B.M.S. COLLEGE OF ENGINEERING, BENGALURU
Autonomous College under VTU

VISION	MISSION
PROMOTING PROSPERITY OF MANKIND BY AUGMENTING HUMAN RESOURCE CAPITAL THROUGH QUALITY TECHNICAL EDUCATION & TRAINING	ACCOMPLISH EXCELLENCE IN THE FIELD OF TECHNICAL EDUCATION THROUGH EDUCATION, RESEARCH AND SERVICE NEEDS OF SOCIETY

FIRST YEAR SYLLABUS BOOK
With effect from the A.Y.2017-18

CONTENTS

B.M.S. COLLEGE OF ENGINEERING, BENGALURU
Autonomous College under VTU

Scheme & Syllabus for UG Programme – I & II Semesters

NOTATIONS

AY	Academic Year
AAT	Alternative Assessment Tools
BOE	Board of Examiners
BOS	Board of Studies
CBCS	Choice Based Credit System
CGPA	Cumulative Grade Point Averages
CIE	Continuous Internal Evaluation
DC	Departmental Core
GC	Group Core
HSS	Humanity and Social Science Courses
IC	Institutional Core
IE	Institutional Elective
IL	Institutional Lab
LTPS	Lecture-Tutorial- Practical-Self study
NFTE	Not Fit for Technical Education
PCC	Professional Core Courses
PEC	Professional Elective Courses
SEE	Semester End Examination
SGPA	Semester Grade Point Average
ST	Studio

B.M.S. COLLEGE OF ENGINEERING, BENGALURU

Autonomous College under VTU

Scheme & Syllabus for UG Programme – I Semester

Scheme of Instruction for First Semester B.E. 2017-18
(PHYSICS CYCLE)

S No	Course Code	Course Title	L	T	P	S	Total
1	15MA1ICMAT	Engineering Mathematics – 1	3	1	0	0	4
2	14PY1ICPHY	Engineering Physics	4	0	1	0	5
3	14EC1ICEEE	Elements of Electronics Engineering	4	0	0	0	4
4	14ME1ICEME	Elements of Mechanical Engineering	4	0	0	0	4
5	14CS1ICCCP	'C' Programming	3	0	1	0	4
6	14ME1ILCLI	Co-Lab – I	0	0	1	0	1
7	15BT1ICBIE	Biology for Engineers	0	0	1	0	1
8	15HS1ICPDC	Personality Development & Communication	2	0	0	0	2
9	15HS1IMKAN	Kannada Language*	Mandatory Course				0
		Total					25

Scheme of Instruction for First Semester B.E. 2017-18
(CHEMISTRY CYCLE)

S No	Course Code	Course Title	L	T	P	S	Total
1	15MA1ICMAT	Engineering Mathematics – 1	3	1	0	0	4
2	14CY1ICCHY	Engineering Chemistry	4	0	1	0	5
3	14EE1ICBEE	Basic Electrical Engineering	4	0	0	0	4
4	14ME1ICEED	Elements of Engineering Drawing	2	0	2	0	4
5	14CV1ICENM	Engineering Mechanics	4	0	0	0	4
6	14ES1ILCL2	Co Lab - II	0	0	1	0	1
7	14HS1ICEVS	Environmental Studies	1	0	0	0	1
8	15HS1ICCIP	Constitution of India & Professional Ethics	2	0	0	0	2
9	15HS1IMENG	Functional English*	Mandatory Course				0
		Total					25

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, BENGALURU
Autonomous College under VTU
Scheme & Syllabus for UG Programme – II Semester
Scheme of Instruction for Second Semester B.E. 2017-18
(CHEMISTRY CYCLE)

