B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Scheme of Instruction for First Semester B.E. 2014-15
(PHYSICS CYCLE)

Course Code	Course Title	Credit Distribution				Total Credits	Total Contact Hrs.	Total Marks
		L	T	P	S			
14MA1ICMAT	Engineering Mathematics - I	3	1	0	0	4	5	100
14PY1ICPHY	Engineering Physics	4	0	1	0	5	6	100
14EC1ICEEE	Elements of Electronics Engineering	4	0	0	0	4	4	100
14ME1ICEME	Elements of Mechanical Engineering	4	0	0	0	4	4	100
14CS1ICCCP	'C' Programming	3	0	1	0	4	5	100
14ME1ILCL1	Co Lab - I	0	0	1	0	1	2	100
14BT1ICBIE	Biology for Engineers	1	0	0	0	1	1	100
14HS1ICPDC	Personality Development & Communication	2	0	0	0	2	2	100
14HS1IMKAN	Kannada Language*	Mandatory Course				0	2	50
					Total	25	31	850

L-Lecture (1 credit=1 contact hr.); **T**-Tutorial (1 credit=2 contact hrs.); **P**-Practical (1 credit=2 contact hrs.);
S- Self Study (1 credit= 4 study hrs.); ***** CIE only

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Scheme of Instruction for First Semester B.E. 2014-15

(CHEMISTRY CYCLE)

Course Code	Course Title	Credit Distribution				Total Credits	Total Contact Hrs.	Total Marks
		L	T	P	S			
14MA1ICMAT	Engineering Mathematics - I	3	1	0	0	4	5	100
14CY1ICCHY	Engineering Chemistry	4	0	1	0	5	6	100
14EE1ICBEE	Basic Electrical Engineering	4	0	0	0	4	4	100
14ME1ICEED	Elements of Engineering Drawing	2	0	2	0	4	6	100
14CV1ICENM	Engineering Mechanics	4	0	0	0	4	4	100
14ME1ILCL2	Co Lab - II	0	0	1	0	1	2	100
14HS1ICEVS	Environmental Studies	1	0	0	0	1	1	100
14HS1ICCIP	Constitution of India & Professional Ethics	2	0	0	0	2	2	100
14HS1IMENG	Functional English*	Mandatory Course				0	2	50
					Total	25	32	850

L-Lecture (1 credit=1 contact hr.); **T**-Tutorial (1 credit=2 contact hrs.); **P**-Practical (1 credit=2 contact hrs.);
S- Self Study (1 credit= 4 study hrs.); ***** CIE only

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Scheme of Instruction for Second Semester B.E. 2014-15
(CHEMISTRY CYCLE)

Course Code	Course Title	Credit Distribution				Total Credits	Total Contact Hrs.	Total Marks
		L	T	P	S			
14MA2ICMAT	Engineering Mathematics - II	3	1	0	0	4	5	100
14CY2ICCHY	Engineering Chemistry	4	0	1	0	5	6	100
14EE2ICBEE	Basic Electrical Engineering	4	0	0	0	4	4	100
14ME2ICEED	Elements of Engineering Drawing	2	0	2	0	4	6	100
14CV2ICENM	Engineering Mechanics	4	0	0	0	4	4	100
14ME2ILCL2	Co Lab - II	0	0	1	0	1	2	100
14HS2ICEVS	Environmental Studies	1	0	0	0	1	1	100
14HS2ICCIP	Constitution of India & Professional Ethics	2	0	0	0	2	2	100
14HS2IMENG	Functional English*	Mandatory Course				0	2	50
	Total					25	32	850

L-Lecture (1 credit=1 contact hr.); **T**-Tutorial (1 credit=2 contact hrs.); **P**-Practical (1 credit=2 contact hrs.);
S- Self Study (1 credit= 4 study hrs.); ***** CIE only

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Scheme of Instruction for Second Semester B.E. 2014-15

(PHYSICS CYCLE)

Course Code	Course Title	Credit Distribution				Total Credits	Total Contact Hrs.	Total Marks
		L	T	P	S			
14MAI2CMAT	Engineering Mathematics - II	3	1	0	0	4	5	100
14PY2ICPHY	Engineering Physics	4	0	1	0	5	6	100
14EC2ICEEE	Elements of Electronics Engineering	4	0	0	0	4	4	100
14ME2ICEME	Elements of Mechanical Engineering	4	0	0	0	4	4	100
14CS2ICCCP	'C' Programming	3	0	1	0	4	5	100
14ME2ILCL1	Co Lab - I	0	0	1	0	1	2	100
14BT2ICBIE	Biology for Engineers	1	0	0	0	1	1	100
14HS2ICPDC	Personality Development & Communication	2	0	0	0	2	2	100
14HS2IMKAN	Kannada Language*	Mandatory Course				0	2	50
					Total	25	31	850

L-Lecture (1 credit=1 contact hr.); **T**-Tutorial (1 credit=2 contact hrs.); **P**-Practical (1 credit=2 contact hrs.);
S- Self Study (1 credit= 4 study hrs.); ***** CIE only

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Code	14MA1ICMAT	Course Name	Engineering Mathematics - I
Credits	04	L - T - P - S	3 - 1 - 0 - 0

Course Objectives: To acquaint the students with principles of mathematics through Calculus and Differential Equations, that serves as an essential tool in several applications.

UNIT - 1

Calculus of one variable [9 hours]

Introduction to n^{th} derivatives of standard functions, Leibnitz's theorem (without proof). Taylor's and Maclaurin's series expansion for function of one variable.

(4L+1T)

Polar curves: Polar coordinates, angle between radius vector and tangent, angle between the polar curves, length of the perpendicular from pole to the tangent.
Applications: Curvature, radius of curvature in polar coordinates (without proof).

(3L+1T)

Suggested Reading: Geometrical meaning of second derivatives, hyperbolic functions, Pedal equation for polar curves, Indeterminate forms (L' Hospital's rule).

UNIT - 2

Multivariate Calculus [9 hours]

Partial differentiation: Partial derivatives, total differentiation, differentiation of composite and implicit functions, Jacobians and their properties (without proof). Taylor's and Maclaurin's series expansion for functions of two variables.

(4L+2T)

Applications: Maxima and Minima for functions of two variables. (unconstrained optimization)

(2L+1T)

Suggested Reading: Lagrange's method of multipliers (constrained optimization).

UNIT – 3

Curve tracing and Integral Calculus [11 hours]

Reduction formulae for the integration of $\sin^n x$, $\cos^n x$ (without proof) $\sin^m x \cos^n x$ (with proof) (m and n being positive integers) and evaluation of these integrals with standard limits. Tracing of standard curves: Cartesian form - Strophoid, Leminscate, Parametric form - Cycloid, Astroid, Polar form - Cardioid, Leminscate.

(6L+2T)

Expressions for Derivatives of arc length (cartesian and polar form-without proof).
Applications: Area under a plane curve (polar curves), length of plane curves.

(2L+1T)

Suggested Reading: Proof of Reduction formulae for the integration of $\sin^n x, \cos^n x$, volume of revolution and surface area of revolution of standard curves.

UNIT – 4

Ordinary Differential Equations – 1 [10 hours]

Geometrical meaning of first order ordinary differential equation, solution and family of curves, motivating examples of first order ordinary differential equation, linear differential equations, Bernoulli's equation, exact equations, equations reducible to exact equations (integrating factor of homogeneous equations, integrating factor for the equations of the type $f_1(xy)ydx + f_2(xy)xdy = 0$).

(4L+1T)

Applications: Orthogonal trajectories. Simple electric circuits (RL-circuit, RC-circuit), Newton's law of cooling, heat flux, mixing problem. (model building)

(4L+1T)

Suggested Reading: Homogeneous and non-homogeneous ordinary differential equations, equations reducible to exact equations (cases 4 & 5), velocity of escape from earth, chemical reaction.

UNIT – 5

Ordinary Differential Equations - 2 [9 hours]

Linear differential equations of second and higher order with constant coefficients, method of variation of parameters, solutions of Cauchy's homogenous linear equations and Legendre's equations.

(5L+1T)

Applications: LRC Circuit's and Newton's second law of motion (spring mass system).

(2L+1T)

Suggested Reading: Method of undetermined coefficients, system of first order differential equations.

Course Outcomes:

1. Apply the standard calculus computations on parametric and polar curves.
2. Apply the concepts of functions of several variables.
3. Demonstrate an understanding towards the nature of curves by tracing the same using certain properties.
4. Apply integration to find arc lengths, areas, volume and surface area of revolution.
5. Use analytical techniques to compute solutions of ordinary differential equations.

Text Books:

(1) Higher Engineering Mathematics, B.S. Grewal, 42nd edition, 2013, Khanna Publishers.
(2) Higher Engineering Mathematics, B.V. Ramana, 7th reprint, 2009, Tata Mc. Graw Hill.

