planes; Frustum of Prism, Pyramid and Cone inclined to one of the Reference Plane; Types of Cutting Planes - Auxiliary Inclined Plane, Auxiliary Vertical Plane, Horizontal Cutting Plane, Profile Cutting Plane; Sections of Solids resting on H.P/V.P and Inclined to only one of the Reference Planes; Sectional Views, True Shape of the Sections.	20%	8
6	DEVELOPMENT OF SURFACES: Methods of Development of Lateral Surfaces of Right Regular Solids, Parallel Line Development and Radial Line Development, Applications of Development of Surfaces.	10%	4
7	ORTHOGRAPHIC PROJECTIONS: Projections on Principal Planes from Front, Top and Sides of the Pictorial view of an Object, First Angle Projection and Third Angle Projection method; Full Sectional Orthographic Views – Side and Front, Offset Cutting views.	15%	
8	ISOMETRIC VIEW/DRAWING AND ISOMETRIC PROJECTIONS: Conversion of Orthographic Views into Isometric Projection, View or Drawing; Isometric Scale.	15%	
9	OVERVIEW OF COMPUTER AIDED DRAFTING TOOLS: Introduction to Computer Aided Drafting Software; Preparation of Orthographic Projections and Isometric Views Using Drafting Software.	5%	

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Engineering Drawing (TextBook)
N.D. Bhatt & V.M. Panchal; Charotar Publishing House
2. ENGINEERING GRAPHICS
P. J. Shah; S. Chand & Co., New Delhi Publications.
3. Graphic Science and Design
French, T.E. Vierck, C.J & Foster; Tata McGraw Hill Publications.
4. Fundamentals of Engineering Drawing
Luzadder; W. J & Duff Prentice Hall Publications.
5. Engineering Drawing and Graphics
Venugopal k; New Age International Private Limited Publishers.

Course Outcome:

After Learning the course the students shall be able to:

1. Demonstrate the use of Drawing Instruments.
2. Identify the Drawing Symbols, Conventions used in Engineering Drawing.
3. Interpret Engineering Drawings.
4. Construct the Different types of Engineering Curves.
5. Apply Descriptive Geometry Principles to Solve Engineering Problems Involving Points, Lines, Planes and Solids.
6. Recognize the need of Advanced Computer Aided Tools and Software.

List of Practical:

1. Introduction to Engineering Graphics: Types of lines, Letterings, Drawing Symbols, Numberings, Dimensioning Terms and Notations, Title Block, Geometric Constructions etc.
2. Drawing Sheet on Engineering Curves.
3. Drawing Sheet on Projections of Points and Lines.
4. Drawing Sheet on Projections of Planes.
5. Drawing Sheet on Projections of Solids and Sections of Solids.
6. Drawing Sheet on Development of Surfaces.
7. Drawing Sheet on Orthographic Projections.
8. Drawing Sheet on Isometric Projection/View or Drawing.
9. Prepare 2D Drawings using AutoCAD.
10. Prepare Isometric Views using AutoCAD.

Open Ended Problems:

Continuous Evaluation will consist of :

Open ended problems -10 marks and Assignment – 10 marks

Open Ended Problem(OEP):

Based on practical students shall prepare any one of following projects on :

1. Working Model for Engineering Curves Generation.
2. Working Model of Systems of Projections.
3. Model of Development of Surfaces.
4. Model of Orthographic Projections.
5. Wooden Components for Orthographic and Isometric Projections.

Assignments:

1. Practice Examples on Engineering Curves.
2. Practice Examples on Projections of Points and Lines.
3. Practice Examples on Projections of Planes.
4. Practice Examples on Projections of Solids and Sections of Solids.

5. Practice Examples on Development Surfaces.
6. Practice Examples on Orthographic Projections.
7. Practice Examples on Isometric Projection/View or Drawing.

Elements of Mechanical Engineering (03109102)

Type of Course: BTech

Prerequisite: Knowledge of Physics and Mathematics up to 12th Science Level.