S No	Course Code										Course Title	Credits				
												L	T	P	S	Total
1	1	5	M	A	2	I	C	M	A	T	Engineering Mathematics – 2	3	1	0	0	4
2	1	4	C	Y	2	I	C	C	H	Y	Engineering Chemistry	4	0	1	0	5
3	1	4	E	E	1	I	C	B	E	E	Basic Electrical Engineering	4	0	0	0	4
4	1	4	M	E	2	I	C	E	E	D	Elements of Engineering Drawing	2	0	2	0	4
5	1	4	C	V	2	I	C	E	N	M	Engineering Mechanics	4	0	0	0	4
6	1	4	E	S	2	I	L	C	L	2	Co Lab - II	0	0	1	0	1
7	1	4	H	S	2	I	C	E	V	S	Environmental Studies	1	0	0	0	1
8	1	5	H	S	2	I	C	C	I	P	Constitution of India & Professional Ethics	2	0	0	0	2
9	1	5	H	S	2	I	M	E	N	G	Functional English*	Mandatory Course				0
											Total					25

Scheme of Instruction for Second Semester B.E. 2017-18
(PHYSICS CYCLE)

S No	Course Code										Course Title	Credits				
												L	T	P	S	Total
1	1	5	M	A	2	I	C	M	A	T	Engineering Mathematics – 2	3	1	0	0	4
2	1	4	P	Y	2	I	C	P	H	Y	Engineering Physics	4	0	1	0	5
3	1	4	E	C	2	I	C	E	E	E	Elements of Electronics Engineering	4	0	0	0	4
4	1	4	M	E	2	I	C	E	M	E	Elements of Mechanical Engineering	4	0	0	0	4
5	1	4	C	S	2	I	C	C	C	P	'C' Programming	3	0	1	0	4
6	1	4	M	E	2	I	L	C	L	I	Co-Lab – I	0	0	1	0	1
7	1	5	B	T	2	I	C	B	I	E	Biology for Engineers	0	0	1	0	1
8	1	5	H	S	2	I	C	P	D	C	Personality Development & Communication	2	0	0	0	2
9	1	5	H	S	2	I	M	K	A	N	Kannada Language*	Mandatory Course				0
											Total					25

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

5.1	**COURSE CODE**	15MA1ICMAT	**COURSE NAME**	**ENGINEERING MATHEMATICS -1**
	CREDITS	**04**	**L-T-P-S**	**3 – 1 – 0 - 0**
	CONTACT HOURS	**48 hours (36L+12T)**		

Prerequisites: Trigonometric formulas, methods of differentiation, methods of integration, solution to first order ordinary differential equations-variable separable method and solution to Homogeneous first order ordinary differential equations.

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

UNIT-1

DIFFERENTIAL CALCULUS OF ONE VARIABLE

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

[9 hours]

Polar curves: Polar coordinates, angle between radius vector and tangent, angle between the polar curves.

Applications: curvature and radius curvature in polar coordinates (without proof**)**. **(7L+2T)**

Suggested Reading: Hyperbolic functions, length of the perpendicular from pole to the tangent, pedal equation for polar curves.

UNIT-2

MULTIVARIATE DIFFERENTIAL CALCULUS
Partial differentiation: Partial derivatives, total differentiation, differentiation of composite and implicit functions, Jacobians and their properties (without proof). Taylor's and Maclaurin's series expansions for functions of two variables. **[9 hours]**

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

(7L+2T)

Suggested Reading: Indeterminate forms (L' Hospital's rule) and Lagrange's method of multipliers (constrained optimization).

UNIT-3

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS

Geometrical meaning of first order ordinary differential equations, solution and family of curves, motivating examples of first order ordinary differential equations, linear differential equations, Bernoulli's equation, exact equations, equations reducible to exact equations- case1: integrating factor of a homogeneous differential equation with $Mx + Ny \neq 0$, case2: integrating factor for equations of the type $f_1(xy)\, y\, dx + f_2(xy)\, x\, dy = 0$ **[9 hours]**

Applications: Orthogonal trajectories. Newton's law of cooling. **(7L +2T)**

Suggested Reading**:** Solution of differential equations of the type $Mdx + Ndy = 0$ where $(i)\dfrac{M_y - N_x}{N} = g(x)$ $(ii)\dfrac{N_x - M_y}{M} = h(y)$. Applications of ordinary differential equations to mixing problem.