Reference Books:

(1) Advanced Engineering Mathematics, Erwin Kreyszig, 10th edition, 2010, Wiley-India.
(2) Calculus - Early Transcendentals, 7th Edition, James Stewart, Thomsons books.

E books and online course materials:
(1) Engineering Mathematics, K. A. Stroud, Dexter J. Booth, Industrial Press, 2001 http://books.google.co.in/books/about/Engineering_Mathematics.html?id=FZncL-xB8dEC&redir_esc=y.
(2) Advanced Engineering Mathematics, P. V. O'Neil, 5th Indian reprint, 2009, Cengage learning India Pvt. Ltd.
(3) http://ocw.mit.edu/courses/mathematics/ (online course material)

Online Courses and Video Lectures:
(1)http://nptel.ac.in/courses.php?disciplineId=111
(2)https://www.khanacademy.org/
(3)https://www.class-central.com/subject/math (MOOCS)

* * *

Course Code	14PY1ICPHY/ 14PY2ICPHY	Course Name	Engineering Physics
Credits	05	L-T-P-S	4-0-1-0

Course Objectives: The student will learn the following:

- The limitations of classical physics and the need for the development of quantum mechanics, understand the dual nature of matter, uncertainty arising out of wave nature of matter, develop one dimensional Schrodinger's equation and apply it to simple physical systems.
- The basic crystal structure, the planes, crystal classification, interatomic spacing, imperfections in crystals and understand the structure determination technique using X-rays.
- The electrical and thermal conduction in metals, the concept of Fermi energy and the Wiedmann-Franz law.
- The domain theory of ferromagnetic materials, polarization mechanisms and the concept of internal fields.
- The physical principle of LASER, the working of LASER, applications of LASER and holography. Propagation of light in optical fibers, numerical aperture, fiber classification, energy losses in fibers and applications of optical fibers.

UNIT – 1

Quantum Mechanics

De-Broglie hypothesis. Definition and expression of phase velocity and group velocity. Relation between group velocity and phase velocity, relation between group velocity and particle velocity, relation between group velocity, phase velocity and velocity of light. Derivation of de-Broglie wavelength using group velocity. Matter waves – characteristic properties. Problems.

Heisenberg's uncertainty principle – statement and physical significance. Application of uncertainty principle - Non-existence of electron in the nucleus. Wave function-properties and physical significance. Probability density and normalization of wave function. Setting up of one-dimensional time independent Schrödinger wave equation. Eigen functions and eigen values. Applications of Schrodinger's wave equation: 1. Free particle, 2. Particle in a one dimensional potential well of infinite height (eigen functions, probability density and eigen values for the first three states). Problems.

[10 Hours]

UNIT – 2

Crystal Structure

Introduction, lattice parameters, directions and planes in a crystal. Miller indices – procedure for finding Miller Indices, derivation for inter-planar spacing in terms of Miller indices. Expression for angle between crystal directions (qualitative). Imperfections in crystals: point defects (Schottky and Frenkal defects), line defects (edge dislocation and screw dislocations). Bragg's law - derivation. Bragg's diffractometer, powder diffraction method of finding lattice parameters. Problems. [10 Hours]

UNIT – 3

Electrical and Thermal Properties of Solids

Electric Properties: Introduction, limitations of classical free electron theory. Postulates of quantum free electron theory, Fermi energy, Fermi factor, dependence of f(E) on temperature, Fermi velocity, Fermi temperature. Electrical conductivity (qualitative expression using effective mass and Fermi velocity). Merits of quantum free electron theory. Problems.

Thermal Properties: Thermal conductivity, expression for thermal conductivity of a conductor using classical free electron theory, Wiedemann – Franz law, calculation of Lorentz number using classical and quantum assumptions. Theory - determination of thermal conductivity using Forbe's and Lee – Charlton's methods. Problems. [9 Hours]

UNIT – 4

Magnetic and Dielectric Properties of Solids

Magnetic Materials: Ferromagnetic materials – characteristic features, Weiss's domain theory. B-H graph in ferromagnetic materials using the concept of domains. Soft and hard magnetic materials – characteristic features, explanation using domain theory and applications. Anti-ferromagnetic materials, Ferrites – features and applications.

Dielectric Materials: Introduction, polarization – types of polarization. Derivation of electronic polarizability, Frequency dependence of dielectric constant. Derivation of dielectric loss. Expression for internal fields in liquids and solids (one dimensional). Clausius – Mossotti relation. Problems. [9 Hours]

UNIT – 5

Lasers and Optical Fibers

Lasers: Introduction, interaction of radiation with matter, derivation of energy density of radiation in terms of Einstein's coefficients. Characteristics of lasers, condition for laser action using Einstein's coefficients, basic requisites of a laser system. Construction and working of He-Ne laser and semiconductor laser. Mention of any five applications of lasers. Holography – recording of hologram and reconstruction of image. Problems.

Optical Fibers: Introduction. Principle of propagation in optical fibers. Angle of acceptance, expression for numerical aperture and condition for propagation. Fractional index change. Classification of optical fibers. Number of modes – V number. Attenuation – causes of attenuation, coefficient of attenuation. Mention of any five applications optical fibers. Problems. [10 Hours]

Text Books:

1. Solid State Physics – Sixth Edition – S. O Pillai – New Age International Publishers.
2. Engineering Physics – V Rajendran – Tata Mcgraw–Hill.

Reference Books:

1. Concepts of Modern Physics – Fifth edition- Arthur Beiser – Tata Mcgraw-Hill.
2. Engineering Physics – R K Gaur and S L Gupta – Dhanpat Rai Publications.

E-Books/Resources:

http://de.physnet.net/PhysNet/education.html
http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html

Online digital courses:

1. https://www.edx.org
2. https://www.coursera.org

LIST OF EXPERIMENTS
(Ten to be performed)

No.	Name of the experiment	Remarks
1	Planck's constant or determination of wavelength of different LED's.	UNIT-1
2	Determination of interplanar spacing using x-ray data.	UNIT-2
3	Measurement of Fermi energy of copper using Calender and Griffith's bridge.	UNIT-3
4	Thermal conductivity of a bad conductor by Lee Charlton's method.	UNIT-3
5	Thermal conductivity of a metal by Forbe's method.	UNIT-3
6	Determination of electrical conductivity of a semiconductor using four probe method.	UNIT-3
7	Determination of dielectric constant of the material by charging and discharging of the capacitor.	UNIT-4
8	B-H Curve of ferrites/soft iron (absolute method).	UNIT-4
9	B-H Curve of ferrites/soft iron (using CRO).	UNIT-4
10	Measurement of wavelength of semiconductor laser source using diffraction grating.	UNIT-5
11	To study the divergence of semiconductor laser beam.	UNIT-5
12	Experiment on optical fibers (numerical aperture/attenuation).	UNIT-5
13	Measurement of energy gap of a semiconductor.	General Physics
14	Frequency response of series and parallel LCR circuits and study of quality factor.	General Physics
15	Measurement of elastic constants.	General Physics
16	Experiments on resonance.	General Physics
17	Reddy's shock tube and its characteristics.	General Physics

Experiment numbers 13-16 are suggested as Open End Experiments.

Reference Book: (Laboratory)

1. Practical Physics - Harnam Singh and Dr. P. S. Hemne - S Chand and Co Ltd. (2011 edition)

Course Outcomes:

1. Apply the knowledge of basic quantum mechanics, to set up one-dimensional Schrodinger's wave equation and its application to few physical problems.
2. Recognize various planes in a crystal and describe the structure determination using x-rays.
3. Summarize the importance of free electrons in determining the properties of metals; understand the concept of Fermi energy.
4. Describe the basic magnetic and dielectric properties of solids.
5. Describe the basic laser physics, working of lasers, holography and principle of propagation of light in optical fibers.

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Code	14EC1ICEEE/ 14EC2ICEEE	Course Name	Elements of Electronics Engineering
Credits	04	L-T-P-S	4-0-0-0

Course Objectives:

1. Imparting knowledge of fundamentals of analog & digital electronics.
2. Make a student to understand the scope and applications of electronics & communications in the current scenario.

UNIT - 1

Transistors:

Physical structure and operation modes of BJT, Active region operation of a transistor, Operating point and load line analysis of BJT,Voltage divider bias, Numerical problems as applicable, BJT as a switch.

Field Effect Transistor(FET): Classification of FET, Junction FET ,operation of JFET, Characteristics of JFET, Characteristic parameters of JFET, Comparison Between FET and BJT, Metal Oxide Semiconductor FET(MOSFET),Comparison between NMOS and PMOS, Symbols of JFET and MOSFET. Numerical problems as applicable. [11 Hours]

UNIT - 2

Amplifiers:

Introduction, Linear and Non-linear Amplifiers, Classification of Amplifiers, BJT as a Linear Amplifier, CE Amplifiers, DC Analysis of CE amplifier, AC analysis (using r_e model only), Comparison of CE,CB and CC Amplifiers, Introduction to Frequency Response of BJT Amplifiers, General Frequency Response of Amplifiers, Feedback Principles, Advantages of negative feedback, Feedback Amplifiers, Feedback Amplifier Topologies. Numerical problems as applicable. [10 Hours]

UNIT - 3

A: Oscillators:

LC-tuned Circuit, principle of sinusoidal feedback oscillations, Working of RC phase shift oscillator, Hartly oscillator and Crystal oscillator(BJT version). Numerical problems as applicable.