Rationale: This course provides introduction to basic principles of Mechanical Engineering for the students of varied branches of Engineering.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
3	2	0	5	60	30	20	20	20	150

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	BASICS OF THERMODYNAMICS: Prime Movers - Meaning and Classification; Concept of Force, Pressure, Energy, Work, Power, System, Heat, Temperature, Specific heat capacity, Internal Energy, Enthalpy, Specific Volume; Thermodynamics – Definition: Change of State, Path, Process, Cycle, Thermodynamic systems, Statement of Zeroth Law, First Law and Second Law of Thermodynamics and its Applications.	10%	4
2	CONVENTIONAL AND NON CONVENTIONAL ENERGY SOURCES: Introduction and Classification of Energy Sources; Conventional Energy Sources e.g. Solid, Liquid, Gaseous and Nuclear fuels; Calorific Value of Fuels; Non Conventional Energy Sources e.g. Solar Energy, Wind Energy, Hydel Power, Biomass and Biomass Energy; Comparison of Conventional & Non Conventional Energy Sources.	10%	4
3	PROPERTIES OF GASES: Gas Laws, Boyle's law, Charles law, Combined gas law; Gas Constant, Relation between Cp and Cv; Constant Volume Process; Constant Pressure Process; Isothermal Process; Adiabatic Process; Poly-tropic Process.	15%	5
4	PROPERTIES OF STEAM: Types of Steam and Steam formation; Internal Energy and Dryness Fraction of Steam; Measurement of Dryness Fraction; Steam Table.	15%	5
5	HEAT ENGINES: Definition of Heat Engine; Classification of Heat Engine; Carnot	20%	12

	Cycle, Rankine Cycle, Otto Cycle and Diesel Cycle. Internal Combustion Engines: Two Stroke Petrol and Diesel Engine; Four Stroke Petrol and Diesel Engine; Measurement of Indicated Power and Brake Power: Numericals on calculation of Mechanical, Thermal and Volumetric Efficiency.		
6	ENERGY CONVERSION DEVICES: Steam Generators: Definition and Classification; Cochran, Lancashire, Locomotive, Babcock and Wilcox Boiler: Construction and Working; Boiler Mounting and Accessories. Refrigeration and Air Conditioning: Meaning of Refrigeration; Vapor Compression Refrigeration Cycle; Vapor Absorption Refrigeration Cycle; Air conditioning; Window Air Conditioning and Split Air Conditioning.	20%	12
7	PUMPS AND AIR COMPRESSORS: Pumps: Definition, Classification and Application of Pumps; Types and Operation of Rotary pump, Reciprocating Pump, Centrifugal Pump. Air Compressors: Definition, Classification and Application of Compressors; Types and Operation of Rotary and Reciprocating Air Compressor.	5%	3
8	MOTION AND POWER TRANSMISSION DEVICES: Shaft and Axle; Belt Drive; Chain Drive; Friction Drive; Gear Drive; Clutch, Coupling and Brake.	5%	3

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Elements of Mechanical Engineering (TextBook)
S.B.Mathur, S. Domkundwar; Dhanpat Rai & Sons Publications.
2. Thermal Engineering
R. K. Rajput; Laxmi Publication.
3. Thermal Science and Engineering
Dr. D. S. Kumar; S. K. Kataria and sons Publishers.
4. Basic Mechanical Engineering
T. S. Rajan; Wiley Eastern Ltd.
5. Fundamental of Mechanical Engineering
G. S. Sawhney; PHI Publication New Delhi.
6. Elements of Mechanical Engineering
Sadhu Singh; S. Chand Publisher.

Course Outcome:

After Learning the course the students shall be able to:

1. Demonstrate a basic understanding of the first and second laws of thermodynamics and its applications to systems.
2. Identify various nonconventional sources of energy.
- 3 Demonstrate a basic understanding of different types of internal combustion engines and their operations.
4. Demonstrate the ability to calculate Mechanical, Thermal and Volumetric Efficiency.
5. Demonstrate a basic understanding of different cycles of Refrigeration and Air-Conditioning.
6. Understand basic principles of power transmission devices.