UNIT-4

HIGHER ORDER ORDINARY DIFFERENTIAL EQUATIONS
Linear differential equations of second and higher order with constant coefficients, method of variation of parameters, solution of Cauchy's homogenous linear differential equation and Legendre's differential equation**.** **[10 hours]**

Applications: LRC Circuit's and Newton's second law of motion (spring mass system). **(7L+3T)**

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

UNIT-5

SERIES SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS AND INTEGRAL CALCULUS

Equations of second order: Power series method – (i) solution near an ordinary point (ii) solution near a regular singular point. Series solution of Bessel's differential equation leading to Bessel's function and series solution of Legendre's differential equation.

Integral Calculus: 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.   **[11 hours]**

Applications: Expressions for Derivatives of arc length (Cartesian and polar form-without proof). Area under a plane curve (polar curves), length of plane curves.   **(8L+3T)**
Suggested Reading: volume of revolution and surface area of revolution by a given curve.

MATHEMATICS LAB

- Tracing of standard curves: Cartesian form – Cissoid, Strophoid, Leminscate,
- Parametric form - Cycloid, Astroid.
- Polar form - Cardioid, Leminscate, *n*-leaved rose where *n* = 3, 4, 5.

Text Books

(1) Higher Engineering Mathematics, B.S. Grewal, 43rd 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, Vol.1 and Vol.2, 2014, Wiley-India.
(2) Calculus - Early Transcendentals, James Stewart, 7th edition, 2012, Cengage Learning
(3) Multivariable Calculus- James Stewart, 7th Edition, 2012, Cengage Learning.

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

On completion of the course, the student will have the ability to:

Course Code	CO	COURSE OUTCOME (CO)
15MA1ICMAT	CO 1	Understand the concepts of differential and integral Calculus.
	CO 2	Apply the concepts of calculus to Engineering problems.
	CO 3	Demonstrate an understanding towards the nature of curves by tracing the same using certain properties.

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5.2	COURSE CODE	14PY1ICPHY/ 14PY2ICPHY	COURSE NAME	ENGINEERING PHYSICS

| **CREDITS** | **05** | **L-T-P-S** | **4-0-1-0** |

SYLLABUS:

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**]

LIST OF EXPERIMENTS

(Ten to be performed)

SNo.	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

REFERENCES

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:

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

MOOCs:

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

Reference Book: (Laboratory)
1. Practical Physics - Harnam Singh and Dr. P. S. Hemne - S Chand and Co Ltd.

COURSE OUTCOMES:

CO 1	Understand and explain the principles of quantum mechanics, transport phenomena, dielectric and magnetic properties of solids, laser and optical fiber and basics of crystallography.
CO 2	Apply the principles of quantum mechanics, transport phenomena, dielectric and magnetic properties of solids, laser and optical fiber and basics of crystallography as a method to obtain a desired parameter.
CO 3	Conduct, analyse and interpret the data and results from engineering physics experiments.

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5.3	COURSE CODE	14EC1ICEEE/ 14EC2ICEEE	COURSE NAME	ELEMENTS OF ELECTRONICS ENGINEERING
	CREDITS	04	L-T-P-S	4-0-0-0

SYLLABUS:

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]

REFERENCES

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.Neshelsky, 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

MOOCs:
1. www.coursera.org/course

COURSE OUTCOMES:

CO 1	**Understand** the concepts of electronic circuits and study the applications of electronics in interdisciplinary engineering domains.
CO 2	**Apply** the basic principles of electronics to solve Analog and Digital circuits.
CO 3	**Analyze** the characteristics/performance parameters of electronic circuits.
CO 4	**Design** basic electronic circuits for given specifications.