B: Opamps

Introduction, Differential Amplifier (BJT circuit), Block diagram representation of OPAMP, schematic symbol and pin configuration, The Ideal OPAMPs Vs Practical characteristics (μA741) , Virtual ground concept, Applications of OPAMP(Inverting and non-inverting, voltage follower, Integrator, Differentiator, adder, subtractor, Differential amplifier).Numerical problems as applicable. [10 Hours]

UNIT - 4

Digital Electronics:

Number System: Introduction to binary, octal, decimal & hexadecimal, BCD systems, representation of negative numbers 1's, 2's complement method and their arithmetic.

Boolean algebra, universality of NAND and NOR gates, Logic circuits, Sum of Product and product of-sum forms.

Simplification of Boolean expressions: Using 2 and 3 variables K- Map, Designing combinational logic circuits, Adder and Subtractor. Numerical problems and puzzles to be solved and realized using Digital Logic.

Basics of Memory systems, Memory parameters, classifications, Basic functions of Memory Devices, Microprocessors introduction & organization. [10 Hours]

UNIT - 5

Displays:

Seven segment display, Advantage of LEDs in electronics display, Types of LCD displays, Advantage & disadvantage of LCD and LED displays. Applications of Display devices.

Communication systems:

Digital Communication: Fundamentals and block diagram, Cellular Communication: Evolution and Block diagram, RADAR: Principle and Block diagram with numericals (Qualitative analysis only), Satellite and GPS system: Basic Principles and Block diagram. Comparison of Analog and digital Communication.

Applications:

Data Acquisition system, Electronic control system, Internet Of Things (IOT), Role of Electronics in Robotics

[11 Hours]

Course Outcomes:

1. Analyze and design the basic electronic circuits containing non-linear elements such as transistors.
2. Identify the need of few analog Integrated Circuits and use them in realizing circuit applications.
3. Analyze and implement basic Digital Electronic circuits for a given application.
4. Identify the applications and significance of electronics in interdisciplinary engineering domains.

Text Books:

1. Electronic Devices and Circuits By David A Bell,PHI,5th edition ,2007
2. Basic Electronics Devices, Circuits and its Fundamentals By Santiram Kal, PHI.2009

Reference Books:

1. Electronic Devices and circuit Theory by Robert L Boylestad and L. Nashelsky,Pearson Education,9th edition, 2005
2. Basic Electronics By Soumitra Kumar Mandal, Mc Graw Hill, 2013

e-books:

1. http://gk12.poly.edu/amps-cbri/pdf/Basic%20Electronics.pdf, 2012
2. http://www-f9.ijs.si/~gregor/ElektronikaVaje/ElectronicsLectures_GinGrich.pdf, 1999
3. http://www.tubebooks.org/Books/Happell_engineering.pdf , 1953

Online certification Course:

Free online courses in electronics at www.coursera.org/course offered by University of Rochester/ university of London

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Code	14ME1ICEME/ 14ME2ICEME	Course Name	Elements of Mechanical Engineering
Credits	04	L-T-P-S	4-0-0-0

Course Objectives: Mechanical Engineering involves design, development and application of machines and devices. Boilers, heating and refrigeration system, gas and steam turbines, Automobiles, engines, machine tools, power transmission mechanisms and mechatronics products, etc. are a few of the systems and devices requiring mechanical engineering knowledge. Other professionals require the basic knowledge of these mechanical systems. The objective of this course is to impart the basic knowledge of these to the students of all engineering disciplines.

Unit – 1

Source of Energy & Boilers

Sources of energy: Introduction, conventional and non-conventional sources of energy, examples, solar energy, hydro power plant.
Steam: Steam formation, steam properties- specific volume, enthalpy & internal energy, types of steam (no numerical problems)
Boilers: Introduction of boilers, classification, Lancashire boiler, Babcock and Wilcox boiler, list of boiler mountings and accessories and applications (no sketches).

[08 Hours]

Unit – 2

Turbines & Refrigeration

Turbines: Introduction and classification of steam turbines, working principle of Impulse and Reaction steam turbines, compounding of impulse steam turbines, Introduction and classification of Gas turbines, open and closed cycle gas turbines, differences, Hydraulic turbines: Introduction and classification, working principle of impulse turbine (Pelton wheel), working principle of reaction turbines (Francis turbine and Kaplan turbine)
Refrigeration: Introduction to refrigeration and air-conditioning, COP, properties of refrigerants and types of refrigerants, working principle of vapour compression & vapour absorption refrigerators, working principle of domestic air-conditioner.

[08 Hours]

Unit – 3

Internal Combustion Engines & Metal Joining Process

Internal combustion engines: Classification of I.C engines, parts of I. C engines, working principle of 4-stroke (petrol & diesel engines), working principle of 2- stroke (petrol & diesel engines), simple problems.
Metal joining process: Introduction, permanent & temporary joints, welding, brazing, soldering, working principle of electric arc welding, temporary fasteners, nuts and bolts, V-thread profile.

[14 Hours]

Unit – 4

Machine Tools

Introduction to Machine tools, Introduction to lathe, Parts, classification & specifications, lathe operations (turning, taper turning, thread cutting & knurling), Introduction to drilling machine, classification (bench and radial drilling machine), different operations on drilling machine, Introduction to milling machine, parts and classification, principle (upmilling & down milling), operations of milling machine (slab, slot, angular, face), Introduction to grinding machine, working principle of cylindrical, surface and centerless grinding.

[12 Hours]

Unit – 5

Power Transmission & Mechatronics

Power transmission: Introduction to power transmission, open and closed belt drives (no derivations), velocity ratio of belt drive, Gear drives, simple and compound gear trains, simple problems.

Bearings: Introduction to Bearing, Classification of Bearings, Ball & Roller bearings.
Mechatronics: Introduction, definition of mechatronics, systems, measurement and control systems, open loop and closed control systems (simple block diagrams.

[06 Hours]

Course Outcomes:
At the end of the course, the student will be able to:

1. Identify the various sources of energy; understand the properties of steam & working of boilers and their accessories.
2. Understand the working of turbines and refrigeration concepts.
3. Understand various metal joining processes, their process capabilities, working principles of IC engines & perform simple mathematical computations..
4. Understand the working of conventional machine tools, their specifications and machining processes, tools and accessories.
5. Understand the fundamentals of mechatronics, identify various power transmission systems and perform simple mathematical computations.

Text Books

1. Elements of Mechanical Engineering by K.R.Gopalakrishna, Subhas Publications 2008, Bangalore.
2. Elements of Mechanical Engineering, Vol.-1 & 2 by HajraChoudry, Media Promoters, New Delhi, 2001.

Reference Books:

1. A Text Book of Elements of Mechanical Engineering - S. Trymbaka Murthy, 3rd revised edition 2006, I K. International Publishing House Pvt. Ltd., New Delhi.
2. Elements of Mechanical Engineering –Dr.A.S.Ravindra, Best Publications, 7th edition 2009.

e-books:

1. Elements of Mechanical Engineering by R.K.Rajput
2. Elements of Mechanical Engineering by D.S.Kumar

Online courses:

1. http://ocw.mit.edu/courses/mechanical
2. www.distance.lehigh.edu/credit/me.html

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Code	11CS1ICCCP / 11CS2ICCCP	Course Name	C Programming
Credits	04	L-T-P-S	3-0-1-0

Note: All the units shall include numerous sample programs.

Course Objectives:

1. To impart the knowledge of Modular & structured programming.
2. To assist the students in understanding the concept of computer programming
3. To understand the key features of C language

UNIT -1

Introduction: Data Types in C, Declaration of constants and variables, assigning values to variables. Arithmetic operators, relational operators, logical operators, assignment operator, increment and decrement operators and conditional operator. Operator precedence and associativity.

[8 Hours]

UNIT -2

Basic Programming

Conditional branching statements, Iterative statements, Nested loops, the break and continue statement.

[6 Hours]

UNIT-3

Structured Programming

Function Declaration/function Prototype, Function definition, Function call, Return statement and passing parameters to the function.

Declaration of arrays, accessing elements of the array, storing values in arrays, calculating the length of the array, operations that can be performed on arrays, one-dimensional arrays for inter-function, two-dimensional arrays and operations on two-dimensional arrays.

[10 Hours]

UNIT-4

User-Defined-Space

Strings: Introduction, String operations such as length, converting characters of a string into upper case, converting characters of a string into lower case, concatenating two strings to form a new string and appending. Structures: Introduction, nested structures and self-referential structures.