List of Tutorial:

1. Study of construction and working of Petrol Engine.
2. Study of construction and working of Diesel Engine.
3. Determination of brake thermal efficiency of an I. C. Engine.
4. Study of construction and working of various types of boilers.
5. Study of construction and working of different boiler mountings and accessories.
6. Study of construction and working of different types of pumps.
7. Study of construction and working of different types of air compressors.
8. Demonstration of vapor compression refrigeration cycle and vapor absorption refrigeration cycle.
9. Study of construction, working and applications of different types of coupling, clutch and brake.
10. Study of construction, working and applications of motion and power transmission devices.

Workshop - Mechanical (03109103)

Type of Course: BTech

Prerequisite: Zeal to learn the subject.

Rationale: Workshop practice is the backbone of the real industrial trades which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries. The use of workshop practices in day to day industrial as well domestic life helps to solve the problems.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
0	0	2	1	-	30	-	-	20	50

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	INTRODUCTION TO WORKSHOP LAYOUT AND ITS IMPORTANCE: Familiarization with work shop facility, Introduction to different shops of the Workshop and equipments, Introduction to Various Workshop Layouts, Introduction to various production processes and process planning.	5%	2
2	INTRODUCTION TO INDUSTRIAL SAFETY: Introduction to Industrial safety and its norms, Introduction to various safety equipments and its application, Importance of Industrial safety, How accidents affect the product cost? Causes of accidents and its prevention methods.	5%	2
3	INTRODUCTION TO MEASURING INSTRUMENTS: Classification of Measuring instruments, Introduction to measurement units and its standards. Demonstration of various measuring instruments and hands on practice of the same, Maintenance and care	10%	4

	of various measuring instruments.		
4	FITTING AND DRILLING PRACTICE: Introduction to fitting shop and its importance in industry, Introduction to different hand tools used in fitting shop, Demonstration of use of various hand tools, Making of the job as per the drawing from the given raw material, Marking the job for traceability.	15%	4
5	CARPENTRY PRACTICE: Introduction to carpentry shop and its importance in industry, Introduction to different hand tools used in Carpentry shop, Demonstration of use of various hand tools, Introduction to various wood materials and its application, Introduction to various joints used in wooden product, Making of the job as per the drawing from the given raw material, Marking the job for traceability.	10%	4
6	SHEET METAL PRACTICE: Introduction to sheet metal shop and its importance in industry, Introduction to various materials and its application, Introduction to different hand tools used in sheet metal shop, Demonstration of use of various hand tools and operations carried out in sheet metal shop, Making of the job as per the drawing from the given raw material, Marking the job for traceability.	12%	4
7	SMITHY PRACTICE: Introduction to smithy shop and its importance in industry, Introduction to various materials and its application, Introduction to different hand tools used in smithy shop, Demonstration of use of various hand tools and operations carried out in smithy shop, Making of the job as per the drawing from the given raw material, Marking the job for traceability.	12%	4
8	METAL JOINING PROCESSES:WELDING AND SOLDERING PRACTICE: Introduction to various joining processes viz. Welding,Soldering and Brazing and its importance in industry, Introduction to various materials and its application, Introduction to different hand tools and equipments used in Welding and Soldering shop. Demonstration of use of various hand tools and operations carried out in Welding shop and Soldering shop.	15%	4
9	PLUMBING PRACTICE: Introduction to plumbing shop and its importance, Introduction to various materials, pipe fittings and its application, Introduction to different hand tools and equipments used in plumbing shop, Demonstration of use of various hand tools and operations carried out in plumbing shop,Making of the job as per the drawing from the given raw material, Marking the job for traceability.	10%	2
10	COST ESTIMATION OF JOB: Introduction about costing & estimation, Types of cost and its calculation, Weight / material requirement calculation of a given job, Estimation of a given job and deciding its selling price.	6%	2