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5.4	**COURSE**	**14ME1ICEME /**	**COURSE NAME**	**ELEMENTS OF MECHANICAL**

CODE	14ME2ICEME		ENGINEERING
CREDITS	**04**	**L-T-P-S**	**4-0-0-0**

SYLLABUS:

UNIT – 1

Sources 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 Hrs**]

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 Hrs**]

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 Hrs**]

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 Hrs**]

UNIT – 5

Power Transmission & Mechatronics

Power transmission: Introduction to power transmission, open and crossed 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 Hrs**]

REFERENCES:

Text Books

1. Elements of Mechanical Engineering, K. R. Gopalakrishna, Subhas Publications, Bangalore, 2008.
2. Elements of Mechanical Engineering, Vol.-1 & 2, Hajra Choudhury, 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, R. K. Rajput, Laxmi Publications, 3e, 2005
2. Elements of Mechanical Engineering, V. K. Manglik, PHI Learning, 2013

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

COURSE OUTCOMES:

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

CO 1	Define, Classify and explain the working of Boilers, IC Engines, Turbines, Refrigeration Systems, Machine Tools, Power Transmission systems, Mechatronics Systems, Bearings and sources of energy.
CO 2	Apply the fundamental knowledge of various machines to solve for various performance parameters.
CO 3	Analyse various machines and their capabilities to choose, compare and distinguish them for various conditions.

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5.5	**COURSE CODE**	**14CS1ICCCP / 14CS2ICCCP**	**COURSE NAME**	**C PROGRAMMING**

CREDITS	04	L-T-P-S	3-0-1-0

SYLLABUS:

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.

[10 hours]

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.

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]

REFERENCES

Text Books:
1. Programming in C, Reema Thareja: Oxford University Press, 2012
2. Programming in ANSI C, Balaguruswamy: Mc Graw Hill, fifth Edition, 2011

Reference Books:
1. C: The complete reference by Herbert Schildt: McGraw-Hill Education, 4th edition, 2000
2. C programming Language by Brian W Kernighan Dennis M Ritchie: Prentice Hall

e-books:
1. Introduction to C Programming by ROB Miles
http://www.control.aau.dk/~jdn/edu/doc/arduino/litt/C%20Programming.pdf
2. C programming Tutorial by Mark Burgers http://markburgess.org/CTutorial/C-Tut-4.02.pdf

MOOCs:
1. ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010.
2. www.cse.iitb.ac.in/~CS101/2011.1/

List of Programs

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Sl. No	Program Description	Remarks
1	Write a program (WAP) to demonstrate the use of printf() and scanf() statements to read and print values of variables of different data types.	UNIT I
2	WAP to calculate the distance between two points.	UNIT I
3	WAP to determine the character entered by the user.	UNIT I
4	WAP to find whether the given number is even or odd.	UNIT II
5	WAP to find whether a given year is a Leap year or not.	UNIT II
6	WAP to find greatest of three numbers.	UNIT II
7	WAP to calculate the roots of a quadratic equation.	UNIT II
8	WAP to calculate average of numbers entered by the user.	UNIT II
9	WAP to read the numbers until -1 is encountered. Also calculate the sum and mean of all positive numbers entered and sum and mean of all negative numbers entered separately.	UNIT II
10	WAP to print the multiplication table of N, where N is entered by the user.	UNIT II
11	WAP to classify a given number as Prime or composite.	UNIT II
12	WAP to print the reverse of number.	UNIT II
13	WAP to calculate the area of circle using function.	UNIT III
14	WAP to sum the series: 1/1!+4/2!+27/3!+….using function.	UNIT III
15	WAP to print position of the smallest of N numbers using arrays.	UNIT III
16	WAP to interchange the largest and smallest number in the array.	UNIT III
17	WAP to merge two sorted arrays.	UNIT III
18	WAP to read a two-dimensional array "Marks" which stores marks of 5 students in three subjects. Display the highest marks in each subject.	UNIT III
19	WAP to find the length of a string.	UNIT IV
20	WAP to concatenate two strings.	UNIT IV
21	WAP using structures to read and display the information about a student.	UNIT IV
22	WAP to illustrate the use of pointers in arithmetic operations.	UNIT V
23	WAP to read data from the keyboard, write it to a file called "Input". Again read the same data from the "Input" file and display it on the screen.	UNIT V
24	WAP to create a linear linked list of two nodes and display the list.	UNIT V

COURSE OUTCOMES:

CO1:	Understand the basic knowledge of C programming.
CO2:	Apply the knowledge of modular programming concepts in writing C program.
CO3:	Identify appropriate logic of different programing constructs.
CO4:	Usage of C programming concepts such as memory allocation/ relinquish, file handling and pointers in implementing the real world computer program.
CO5:	Implement solutions for the given problem using C programming concepts.