[8 Hours]

UNIT-5

Advanced Programming

Pointer declarations, pointer expressions, pointers as function arguments, allocating a block of memory: MALLOC, Creating a linked list, Opening a file-closing a file-Input/output operations on files.

[7 hours]

Course Outcomes:

1. Practice modular programming concept in writing program
2. Use of C programming constructs in writing the Computer Program
3. Usage of C programming concepts such as memory allocation/relinquish, file handling and pointers in implementing the real world computer program

Text Books:

1.Programming in ANSI C-Balaguruswamy: Mc Graw Hill, fifth Edition, 2011
Chapter[2.7,2.8,2.10,2.11,2.12,3.2,3.3,3.4,3.5,3.6,3.7,3.15,11.4,11.8,11.13,12.2,12.3 ,12.4,13.3,13.11]
2. Programming in -C-Reema Thareja: Oxford University Press, 2012
Chapter[2.12,3.2,3.3,3.4,3.5,4.3,4.4,4.5,4.6,4.7,5.2,5.3,5.4,5.5,5.6,5.7,5.8,5.9,6.1, 6.4.1,6.4.2,6.4.3,6.4.4,6.4.5,8.1,8.2,8.5]

Reference Books:

1. Programming with C- B S Gottfried: Schaums Outline Series 2003

Online References:

1. C Programming, http://www2.its.strath.ac.uk/courses/c/
2. Practical Programming in C, http://ocw.mit.edu/courses/
3. C Programming, http://www.richardclegg.org/previous/ccourse/
4. Learn C Online, http://www.learnconline.com/
5. VTU e learning, http://elearning.vtu.ac.in/06CCP-13.html
6. Khan Academy - Intro to C Programming Video Tutorials, https://www.gudagi.com/project.php?id=M5676U17

***

Course Code	14ME1ILCL1/ 14ME2ILCL1	Course Name	Co Lab - I
Credits	01	L-T-P-S	0-0-1-0

Course Objectives:

An engineer must know how the work on shop floor is carried out. The knowledge and skill to use tools, machines, equipment, and measuring instruments is required to be developed. Safe handling of machines and tools is also very important. So, it is essential for students of 1st year to undergo basic workshop practical training. The topics include practical works in fitting, welding and sheet metal shop and demonstration of various aspects of Civil Engineering.

Unit-1

Fitting

Introduction of tools, classification, specifications and applications. Preparation of various fitting models. [08 Hours]

Unit-2

Sheet Metal Work

- Sheet Metal and Soldering work.
- Preparation of Funnel & Square Prism.

[06 Hours]

Unit-3

Welding (Arc Welding) - Preparation of Butt joint & T-joint & L-joint. [04 Hours]

Unit-4

Demonstration of Basics of Civil Engineering: Field test on Cement, Mortar, Ingredients of concrete, Properties of concrete strength of concrete, Preparation of Concrete-Mix Design.

Terrestrial measurement-Liner and Angular measurements
Field identification of soils/General topography
Identification of basic structural elements of typical building- Foundation, Columns, Beams, Walls, Lintels, Stairs, Slabs/roofs.

[06 Hours]

Course Outcomes:
At the end of the course, the student will be able to:
1. Demonstrate fitting & sheet metal models with an understanding of their applications.
2. Perform soldering and welding of different sheet metal & welded joints.
3. Understand the Basics of Civil Engineering.

Text books:
1. Workshop Technology Vol. I & Vol. II by Prof.Raghuvamshi, DanpatRai& Sons, 1998.
2. Workshop Technology Vol.I by Hajra&Choudary, Media Promoters, 2000.

Reference Books:
1. Workshop Manual, Published by Mechanical Engg.-BMSCE, Bangalore.
2. Mechanical Engineer's Pocket Book, Newnes Pocket Books, Elsevier.

E-books:
1. Mechanical Workshop Practice – K.C. John, PHI, 2010
2. Mechanical Experiments & Workshop Practice – G.S.Sawhney, I K International Pvt. Ltd.,2009.

Online Digital Courses:
1. http://www.notesandsketches.co.uk/Machine-Tool-Animations.html
2. http://www.nptel.iitm.ac.in/courses

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Code	14BT1ICBIE/ 14BT2ICBIE	Course Name	Biology for Engineers
Credits	01	L-T-P-S	1-0-0-0

Course objectives: Newer technologies such as lab-on-a-chip, DNA and protein microarrays, biosensors, nanobots are promising innovative avenues in engineering science. These technologies require application of engineering principles, biology, mathematics and computational tools. There is ever increasing demand for technological development in healthcare, industry and informatics. For engineers to play an effective role in society, it is essential to gain knowledge of biology. The course is introduced to impart knowledge on the basic concepts of biology in order to help the engineering graduates acquire inter-disciplinary skills.

Biology for Engineers course gives overview of fundamental mechanisms of a living cell, so as to enable the engineers to apply the principles of biology to modern technology.

Course Description: The course deals with cell membranes, biomolecules, molecular motors, cytoskeletal components, Biosensors, Artificial neural networks and their relevance to engineering applications.

UNIT - 1

Introduction to Biology

- The cell overview: Cell membranes as nanofilters
- Lipids and Carbohydrates; Application as Biodiesel
- Concepts of genes : Structure, stability, replication, transcription, translation and epigenetics

[3 Hours]

UNIT - 2

Computational Biology

- DNA structure, application in DNA computing, Forensic Biology
- Bioinformatics

[2 Hours]

UNIT - 3

Biosensors

- Overview of biosensors.
- Proteins: Application in biosensors and bioplasics
- Biosensors applications

[3 Hours]

UNIT - 4

Mechanobiology

- Molecular motors, application for self-propulsion of nanobots
- Cytoskeleton and extracellular matrices, use in scaffolds

[2 Hours]

UNIT - 5

Neural Networks

- The nervous system, Analogy to artificial neural networks
- Application of Neural networks in Engineering branches

[2 Hours]

Course Outcome:

1. Understand cellular make up and biomolecules
2. Understand concepts of DNA computing and bioinformatics
3. Understand functioning of molecular motors and cytoskeleton and comparison to mechanical structures
4. Understands nervous system and its analogy to artificial neural networks

Text Books:

1. Molecular Biology of THE CELL. Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter, , Garland Science; 5 edition
2. Biochemistry: Donald Voet and Judith G Voet. Jhon Wiley publications.

Reference Books:

1. Simon O. Haykin, Neural Networks and Learning Machines (3rd Edition), Prentice Hall; 3 edition (November 28, 2008).
2. R.B. MISHRA, Artificial Intelligence, PHI Learning Private Limited (July 14, 2013).

e-Books:

1. Molecular Biology By David Freifelder. Publisher Jones and Bartlett,
2. Molecular cell biology by Lodish, Berk, Krieger etal. Freeman Publications

Online certification Course:

1. http://biochem218.stanford.edu/
2. http://www.nyu.edu/academics/open-education/coursesnew/natural-science-brain-behavior.html

* * *

Course Code	14HS1ICPDC / 14HS2ICPDC	Course Name	Personality Development and Communication
Credits	02	L-T-P-S	2-0-0-0

Course objectives:

1. To familiarize the students with personality and issues related to the same.
2. To equip them with better interpersonal and intrapersonal skills.
3. To improve their communication skills.
4. To improve their etiquettes to succeed in their profession.

UNIT – 1

Personality Development: Meaning, need, Introduction to Personality, Definition and Determinants – Personality Traits - Ways of developing positive personality traits, Self-awareness, Habits – Ways of forming good habits. Self-discipline

Attitude: Definition, Components, Determinants and Types – Building and Maintaining PMA (Positive Mental Attitude).

Suggested Reading: Seven habits of highly effective people, By Stephen R Covey

Activity 1: Assessment Test – Big Five Model (Sheet to be provided).

UNIT – 2

Self Esteem: Introduction, Definition and Types – Faces of low self-esteem – Steps to improve low self-esteem.

Self-Motivation: Definition – Ways of Building self-motivation.

Leadership: Key Elements of Leadership –Types of Leaders, Traits of an effective leader.

Teams: Difference between a team and a group – Stages of Team development (The Five-Stage Model), Team effectiveness.
Activity 1: Lost at Sea
Activity 2: Team building exercise.

UNIT – 3

Time Management: Benefits - Effective Time Management techniques.

Stress Management: Introduction - Understanding Stress – Stressors – Strategies to deal with Stress.

Activity: One minute activities

UNIT – 4

Communication: Introduction, Meaning, Types, Purpose and Definition – Communication Process (The Linear Concept, Shannon-Weaver Model) - 7 Cs of Communication – Barriers to Effective Communication

Oral Communication: Principles of successful oral communication,

Written Communication: Purpose, Principles of effective writing, 3X3 writing process

Non-Verbal Communication and Meta Communication

Activity 1: Distorted Message - Chinese Whisper, Cliff Hanger
Activity 2: Silent role plays

UNIT – 5

Application of Oral And Written Communication

Negotiation Skills, Assertiveness, Presentation Skills, Impact of Technological Advancement on Business Communication

Workplace communication:
Business Letters: Types, Layouts, Structure.