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Workshop Technology (TextBook)
Bava H. S.; Tata McGraw Hill Publishing Co. Ltd.
2. Elements of Workshop Technology Vol. I (TextBook)
Hajra Chaudhary S.K.; Asia Publishing House
3. Workshop Technology
Chapman, W.A.J. ELBS Low Price Text; Edward Donald Pub. Ltd
4. Basic Machine Shop Practice Vol. I & II
Tejwani, V.K.; Tata McGraw Hill Pub. Co.
5. Workshop Technology Vol. I & II
Arora, B.D.; Satya Prakashan, New Delhi
6. Shop Theory
Anderson James & Earl E. Tatro; Macmillan/Mcgraw-Hill School

Course Outcome:

After Learning the course the students shall be able to:

1. Comprehend the safety measures required to be taken while using working in workshop.
2. Select the appropriate tools required for specific operation.
3. Understand the different manufacturing technique for production out of the given raw material.
4. Understand applications of machine tools, hand tools and power tools.

List of Practical:

1. Introduction To Workshop Layout and Its Importance
2. Introduction To Industrial Safety
3. Introduction To Measuring Instruments
4. Fitting And Drilling Practice
5. Carpentry Practice
6. Sheet Metal Practice
7. Smithy Practice
8. Metal Joining Processes: Welding and Soldering Practice
9. Plumbing Practice
10. Cost Estimation of a Job

Mathematics-1 (03191101)

Type of Course: BTech

Prerequisite: Knowledge of Mathematics up to 12th science level

Rationale: Mathematics is basic need of Engineering

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
3	2	0	5	60	-	20	20	-	100

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	Linear Algebra:: Matrices & Determinants with Properties, Linear Independence, Rank of Matrix, System of Linear Equations, Consistency of System, Solution of system of Linear Equations by Gauss Jordan and Gauss-Elimination Method, Eigen values, Eigenvectors and its Applications, Cayley Hamilton Theorem and its Applications, Diagonalization, Quadratic form.	19%	12
2	Sequence & Series:: Basic of Sequences, Bounded and Monotonic Sequences, Series, Geometric series, p- series, Integral Test, Comparison Test, Alternating Series, Absolute and Conditional convergence, Ratio test, Root Test, Power series, Taylor's and Maclaurin's series.	15%	10
3	Curve Sketching:: Monotonic function, Concavity, Point of inflection, Curve Sketching of various curve in Cartesian coordinate system, Parametric curves, Polar coordinate, Relationship between Cartesian and polar coordinate system, Curve Sketching in polar form (Line, Circle, Lemniscates, Cardioid)	12%	8
4	Partial Derivatives & Its Application:: Functions of Several Variables, Limit, Continuity, Partial Derivatives, Homogeneous function, Euler's Theorem for homogeneous function, Modified Euler's Theorem, Chain Rule, Implicit function, Jacobian, Tangent plane and Normal line, Maximum and Minimum Values, Lagrange's Multiplier, Taylor's and Maclaurin's Series for functions of two variables.	28%	17
5	Application of Definite Integral:: Area bounded by curves in Cartesian and Polar form, Area of a region bounded by function, Area of a region bounded by curves in Parametric form, Volume by slicing, Volume of solid by revolution.	15%	10
6	Complex Numbers:: Review of Complex Numbers, Geometric representation of Complex Number, Algebraic Operations on Complex Numbers, Properties of Complex Numbers, , Modulus and Argument of Complex Number, De- Moivre's Theorem, Roots of Complex Numbers, Euler's Formula, Hyperbolic, Inverse Hyperbolic and Logarithmic function.	11%	7

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Calculus with early transcendental functions
James Stewart; Cengage Learning; 6th Edition
2. Thomas' Calculus
Maurice D. Weir, Joel Hass, Frank R. Giordano; Pearson Education; 11th Edition
3. Advanced Engineering Mathematics
Erwin Kreyszig; WileyIndia Education; 8th Edition
4. Elementary Linear Algebra Applications version
Howard Anton, Chris Rorres; Wiley India Education; 9th Edition
5. Higher Engineering Mathematics
B. S. Grewal; Khanna Publications
6. The Pearson Guide To Quantitative Aptitude for competitive exam
; Pearson Publication

List of Tutorial:

1. Engineering Mathematics System of Linear equation and its application

2. Eigen Value, Eigen Vector and its Application
3. Sequence and Series
4. Application of Sequence Series: Power Series, Taylor & McLaren's Series
5. Curve Sketching
6. Chain Rules
7. Euler's Theorem
8. Application of Partial Derivatives
9. Application of Definite Integral
10. Complex Number
11. Partial Derivative

Physics (03192101)

Type of Course: BTech

Prerequisite: Knowledge of Physics and some basic concepts in Mathematics like differentiation, integration, limit, differential equation up to 12th science level.