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5.6	COURSE CODE	14ME1ILCL1 / 14ME2ILCL1	COURSE NAME	CO LAB - I

CREDITS	01	L-T-P-S	0-0-1-0

SYLLABUS:

Unit - 1

Fitting

Introduction of tools, classification, specifications and applications. Preparation of various fitting models.   **[8 Hours]**

Unit – 2

Sheet Metal Work

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

[6 Hours]

Unit – 3

Welding

Arc Welding, Preparation of Butt joint & T-joint & L-joint.

[4 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.

[6 Hours]

REFERENCES:

Text books
1. Workshop Technology Vol. I & Vol. II, Prof. Raghuvanshi, Dhanpat Rai & Sons, 1998.
2. Workshop Technology Vol. I, Hajra Choudhury, 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

MOOCs

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

COURSE OUTCOMES:

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

CO 1	Demonstrate fitting & sheet metal models with an understanding of their Applications.
CO 2	Perform soldering and welding of different sheet metal & welded joints.
CO 3	Demonstrate the use of Tools.
CO 4	Create simple articles such as funnel.
CO 5	Understand the Basics of Civil Engineering.

****

5.7	**COURSE CODE**	**14BT1ICBIE/14BT2ICBIE**	**COURSE NAME**	**BIOLOGY FOR ENGINEERS**

CREDITS	01	L-T-P-S	0-0-1-0

SYLLABUS:

Ecology Virtual Lab:

Determination of pH of Waste Water Sample, Biological Oxygen Demand, Chemical Oxygen Demand of Waste water, A Brief Introduction to Species Interactions in Ecology, Population Invasion - A Threat to Ecosystem, Case Studies on Ecology

Biochemistry Virtual Lab:

Qualitative Analysis of Carbohydrates, Isoelectric Precipitation of Proteins: Casein from Milk, Estimation of Saponification Value of Fats/Oils, Detection of Adulteration in Milk, Estimation of Iodine Value of Fats and Oils, Estimation of blood glucose by Glucose oxidase method

Population Ecology Virtual Lab-I:

Population with Continuous and Discrete Growth, Spread of a Pest Population - Population Invasion, Interspecific Competition and Coexistence, Effect of Interspecific Competition on Species Border, Logistic Population Growth: Continuous and Discrete, Conserving an Endangered Species

Cell biology Virtual Lab I:

Light Microscope, Cell Organization and Sub Cellular Structure Studies (Prokaryotic and Eukaryotic), Transmission Electron Microscopy, Isolation of Mitochondria, Isolation of Chloroplast, Isolation of Endoplasmic Reticulum, Basics of Plant Tissue Culture

Execution & Evaluation:
- 2 Hour of introduction about need for Biology for Engineers and Bio Inspired engineering
- 2 Hour of introduction to the virtual lab (A tour of the modules available)
- Students have to select one module of their respective programme.
- They have to complete atleast six/seven experiments in their selected module.
- The CIE and SEE will be online examination w.r.t their module – Both will be conducted under the supervision of the faculty incharge.