Reports: Purpose, Types, Structure.

Employment Communication: Resume and Cover Letter, Group Discussions and Employment Interviews

Activity 1: Extempore
Activity 2: Students are expected to write a one page resume – Block format letter.
Activity 3: Short Report Writing for an event.

Course outcomes:

1. Students develop better people skills.
2. Improve their behavioural dimensions that have far reaching significance in the direction of organizational effectiveness.
3. Improve the functional effectiveness through better communication skills.
4. Improved managerial capabilities through team building and group dynamics.

Text Books:

1. Business Communication – P. D. Chaturvedi & Mukesh Chaturvedi, Pearson Education.
2. Personality Development – Harold R. Wallace – Ft. Collins Co Ph. D. Ann Masters, Harold R. Wallace. Ann Masters, Cengage Learning.

Reference Books:

1. The Skills of Communicating – Bill Scott – Jaico Books.
2. Writing, Speaking, Listening – Helen Wilkie – Jaico Books.

* * *

Course Code	14CY1ICCHY / 14CY2ICCHY	Course Name	Engineering Chemistry
Credits	05	L-T-P-S	4-0-1-0

Course Objectives: The students will learn the following:

- The importance of purity of water for domestic and industrial purposes and also learn the techniques of waste water treatment
- The process involved in the interconversion of electrical energy and chemical energy
- The three main issues while dealing with energy problems :
  i) The need to restrict increase in energy consumption
  ii) The need to evolve alternative energy sources as a substitute to conventional energy sources
  iii) The evolution of how far these new energy sources can serve as replacement for conventional energy sources
- The idea of deterioration of metal/alloy due to electrochemical interaction of metal / alloy with its environment, ill effects of corrosion, types and corrosion control by various methods
- Information about better things for better living-through polymers

UNIT-1

Water Treatment

Introduction, hardness of water, units of hardness, determination of hardness by EDTA method, disadvantages of hard water – boiler scales, corrosion and caustic embrittlement, qualities of drinking water, treatment of water for municipal supply, desalination of water – reverse osmosis and electrodialysis, waste water – COD and BOD, treatment of waste water – primary, secondary and tertiary treatment methods, principle, experimental determination of COD of waste water, estimation of dissolved alkali and alkaline earth metals in water by flame photometry, applications of nanotechnology in water treatment, problems

[09 hours]

UNIT – 2

Electrochemical Energy Systems

a) Electrode potential and cells – Introduction, classification of cells-primary, secondary and concentration cells, reference electrodes–calomel electrode and Ag/AgCl electrode, ion-selective electrode- glass electrode, determination of pH using glass electrode, applications of these electrodes in determining strength of acids, bases and red-ox reactions, numerical problems

b) Batteries - Basic concepts, battery characteristics, classification of batteries– primary, secondary and reserve batteries, modern batteries - construction, working and applications of zinc–air, nickel-metal hydride and Li-MnO_2 batteries

c) Fuel cells - Introduction, types of fuel cells - alkaline, phosphoric acid, molten carbonate, solid polymer electrolyte and solid oxide fuel cells, construction and working of methanol-oxygen fuel cell

[10 hours]

UNIT – 3

Chemical Fuels and Photovoltaic Cells

a)Chemical fuels - Definition, classification, calorific value-definition, gross and net calorific values, determination of calorific value of a solid / liquid fuel using Bomb calorimeter and problems on calorific value, petroleum cracking - fluidized bed catalytic cracking, reformation of petrol, octane number, cetane number, knocking – mechanism, prevention of knocking, anti-knocking agents, unleaded petrol, synthetic petrol – Fischer-Tropsch's process, power alcohol , biodiesel and hydrogen as a fuel

b)Photovoltaic cells – Production of solar grade silicon, physical and chemical properties of silicon relevant to photovoltaics, doping of silicon, construction and working of a PV- cell and uses

[09 hours]

UNIT – 4

Corrosion Science and Metal Finishing

a)Corrosion – Definition of chemical corrosion, electrochemical theory of corrosion, types of corrosion - differential metal, differential aeration corrosion (pitting and water line corrosion), stress corrosion, factors affecting the rate of corrosion, corrosion control: inorganic coatings – anodizing and phosphating, metal coatings – galvanization and tinning, corrosion inhibitors, cathodic protection.

b)Metal finishing - Technological importance of metal finishing, significance of polarization, decomposition potential and over-voltage in electroplating processes.

Electroplating – Process, effect of plating variables on the nature of electrodeposit, surface preparation, electroplating of Cr and Au, estimation of copper in the effluent of electroplating industries by colorimetric method. Electroless plating - Distinction between electroplating and electroless plating, advantages of electroless plating, electroless plating of copper on PCB

[10 hours]

UNIT- 5

Polymer Chemistry

Polymers - Introduction, mechanism of coordination polymerization (Zeigler - Natta polymerization), methods of polymerization – bulk, solution, suspension and emulsion polymerization, glass transition temperature, structure and property relationship of polymers, number average molecular weight, weight average molecular weight and their determination

a) Plastics - Definition of resins and plastics, compounding of resins to plastics, synthesis, properties and applications of PMMA and UF

b) Elastomers - Synthesis and application of butyl rubber and nitrile rubber

c) Adhesives - Preparation and applications of epoxy resins

d) Polymer composites - Wood polymer composites(WPC), Nano composites-composition, effect of size on properties and uses

e) Conducting polymers – Definition, structure, properties, mechanism and uses of conducting polyaniline

[10 hours]

Text Books:

1. A Text book of Engineering Chemistry–by Jain and Jain, Dhanapatrai Publications, New Delhi, 2011
2. Engineering Chemistry by Gadag and Nityananda Shetty, I.K International publishing House Pvt. Ltd, 2010

Reference Books:

1. Puri B R, Sharma L R and Madan S Pathania, Principles of Physical Chemistry, Vishal publishing Co., Edition 2004
2. Kuriocose J C and Rajaram J, Engineering Chemistry, Volume I/II, Tata McGraw-Hill Publishing Co. Ltd. New Delhi, 2000

e – books:

1. Introduction to Chemistry - Tracy Poulsen; 250 pages; ISBN-13: 9781478298601; ISBN-10: 147829860X
2. Elementary Applied Chemistry * - Lewis Benajah Allyn; 152 pages; Publisher: Ginn and Company 1912; ISBN/ASIN: 1112247610

Moocs list:

1. http://www.mooc-list.com/course/chemistry-minor-saylororg
2. https://www.canvas.net/courses/exploring-chemistry

List of Experiments

1 Determination of percentage of copper in brass using standard sodium thiosulphate solution
2 Determination of total hardness of a sample of water using disodium salt of EDTA
3 Determination of chemical oxygen demand (COD) of the given industrial waste water sample
4 Estimation of sodium in water by flame photometric method
5 Conductometric estimation of HCl + CH_3COOH using standard NaOH solution
6 Potentiometric estimation of FAS using standard $K_2Cr_2O_7$ solution
7 Determination of pKa of a weak acid using pH meter
8 Determination of calorific value of a solid fuel using Bomb calorimeter
9 Determination of percentage of iron in the given rust solution (using potassium dichromate) by external indicator method
10 Estimation of copper from the effluent of electroplating industry by colorimetric method
11 Determination of molecular weight of a polymer using Ostwald's viscometer

Reference Books:

1. Engineering Chemistry Lab Manual, written by faculty, Dept.of Chemistry, BMSCE, Bangalore.
2. Vogel's Text Book of Quantitative Chemical Analysis, revised by J Bassett, R.C. Denny, G.H. Jeffery, 4^{th} Ed,.

Course Outcomes: After the completion of the course, students will have:

1. Ability to test, measure and arrive at valid conclusions by applying various chemical processes on water
2. Ability to define, describe and solve different electrochemical problems
3. Ability to understand different types of chemical fuels and photovoltaics
4. Ability to interpret types of corrosion and its control by various methods including metal finishing techniques
5. Ability to differentiate different types of polymers and study their applications
6. Ability to conduct experiments using modern tools to obtain the hardness, sodium content of water, COD of waste water, estimate components in the acid mixture, determine ferrous ammonium sulphate content, strength of weak acids, calorific value of a solid/liquid fuel, percentage of iron in the rust, copper content in the effluent sample and obtain the molecular weight of polymers

***

Course Code	14EE1ICBEE/ 14EE2ICBEE	Course Name	Basic Electrical Engineering
Credits	04	L-T-P-S	4-0-0-0

Course Objectives:

- To introduce fundamental concepts and analysis techniques in electrical engineering to students across all disciplines.
- To inform the students about domestic wiring, the functioning of various electrical apparatus and the safety measures in home and industry.