Rationale: Knowledge of physics is essential for all Engineering branch because physics is the foundation subject of all the branches of engineering and it develops scientific temperament and analytical capability of engineering students. Comprehension of basic physics concepts enables the students to solve engineering problem logically and develop scientific approach.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
3	0	2	4	60	30	20	20	20	150

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	QUANTUM MECHANICS: • Failure of classical physics • Black body radiation • Rayleigh-Jeans Explanation and Planck's proposition • Dual nature of matter and radiation • Compton effect • Pair production of de-Broglie relation • Wave function • Schrodinger wave equation operators (time dependent and independent) Definition of Eigen function and Eigen values	15%	7
2	ELECTROMAGNETIC THEORY: • Introduction of scalar and vector field, Coulomb's law, gauss' law, conductors, electrostatic field in matter, Ampere's law, Bio –savart's law, Lorentz force, displacement current • Gauss-Divergence and stoke's equation. Del operator-grad, div, curl and their physical significance • Electromagnetic wave: Maxwell's equation in vacuum & medium • Poynting theorem.	10%	6
3	OPTICS: LASER: • Introduction • Properties of laser • Einstein's co efficient, spontaneous and stimulated emission • Brief working principal of laser	20%	10

	<ul style="list-style-type: none"> • Types of laser: Ruby laser, He-Ne laser(In Detail),CO2 laser, semiconductor laser, Nd-Yag Laser(In Detail). Application of laser • Introduction • Principal of optical fiber • Advantages of Optical Fiber • Total Internal Reflection • Numerical Aperture and Acceptance angle • Types of Optical Fiber Applications of optical fiber Care to be taken during the utilization of fiber in communication 		
4	Acoustics & Ultrasonic: Acoustics • Introduction, Classification and Characteristics of sound • Sabine's formula for reverberation (without proof) • Introduction of Absorption co-efficient • Sound absorbing materials Factors affecting the acoustics of building and their remedies Ultrasonic • Properties of ultrasound • Production of ultrasound by (1) piezoelectric method and (2) magnetostriction method • Methods for Ultrasound Velocity measurement Applications of ultrasound	13%	7
5	Vacuum Science and Technology: Introduction-Exhaust pump and their characteristics-different types of pumps-rotary vane pump-roots pump-diffusion pump --measurement of low pressure pirani gauge-penning guage - applications of vacuum technology	15%	8
6	NANO TECHNOLOGY: • Introduction of Nanomaterials and Nanotechnology • Surface effects on Nanomaterials • Surface to volume ratio • Unusual properties of Nanomaterials • Disadvantages of Nanomaterials • Synthesis of Nanomaterials Carbon Nanotubes: Introduction, Structure, Synthesis, Properties and applications Applications of Nanomaterial	10%	6
7	Engineering Materials: Introduction of Engineering Materials Classification of engineering materials Superconducting Materials, Metallic Glasses, Magnetic Materials, Shape Memory Alloys, Energy Materials- Solar cells,Fuel cells (H2, Lithium cell) ,Ultra capacitors	17%	12

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Concept of modern physics
Arthur Beiser; McGraw-Hill; 6th Edition
2. Quantum Mechanics
Chaddha, G. S.; New Age International (P) Ltd., Publishers; 1
3. Introduction to Electrodynamics
Griffiths; Pearson Education; 4
4. Optics
Brijlal And Subramanyam; S. Chand; 25
5. Optics
Ghatak; Mcgraw Hill Education; 5
6. Engineering Physics
R.K.Gaur and S.L. Gupta; Dhanpatrai & Co
7. Engineering Physics
Vijayakumari, G
8. Engineering Physics
Avadhalula, M. N. & Kshirsagar, P. G; S CHAND
9. Vacuum Science and Technology
V V Rao T B Ghosh K L Chopra; Allied Publishers Pvt. Ltd.; 1
10. Integrated Engineering Physics
Devraj Singh; Dhanpatrai & Co