REFERENCES

Text Books:

1. Molecular Biology of THE CELL. Bruce Albertys, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter, Garland Science; 5 edition
2. Biochemistry: Donald Voetand 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.standford.edu/
2. http://www.nyu.edu/academics/open-education/coursesnew/natural_-science_-brain- behavior.html

COURSE OUTCOMES:

CO 1	Apply the knowledge of Biology for respective field of engineering
CO 2	Use modern tools in Virtual labs for analyzing the concepts of Biology in Engineering discipline.
CO 3	Engage in Independent learning for the abstraction of Biology in Engineering courses

ASSESSMENT:

- 1 Hour of introduction about need for biology for Engineers and Bio Inspired engineering
- 1 Hour of introduction to the virtual lab (A tour of all modules available)
- Students will be allowed to select one module of interest to them. They have to complete at least five experiments in their selected module
- The CIE will be the assignment devised in each module and SEE will be the self-evaluation test in the module – Both will be conducted under the supervision of the faculty incharge

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5.8	COURSE CODE	15HS1ICPDC /15HS2ICPDC	COURSE NAME	PERSONALITY DEVELOPMENT AND COMMUNICATION

CREDITS	02	L-T-P-S	2-0-0-0

SYLLABUS:

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).

[5 Hours]

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.

[5 Hours]

UNIT – 3

Time Management: Benefits - Effective Time Management techniques.
Stress Management: Introduction - Understanding Stress – Stressors – Strategies to deal with Stress.
Activity: One minute activities

[3 Hours]

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

[5 Hours]

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

[8 Hours]

REFERENCES

Text Books:
   Personality Development
   1. Personality Development: Harold R. Wallace and Ann Masters Cengage Learning.
   2. Personality Development and Soft Skills: Barun Mitra, OUP India.

Communication Skills

1. Business Communication: P. D. Chaturvedi and Mukesh Chaturvedi, Pearson Education.
2. Business Communication: Lesikar, Flatley, Rentz and Pande, TMH.

Reference Books:
1. The Skills of Communicating: Bill Scott, Jaico Books.
2. Developing Effective People: Lesley Morrissey, Jaico Books.

e-books:
1. Personality Development and Soft Skills: Barun Mitra, OUP India.
2. a. Effective Communication Skills by MTD Training 1
   b. Effective Communication Skills by MTD Training 2

MOOCs:
1. Communication in the 21st Century Workplace - offered by Coursera
2. Communicating strategically -offered by edX

COURSE OUTCOMES:

CO 1	Understand and explain the aspects of personality development, team development, communication skills, time and stress management
CO 2	Apply the principles of communication for functional effectiveness
CO 3	Analyse the behavioural dimensions of individuals which have far reaching significance in the direction of organizational effectiveness

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5.9	COURSE CODE	15HS1IMKAN / 15HS2IMKAN	COURSE NAME	KANNADA MANASU

CREDITS	0	L – T – P- S	2 -0 -0 -0

PÀ£ÀßqÀ
ªÀÄ£À¸ÀÄ
(ONLY FOR KARNATAKA STUDENTS)

OBJECTIVES : PÀ£ÁðIPÀzÀ «zÁåyðUÀ½UÉ 'PÀ£ÀßqÀ ªÀÄ£À¸ÀÄ'JA§ ¥ÀoÀå¢AzÀ PÀ£ÁðIPÀzÀ ¸ÀA¸ÀÌöÈwAiÀÄ£À£Àß ¥ÀjZÀ¬Ä¸À¯ÁUÀÄvÀÛzÉ.

¨sÁUÀ-1 (PÀxÉ/PÀªÀ£À)   **[10 hours]**

1. ¨Éqï £ÀA§gï K¼ÀÄ   – wæªÉÃtÂ
2. UÀÄ¢ü   - qÀ.
3. ±Àæ ªÀAt   ¨ŹÀ.gÀ.¨ÀÁźÆæ
4. gÉÆnO ªÀÄvÀÄU   - ¸ÀÀ.gÀÀ.
5. J®è¯¯   -¯À«vÁ

¨sÁUÀ-2 (¸ÀA¸ÀÌöw/¥ÀæªÁ¸À PÀxÀ£À/CAPÀt §gÀºÀ/«ÉÆÃzÀ)
                                   [08 hours]