UNIT - 1

DC Circuits:

a. Review of fundamental concepts: Kirchoff's laws, Linearity and superposition, Illustration with examples.

[5 Hours]

b. Magnetic circuits: Magnetic Flux, magnetic flux density, MMF, Reluctance, Permeability, magnetizing force, leakage and fringing., Magnetic Circuits: Analogy between magnetic and electric circuits, series magnetic circuits, series magnetic circuits with air gap, composite series magnetic circuits.

[5 Hours]

UNIT - 2

DC Motor:

Introduction, working principle, Fleming's left hand rule,Back EMF,torque equation, types of DC Motors, Characteristics, applications.

[6 Hours]

Induction Motors:

Concept of rotating magnetic field, principle of operation, constructional features,types,slip and its significance,applications.

[4 Hours]

UNIT - 3

Single Phase AC Circuits:

Sinusoidal voltage generation,RMS value, Average value, Form factor, Peak Factor of sinusoidal quantities, phasor representation of sinusoidal quantities,Analysis of R,L, C,R-L,R-C, R-L-C circuits, Power triangle and power factor . [10 Hours]

UNIT - 4

Transformers

Faraday's Laws of electromagnetic induction, Statically induced EMF, Concept of self and mutual inductance, coupling co-efficient. Principle of operation and construction of single phase transformers, types, EMF equation, losses, efficiency. [9 Hours]

UNIT - 5

Three phase AC Circuits:

Necessity and advantages of three phase system, Relationship between line and phase quantities in Star and delta systems, Power measurements: Measurement of active , reactive power and power factor in three phase circuits by 2 wattmeter method, Effect of variation of Power factor on the wattmeter readings. Construction and principle of operation of wattmeters. [5 Hours]

Domestic Wiring:

Block diagram of residential wiring for lighting and heating loads, Two way, Three way control of lamps, discussion on fuse, Necessity of earthing and types of earthing, safety measures in home and industry. [4 Hours]

Course Outcomes:

1. Formulate and solve equations applying basic laws and determine various circuit parameters in AC and DC Circuits.
2. Explain the construction, basic principle of operation, applications and determine performance parameters of electrical apparatus.
3. To sketch the wiring diagram of domestic installations and describe the safety measures in home and industry.

Text Books:

a. D.C Kulasreshta, "Basic Electrical Engineering", TMH Edition, New Delhi.
b. N.Narasimhaswamy,"Basic Electrical Engineering", Interline Publishers.

Reference Books:

a. E. Hughes," Electrical Technology", Pearson publishers.
b. S.S. Parker Smith & NN Parker Smith, " Problems in Electrical Engineering".

On-line video lectures:

- http://www.onlinevideolecture.com/electrical-engineering/iisc-bangalore/basic-electrical-technology/?course_id=525
- http://www.onlinevideolecture.com/electrical-engineering/uc-berkeley/electrical-engineering,fall-2011/?course_id=494

e-Books:

- http://www.faadooengineers.com/threads/3192-Basics-of-electrical-engineering-FREE-Ebook-covering-full-semester-syllabus
- http://artikel-software.com/blog/ebooks/electrical-engineering/

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Code	14ME1ICEED/ 14ME2ICEED	Course Name	Elements of Engineering Drawing
Credits	04	L-T-P-S	2-0-2-0

(2 Hrs. Theory; 4 Hrs. Manual Drafting)

Course Objectives: Engineering drawing has become an indispensable tool for all Engineers and for many others professionals. It is the language of Engineers because it communicates all the needed information about "what is wanted" to the people who will expend resources turning the idea into a reality i.e., it communicates all needed information from the engineer who designed a part to the workers who will make it. The aim of the syllabus is to equip students with the fundamentals of this unique language and to further the ability to communicate information by graphical means.

Introduction
Introduction, Drawing Instruments and their uses, BIS Conventions, Scaling, Lettering, Polygon constructions, dimensioning.

[2L+2P Hours]

UNIT - 1

Orthographic Projections

Introduction, Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants. Projections of straight lines (located in first quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes, simple application problems. (No Traces) [7L+12P Hours]

UNIT – 2

Projections of Plane Surfaces (First Angle Projection Only)

Introduction, Projections of planes, surfaces-triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only (No problems on punched plates and composite plates). [4L+8P Hours]

UNIT – 3

Projections of solids (First Angle Projection Only)

Introduction, Projections of right regular solids; tetrahedron, cube, prisms, pyramids, cylinders and cones in different positions (no problems on octahedrons and combination of solids). [7L+12P Hours]

UNIT – 4

Sections and Development of Lateral Surfaces of Solids

Introduction, Section planes, (No problems on sections of solids) Development of lateral surfaces of right regular prisms, pyramids, cylinders and cones resting with base on HP, their frustums and truncations. [3L+8P Hours]

UNIT – 5

Isometric Projection (Using Isometric Scale only)

Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron (cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres and combination of solids (maximum of three solids) [3L+8P Hours]

Demonstration

Computer screen, layout of the software, standard tool bar/menus and description of most commonly used tool bars, navigational tools. Co-ordinate system and reference planes. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz., tangency, parallelism, inclination and perpendicularity. Dimensioning, line conventions, material conventions and lettering. [02P Hours]

Course Outcomes:

At the end of the course, the student will be able to:

1. Understand the concepts of projections.
2. Prepare orthographic & Isometric projections.
3. Prepare developments of lateral surfaces of solids and appreciate their applications in the industry.
4. Apply the fundamental knowledge of drawing for modeling in CA

Text books:

1. Engineering Drawings Vols-1 & 2, by Prof.K.R.Gopalakrishna, Subhas Stores, Bangalore, 2005.
2. Engineering Drawing by N.D.Bhat & V.M.Panchal, 45th Edition, Charotar Pub.House, Gujrat 2005.

Reference Book:

1. A Textbook of Engineering Graphics by K. Venugopal & Prabhu Raj, New Age International, 2009.
2. Engineering Graphics, by B Bhattacharyya, I. K. International Pvt Ltd, 2008.

E-Books:

1. Engineering Drawing by Basant Agrawal, Tata McGraw-Hill Education, 2008
2. Textbook of Engineering Drawing, by K.Venkat Reddy, B.S.Publications, Second Edition, 2009.

Digital Online courses:

1. http://www.iitg.ac.in/cet/nptel.html
2. http://pergatory.mit.edu/2.007/Resources/index.html
3. http://www.learnerstv.com/Free-engineering-video-lecture-courses.html

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Code	14CV1ICENM/ 14CV2ICENM	Course Name	Engineering Mechanics
Credits	4	L-T-P-S	4-0-0-0

Course Objectives:
Day to day activities of every action follows the fundamental laws of physics. There is a need to know how the laws of physics could be applied to explain these activities. Effects of forces/force systems on an object/engineering structure are to be analysed under static and dynamic conditions. This course is devised keeping the above objectives in mind.

INTRODUCTION TO ENGINEERING MECHANICS: Concept of force, force Characteristics, internal and external forces, force system and types of force systems, Principle of Transmissibility of force, principle of Superposition and physical independence, Idealization of bodies-particle, rigid body, continuum, moment of a force about a point and about an axis, couple, characteristics of couple, Vector notation for forces, addition and multiplication of vectors, vector cross product. [**4 Hours]**

Resolution and composition of forces, Resultant and equilibrant of a force system, Parallelogram law, Triangle law, and Polygon law of forces, Varignon's theorem, problems on resultant of coplanar concurrent and non-concurrent force system by method of resolution & composition and Vector Approach. [**6 Hours]**

EQUILIBRIUM OF FORCE SYSTEM: Free body diagram, conditions of equilibrium of concurrent and non-concurrent co-planar force system, Lami's Theorem, problems on particle and rigid body equilibrium; statically determinate beams, types of supports; support reactions with different types of loads in determinate beams and frames. Analysis of plane determinate trusses by method of joints and method of sections. [**7 Hours]**

FRICTION: Introduction , coefficient of friction, angle of friction, angle of repose; laws of Dry (Coulomb) friction, Problems on single and multi-body system on horizontal and inclined planes, Wedge friction, problems on ladder friction, Belt friction, problems on belt and differential band brakes [**7 Hours]**

PROPERTIES OF PLANE AREAS: Centroids and center of gravity, centroid of lines and regular geometrical area including parabola, centroid by integration, problems on centroids of composite areas and built up sections. Second moment or moment of inertia of an area, moment of inertia of regular shapes by integration method, polar moment of inertia, radius of gyration, Parallel axes theorem and Perpendicular axis theorem, product of Inertia, problems on moment of inertia of composite areas and built up sections. [**13 Hours]**

Kinematics: Introduction, types of motion, position vector, velocity and acceleration, Equations of linear motion (no numerical problems), projectile motion; numerical problems on projectiles. [**3 Hours]**

Kinetics of particles: Introduction, Newton's Second law of motion, D'Alembert's principle and its application to problems on system of particles, problems on banking of roads. Work, Power, energy and efficiency, Kinetic energy of particle, Work-Energy Principle and its application to problems on particles and system of particles.
[8 **Hours]**

Course Outcomes:

1. Apply the concepts and principles of Mechanics for the analysis of resultant of a given coplanar concurrent/Non-Concurrent force system.
2. Formulate and apply the conditions of static equilibrium to problems involving systems of particles and rigid bodies lying in plane.
3. Locate the centroid and compute the second moment of area of a variety of laminas.
4. Apply the concept and theory of sliding (Dry) friction to problems involving incipient equilibrium of a variety of connected bodies.
5. Formulate relationship between basic elastic constants of deformable bodies.
6. Analyse the problems involving kinetics and kinematics of particles.