Course Outcome:

After Learning the course the students shall be able to:

- Students will gain the knowledge about different materials used in industry.
- Students will be able to use basic concepts of Engineering Physics.
- Students will gain the knowledge about the different technology in material processing.
- Students will gain the knowledge about the use of vacuum technology in industries

List of Practical:

1. Bandgap of semiconductor
2. LED
3. ZENER DIODE
4. wavelength of laser light
5. Ultrasonic Interferrometer
6. Numerical aperture
7. Fiber losses
8. Hall Effect
9. Solar cell
10. Particle size measurement

Communication Skills-1 (03193101)

Type of Course: BTech

Prerequisite: Knowledge of English Language studied till 12th standard.

Rationale: Basic Communication Skills are essential for all Engineers.

Teaching and Examination Scheme:

Teaching Scheme (Hrs./Week)			Credit	Examination Scheme					Total
L	T	P		External		Internal			
				Theory	Practical	Theory	*C.E.	Practical	
0	2	0	2	-	60	-	20	20	100

L-Lectures; T-Tutorial; P-Practical; C.E.-Continuous Evaluation

Contents:

Sr.	Topic	Weightage	Teaching Hrs.
1	Grammar and Vocabulary: Tenses, Types of sentences, Subject verb agreement, Vocabulary Practice & Application	13%	4
2	Listening Skills: Telephonic Conversation	6%	2
3	Speaking Skills: Storytelling, Role Play, Presentation, ITEP (International Test of English Proficiency) – Speaking Task 1: To speak on a given topic for 1 minute, IELTS (International English Language Testing System)/JAM (Just a minute) speaking. Task 1: To speak on a given topic for 2 to 3 minutes	44%	14
4	Reading: Reading Comprehension	6%	2
5	Writing Skills: Picture Description, 1st person description, 3rd person description, dialogue writing, Note Making, Paragraph writing, ITEP – Writing Task 1: write a short note to respond to a simple situation or topic (75 to 100 words), Story Writing / Completion (from given points / description / set of pictures), E- mail	31%	10

***Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

Reference Books:

1. Technical Communication : Principles And Practice
Sangeetha Sharma, Meenakshi Raman; OUP
2. English for Academic Purposes-I
Deeptha Achar, et al.; OBS
3. Barron's The Leader in Test Preparation
Dr. Lin Lougheed,; New Age International (P) Limited Publishers, New Delhi
4. UTS Insearch English Prepare for IELTS: Academic module 2012
University of Technology Sydney
5. Developing Reading Skills: A Practical Guide to Reading Comprehension Exercises
Frangoise Grellet; CUP
6. Communication Skills for Engineers
Mishra and Murlikrishna; Pearson Education
7. Communication Skills for Technical Students
T.M. Farhathullah; OBS
8. Communication Skills
Parul Popat and Kaushal Kotadia; Pearson Publication

Course Outcome:

After Learning the course the students shall be able to:

Students will be able to

- 1) Comprehend day to day English
- 2) Respond to familiar issues / topics in English

List of Tutorial:

1. Grammar and Practice
2. Grammar and Practice Presentations
3. Telephonic conversation Role Play
4. Story completion story Telling
5. Story Writing Story telling
6. Reading Comprehension
7. Dialogue Writing Telephonic Conversation
8. Picture Description Note Making
9. Paragraph writing Email Writing
10. Presentations: Pre task
11. ITEP: Writing Task ITEP: Speaking Task
12. ITEP: Writing Task ITEP: Speaking Task
13. ITEP: Writing Task ITEP / IELTS: Speaking Task
14. ITEP: Writing Task ITEP / IELTS: Speaking Task
15. ITEP: Writing Task ITEP / IELTS: Speaking Task
16. Presentations