1. PÀ£ÁðIPÀ ¸ÀA¸ÀÌöÈw MAzÀÄ avÀæ   - gÀºÀªÀÄvï vÀjÃPÉgÉ
2. ±Á¸ÀÛ£À¼À°è PÀ£ÁðIPÀ ¸ÀA¸ÀÌöÈw   - qÀ. «.dAiÀÄÄgÁªÀiï
3. zÉÆ̰À°ÀjUÉÆ̮ÄÀ¼À°è   - qÀ. PÉ.²ªÀgÁªÀÄ PÁgÀAvÀ
4. UÀÄ§âaÑAiÀÄ UÀÆqÀÄ - ¦.®APÉÃ±ï
5. £ÀªÀÄä JÉÄäUÉ ªÀiÁvÀÄ w½AiÀÄÄªÀÅzÉÃ? - UÉÆgÀÆgÀÄ gÁªÀ¸Àé«Ä CAiÀÄåAUÁgï

¨sÁUÀ-3 (ªÀåQÛavÀæ/¥Àæ§AzsÀ/vÀAvÀæeÁÕ£À §gÀºÀ/¥Àj¸ÀgÀ ¯ÉÃR£À)   **[06 hours]**

1. qÀ.«±ÉéÃ±ÀégÀAiÀÄå   – qÀ. J.J£ï.ªÀÄÆwðgÁªï
2. CtÚ£À gÉÃµÉ   – PÀÄ³É¥ÀÅ
3. ªÀÄwUÉ²PÀëtÀ°è   - J.¸ï. ¸ÀÀÄAzÀgï
4. āÀÁŔÀæ ªÈÀÁ¹UÇÀ   - PÉ.i.¥ÀÇtðZAAzÀæ vEAa
   ªÀÄvÀÄU j¸ÁÖ¯¯ï

OUTCOMES: PÀ£ÁðIPÀzÀ «zÁåyðUÀ¼ÀÄ ¸ÀA¸ÀÌöÈw CzsÀÄAiÀÄ£À£ÀzÀ ªÀÄÆ®PÀ
PÀ£ÁðIPÀ ZÀjvÉæ, ¥Àj¸ÀgÀ, zsÀªÀÄð, DZÁgÀ «ZÁgÀ ªÀÄÄAvÁzÀ
«µÀAiÀÄUÀ¼À£Àß ªÉÄÃ®UÆÀr¹ PÉÆ¼ÀÄîvÁÛgÉ.

¥ÀoÀå ¥ÀÄ¸ÀÛPÀ:
 1. PÀ£ÀßqÀ ªÀÄ£À¸ÀÄ, ¥Àæ¸ÀgÁAUÀ, PÀ£ÀßqÀ «±Àé«zÁå®AiÀÄ, ºÀA¦.

¥ÁgÀªÀiÁ±Àð£À UÀæAxÀUÀ¼ÀÄ:
 1.UÁæªÀiÁAiÀÄt - gÁªï§°ÀÄzÀÆÝgï
 2. PÀ£ÀÆgÀÄ ºÉUÁÎqÀw – PÀÄªÉA¥ÀÅ
 3. £ÀªÀÄä ºÉÆmÉÖAiÀÄ°è zÀQët CªÉÄÃjPÁ - ©.f.J¯ï. ¸Áé«Ä
 4. §ºÀªÀÄäT - qÁ. «.dAiÀÄzÉÃªÀii

5.10	**COURSE CODE**	**15HS1IMKAN / 15HS2IMKAN**	**COURSE NAME**	**KANNADA KALI**
	CREDITS	**0**	**L – T – P- S**	**2 -0 -0 -0**

KANNADA KALI
(ONLY FOR NON-KARNATAKA STUDENTS)

OBJECTIVES : PÀ£ÀßqÉÃvÀgÀ «zÁåyðUÀ½UÉ 'PÀ£ÀßqÀ PÀ°' JA§ ¥ÀoÀå¢AzÀ PÀ£ÀßqÀ ¨sÁµÉAiÀÄ£Àß PÀ°¸À¯ÁUÀÄvÀÛzÉ.