Text Books:

- Mechanics for Engineers, Statics and Dynamics by Ferdinand Beer and E Russell Johnston, McGraw Hill Company, New York
- Engineering Mechanics by Nelson , McGraw Hill Publishers

Reference Books:

- Engineering Mechanics by Timoshenko and Young; McGraw Hill Book Company , New Delhi
- Engineering Mechanics , Statics and Dynamics by Meriam JL Kraige, Wiley Publishers, New Delhi
- Applied Mechanics by I B Prasad

e-Books:

- VTU e-learning center (Program number 13)
- NPTEL Lecture Series on Engineering Mechanics, IIT Kanpur

Online Digital Courses:

- MOOCs-http://www.mooc-list.com/course/introduction-engineering-mechanics-coursera

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Code	14ES1ILCL2/ 14ES2ILCL2	Course Name	Co Lab - II
Credits	01	L-T-P-S	0-0-1-0

PART – A (Electrical Experiments)

Course Objectives: To equip the students from all disciplines with practical skills in Electrical Engineering, such as:

- Electrical wiring of simple circuits and demonstration of protection mechanisms
- Load estimation, Power and energy measurement
- Determination of mechanical characteristics of rotating machines

Electrical Wiring:

a. Simple lighting and heating circuits, two way control of a lamp
b. Demonstration of working of protection mechanisms such as MCBs & ELCBs in ac systems.

AC Circuit Measurements:

c. Measurement of circuit quantities such as power, power factor, energy in single phase ac circuits having different luminaire such as incandescent, fluorescent, CFL and LED.
d. Estimating the total Load(kW) capacity of a domestic installation

Three-phase Systems:

e. Exposure to three phase systems(star/delta connected) with R load. Measurement of Phase and Line voltages and currents in three phase systems.

Machines:

f Determination of mechanical characteristics of DC & AC Motors

Course Outcomes:

1. Identify the protection mechanisms needed for an electrical installation.
2. Distinguish the significant features of single phase and three phase systems.
3. Estimate the load capacity of a domestic installation.
4. Interpret the behavior of DC and AC motors.

PART B (Electronics Experiments)

Course Objectives:

1. Imparting the Knowledge of discrete electronic components and analog/digital measuring devices.
2. Make a student to implement and analyse the basic analog and digital circuits.

List of Experiments:

1. Introductory session for electronics lab.
2. Study of bridge rectifier with capacitor filter.
3. Truth table Verification of logic gates.
4. Simplification of expressions using basic and universal gates.
5. Verification of half/full adder circuits.
6. Basic OPAMP experiments and data sheets.
7. Study of LDR and temperature sensors.

Course Outcomes:

1. Student will be able to identify the fundamental electronic discrete components.

2. Student will get knowledge of using CRO, with hands on sessions measuring few electrical/electronic circuit variables.
3. Student will learn to build basic electronics circuits using analog and digital components.

Text Books:

1 Electronic Devices and Circuits By David A Bell,PHI,5th edition ,2007
2 Basic Electronics Devices, Circuits and its Fundamentals By Santiram Kal, PHI.2009

Reference Books:

1 Electronic Devices and circuit Theory by Robert L Boylestad and L. Nashelsky,Pearson Education,9th edition, 2005
2 Basic Electronics By Soumitra Kumar Mandal, Mc Graw Hill, 2013

E-Books/Resources:

1. http://www.mrcet.ac.in/newwebsite/pdfs/Labmanuals-13/ECE/LabManuals/EDC%20LAB%20(180)%20II-I.pdf, 2011
2. http://www.scribd.com/doc/59500377/Basic-Electronics-Lab-Manual.pdf,2004

Online digital courses:

1. Free online courses in electronics at www.coursera.org/course offered by University of Rochester/ university of London

***

Course Code	14HS1ICEVS/ 14HS2ICEVS	Course Name	Environmental Studies
Credits	01	L-T-P-S	1-0-0-0

Course Objectives: The industrial revolution and development have led to the stress on environment in the form of pollution. Checking of the pollution in all fronts at local and global level encompassing the issues of carbon credit, ozone level depletion, global warming, desertification and polar ice cap melting. The main objectives of the course is to expose to students to the problems and mitigation measures concerned to the environmental components like resources, air, water and land.

UNIT - 1

Introductions to Environment

Definition, Ecosystem, Biodiversity, Ecology, Human activities and its impact on Environment- Agriculture, Housing, and Mining Activities.

Environmental Impact Assessment (EIA) [05 Hours]

UNIT - 2

Water Resources

Use and overutilization of groundwater, Surface water and its effects, Mineral Resource: Usage and exploration,, Forest Resources, Land resources Use and overutilization.

Purpose of construction of Dam with its associated benefits and problems. [04 Hours]

UNIT - 3

Solid Waste Management

Causes, effects and control measures of Urban and Industrial Waste, Role of individual in prevention of pollution.

Current Environmental issues of importance, Climate change and Global warming: Acid rain, ozone layer depletion and effects. [04 Hours]

Course Outcomes:

1. Describe the fundamental scientific issues associated with environmental science. (PO1, PO2)
2. Describe primary environmental problems and potential solutions in solving environmental issues. (PO4, PO6, PO7)
3. Identify the complex relationship between scientific approaches to environmental issues and social, economic and ethical perspective on the environment.(PO8, PO10, PO12)

Text Books:

1. Ecology by Subramanyam (Tata Mc Graw Hill Publications)
2. Concept of Ecology by Koromoundy (Mc Graw Hill Publications)
3. Environmental and ecology by Masters (Prentice Hall Publishers)

Reference Books:

1. Environmental Studies by Geeta Balakrishna (Revised Edition)
2. Environmental Studies by Benny Joseph, Tata Mc Graw Hill, 2005.
3. Environmental Studies by Dr. D. L. Manjunath
4. Environmental Studies by P.Venugopala
5. Ecology Encyclopedia Mc Millan publication

e- books:

- NPTEL (Open source/ power point and visuals)
- Ecological studies/ IITR/Open source
- Ministry of Environment and forest & wild life.
- MOEF (Open Source)
- GIS (Geological Survey of India (Open source/ Tutorials)

Online courses: (MOOCs)

- MOOCs-https://www.coursera.org/course/sustain

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Code	14HS1ICCIP/ 14HS2ICCIP	Course Name	Constitution of India and Professional Ethics
Credits	02	L-T-P-S	2-0-0-0

Course Objectives:

1. To educate students about the supreme law of the land.
2. To create an awareness about civil liberties.
3. Raise awareness and consciousness of the issues related to the profession and discuss the issue of liability of risks and safety at work place.

UNIT-1

[05 hours]

Framing of the Indian constitution: Role of the Constituent Assembly - Preamble and Salient features of the Constitution of India, Fundamental Rights, its limitations and Case Studies. Fundamental Duties and their significance.

UNIT -2

[03 hours]

Directive Principles of State Policy: Importance and relevance.
Special Constitutional Provisions for Schedule Castes, Schedule Tribes & Other Backward Classes. Women & Children.

UNIT -3

[06 hours]

The Union Executive – The President and The Vice President, The Prime Minister and Council of Ministers. The Union Parliament –Lok Sabha & Rajya Sabha. The Supreme court of India.
State Executive – Governors, Chief Ministers and Council of Ministers. State Legislature – Legislative Assembly and Legislative Council. State High Courts.

UNIT-4

[04 hours]

Election Commission of India – Powers & Functions – Electoral process in India.
Methods of Constitutional Amendment, Limitation on Constitutional Amendment and important Constitutional Amendments – 42nd, 44th, 74th, 76th, 77th, 86th and 91st.
Emergency Provisions. Case Studies.

UNIT-5

[06 hours]

Scope and Aims of Engineering Ethics, Responsibilities of engineers and impediments to responsibilities. Honesty, Integrity and Reliability; Risks – Safety and Liability in Engineering. Case Studies.

List of Important Case Studies:

1. Kesavanand Bharati vs. State of Kerala	9. Indira Sawhney vs. Union of India
2. Maneka Gandhi vs. Union of India	10. BijoeEmmanuel vs. StateofKerala
3. Air India vs. Nargesh Meerza	11. Shah Bano vs. Mohd. Ahmed Khan
4. Vishaka vs. State of Rajasthan	12. Indira Gandhi vs. Raj Narain
5. Mohini Jain vs. State of Karnataka	13. Bhopal Plant Disaster
6. Devdasan vs. Union of India	14. Three Mile Island Accidentcase study
7. Balaji vs. State of Mysore	15. The killer robot case study
8. Unni Krishnan vs. State of AP	16. Apple Inc. v. Samsung Electronics Co., Ltd.

Course Outcomes:

1. Recognise the significance of Indian Constitution as the Fundamental Law of the land.
2. Identify the importance of Directive Principles of the State Policy in administering or formulating the policies for the State government.
3. Describe the Indian political system, the powers and the functions of the Union Executives and State Executives.
4. Identify the impact of caste system, gender bias prevalent in India and the way in which certain classes have been exploited since ages and the role played by an individual in forming a responsible government.
5. Identify the role of an individual in forming a responsible government.
6. Practice the ethical responsibilities and duties to protect the welfare and safety of the public.

Text Books:

1. "An Introduction to Constitution of India and Professional Ethics" by Merunandan K.B. and B.R. Venkatesh, Meragu Publications, 3rd edition2011.

2. "Constitution of India and Professional Ethics" by Phaneesh K. R., Sudha Publications, 7th edition, 2014.

Reference Books:

1. "An Introduction to Constitution of India" by Pylee M. V., Vikas Publishing, 2002.

2. "Ethics in Engineering" by Martin, W. Mike.,Schinzinger, Roland., McGraw-Hill, New York 10020, fourth edition, 2005.

3. "Constitution of India and Professional Ethics" by Ghai K .K. &. Roohi Makol E R , Kalyani Publishers.1stedition, 2009.

Online digital courses:

1. http://elearning.vtu.ac.in/CIP71.html
2. http://books.google.co.in/books/about/Constitution_of_India_and_Professional_E.html? id=VcvuVt-d88QC
3. http://www.universityofcalicut.info/syl/ISemIndianConstitutionPoliticsQB.pdf

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Code	14HS1IMENG/ 14HS2IMENG	Course Name	Functional English
Credits	00	L-T-P-S	0-0-0-0

Course Objectives:

- To enable the students to understand, speak read and write effectively
- To enable them to use language effectively for specific purposes

UNIT - 1 [04 hours]

Communication

Introduction-Basics-Barriers-Non-Verbal communication – Body language and its importance in communication – Listening VS Hearing – Types of listening – its importance in communication –traits of a good listener – Telephone Etiquette – Interviews.

UNIT - 2 [03 hours]

Grammar

Parts of Speech, Usage of Tenses, Punctuation, Types of Sentences, Voice, Reported Speech.

UNIT - 3 [04 hours]

Vocabulary

Identifying errors in sentences

Using Idioms and phrases –words commonly misused and confused – right choice of words in a given context.

UNIT - 4 [06 hours]

Writing Skills (Specific Focus)

Paragraph Writing, Expansion of ideas – Précis Writing – Letter Writing –Job Applications/Official Letters – Writing a resume/Curriculum Vitae

UNIT - 5 [07 hours]

Technical Writing

Presentations- Reports –Interpersonal Communication – Information skills –Group Discussion-Problem Solving

Course outcomes:

1. The students will demonstrate an understanding towards the professional skills required in technical field.
2. They will be able to communicate effectively in both verbal and non-verbal forms in multidisciplinary activities
3. They will have the confidence to apply their communicative skills globally.

Reference Books:

1. Making Sense of English, M.Yadugiri, Viva Publications
2. Course in English Language Teaching, Penny Ur, Cambridge University Press.

Text Books:

1. University Grammar by Quirk and Green Baum, ELBS Publications.
2. Advanced English Grammar by Thomson and Martinet, Cambridge University Press.

Work Book: Functional English – ‘Practice and Perfect’ by Rajalakshmi S., Dept. of Mathematics & Humanities.

Course delivery:

- Through Lectures, Class –room interaction , Group Discussion, Presentations
- English Lab Classes –exercises and self-study

B.M.S. COLLEGE OF ENGINEERING, BANGALORE-19
(Autonomous College under VTU)

Course Code	14MA2ICMAT	Course Name	Engineering Mathematics - II
Credits	04	L – T – P- S	3 - 1 – 0 - 0

Course Objectives: To provide students with a solid foundation in mathematical fundamentals such as multiple integrals, Beta Gamma functions, Vectors, Orthogonal curvilinear coordinates, and Laplace Transforms required for different branches of engineering.

UNIT - 1

Laplace Transforms [8 hours]

Definitions, properties, transforms of elementary functions, transforms of derivatives and integrals.

Applications: Laplace Transforms of - Periodic function, Unit step function and impulse function.

(6L+2T)

Suggested Reading: Plotting periodic functions, engineering oriented applications on unit step function and unit impulse functions.

UNIT – 2

Inverse Laplace Transforms [11 hours]

Inverse Laplace Transforms-properties.

(6L+2T)

Applications: Solving ordinary differential equations using Laplace transforms (initial and boundary value problems) arising in the study of vibration of spring, deflection of beams and LRC Circuits.

(2L+1T)

Suggested Reading: solutions of a system of linear differential equations using Laplace transform (initial value problems).

UNIT-3

Multiple Integrals [10 hours]

Double integrals, evaluation of double integrals by change of order of integration, evaluation of double integrals by changing to polar co-ordinates, Triple integrals.

Application: Computation of area using double integrals, computation of volume using triple integrals.

(6L+2T)

BETA AND GAMMA FUNCTIONS

Properties, relation between Beta and Gamma functions - related problems.

(2L)

Suggested Reading: applications of double integrals to find moment of inertia, mass and centroid.

UNIT – 4

Vector Calculus and Vector Integration [11 hours]

Curves in space, scalar and vector point functions, vector differentiation, Gradient, directional derivative, Divergence, Curl, Laplacian, solenoidal, irrotational vectors.

Vector identities: $\text{divcurl}\vec{F}$, $\text{curlgrad}\,\vec{F}$, $\text{div}\left(¤\,\vec{F}\right)$, $\text{curl}\left(¤\,\vec{F}\right)$, $\text{curlcurl}\,\vec{F}$, $\text{div}\left(\vec{A}\times\vec{B}\right)$ and problems. $(\mathbf{5L}+\mathbf{2T})$

Applications: Vector integration– Statement and problems on Green's theorem, Stokes' theorem and Gauss divergence theorem (without proof).

(3L+1T)

Suggested Reading: derivatives (tangent curves, velocity and acceleration)

UNIT - 5

Orthogonal Curvilinear Coordinates (OCC) [8 hours]

Definitions - Orthogonal curvilinear coordinates, scale factors, base vectors, orthogonality of cylindrical and spherical coordinate systems, expressing a given vector in cylindrical and spherical coordinates. Expressions for gradient, elementary arc length, divergence, elementary volume, curl and Laplacian in orthogonal curvilinear coordinates.

(6L+2T)

Suggested Reading: Evaluation of volume integrals by change of coordinates. Maxwell's field equations.

Course Outcomes:

1. Use Laplace transforms to solve differential equations
2. Apply double integrals to compute areas and learn to use triple integrals in computing volumes.
3. Apply vector calculus in electromagnetic fields, gravitational fields and fluid flow problems.
4. Ability to understand the use of multiple integrals in vector fields.
5. Use Gamma and Beta functions to evaluate integrals.

Text Books:

- Higher Engineering Mathematics, B.S. Grewal, 42nd edition, 2013, Khanna Publishers.
- Advanced Engineering Mathematics, Dennis Zill, Warren S. Wright, Michael R. Cullen, 5th edition, 2014,Jones & Bartlett Learning.

Reference Books:

- Advanced Engineering Mathematics, Erwin Kreyszig, 10th edition, 2010, Wiley-India.
- Advanced Modern Engineering Mathematics, Glyn James 4th edition, 2012, Pearson Education.
- Advanced Engineering Mathematics, P. V. O'Neil, 7th Indian reprint, 2011, Cengage learning India Pvt. Ltd.

e-books and online learning materials:

- Advanced Engineering Mathematics,Alan Jeffrey,Academic Press, 19-Jun-2001. http://books.google.co.in/books/about/Advanced_Engineering_Mathematics.html?id=9nFDvk9yr3kC&redir_esc=y
- Engineering_Mathematics, K. A. Stroud, Dexter J. Booth, Industrial Press, 2001 http://books.google.co.in/books/about/Engineering_Mathematics.html?id=FZncL-xB8dEC&redir_esc=y
- http://ocw.mit.edu/courses/mathematics/

Online Courses and Video Lectures:

- http://nptel.ac.in/courses.php?disciplineId=111
- khanacamedy.org/Math
- https://www.class-central.com/subject/math (MOOCS)