PART-1

Lesson-1: Introducing each other-1. Personal Pronouns, Possessive forms, Interrogative forms.
Lesson-2: Introducing each other-2. Personal Pronouns, Possessive forms, Yes/No type, Interrogation.
Lesson-3: Absolute Ramayana. Possessive forms of nouns, dubietive question, relative nouns.
Lesson-4: Enquiring about a room for rent, Qualitative and Quantitative adjectives.
Lesson-5: Enquiring about the college, Predicative forms, locative case.
Lesson-6: In hotel-dative case defective verbs.
Lesson-7: Vegetable market, Numeral, Plurals.

[10 hours]

PART-2

Lesson-8: Planning for a picnic, Imperative, Permissive, hortative.
Lesson-9: Conversation between doctor and patient. Verb-iru, negation-illa, non-past tense.
Lesson-10: Doctor's advice to patient, potential forms, no-past continuous.
Lesson-11: Discussing about a film, past tense, negation.
Lesson-12: About Brindavan Garden, Past tense, negation.
Lesson-13: About routine activities of a student, verbal principle, reflexive form, negation.
Lesson-14: Telephone conversation, past and present perfect, past continuous and their negation.
Lesson-15: About Halebid, Belur, relative, principle, Negation.
Lesson-16: Discussing about examination and future plan, simple conditional and negation.
[08 hours]

PART-3

Lesson-17: Karnataka (Lesson for reading)
Lesson-18: Kannada Bhaashe (Lesson for reading)
Lesson-19: ManataruvaSangatialla (Lesson for reading)
Lesson-20: BekuBedagalu (Lesson for reading)

[06 hours]

Reference Books:
1. Kannada Kali – Dr. Lingadevaru Halemane
2. Kannada Paatagalu – Editor:Dr. Chandrashekara Kambara.

OUTCOMES: PÀ£ÀßqÉÃvÀgÀ «zÁåyðUÀ¼ÀÄ PÀ£ÀßqÀ ¨sÁµÉAiÀÄ£ÀÄß PÀ°AiÀÄÄ ªÀÅzÀjAzÀ PÀ£ÁðlPÀzÀ°è
NzÀÄªÀ ¸ÀAzÀ¨sÀðzÀ°è PÀ£ÀßrUÀgÉÆA¢UÉ
ªÀåªÀºÀj¸À®Ä ¸ÁzsÀåªÁUÀÄÀvÀÛzÉ.

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5.11	COURSE CODE	14CY1ICCHY/14CY2ICCHY	COURSE NAME	ENGINEERING CHEMISTRY
	CREDITS	05	L-T-P-S	4-0-1-0

SYLLABUS:

UNIT-1

Water Treatment

Introduction, hardness of water, units of hardness, determination of hardness by EDTA method, disadvantages of hard water – boiler scales, boiler corrosion and caustic embrittlement, qualities of drinking water, treatment of water for municipal supply, desalination of water – reverse osmosis and electro dialysis, waste water – COD and BOD, treatment of waste water – primary, secondary and tertiary treatment methods, Principle and 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 – galvanizing and tinning, corrosion inhibitors, cathodic protection by sacrificial anode method

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 electro - deposit, 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 (moulding constituents), 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 and mechanism of conduction in polyaniline and uses

[10 hours]

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

REFERENCES

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
3. Engineering Chemistry Lab Manual, written by faculty, Dept. of Chemistry, BMSCE, Bangalore.

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:

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

COURSE OUTCOMES:

After the completion of the course, students will have able to:

CO 1	Learn and understand Principles of Engineering Chemistry involved in water treatment, conventional electrochemical and renewable sources of energy, polymers corrosion and its control.
CO 2	Ability to describe and address problems based on the learnt Principles.
CO 3	Apply the acquired knowledge to analyze and draw meaningful inferences from the experimental results

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5.12	**COURSE CODE**	14EE1ICBEE/ 14EE2ICBEE	**COURSE NAME**	**BASIC ELECTRICAL ENGINEERING**
	CREDITS	**04**	**L-T-P-S**	**4-0-0-0**

SYLLABUS:

UNIT-1

DC Circuits:
a. Review of fundamental concepts: Kirchhoff'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. 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, 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 wattmeter.

[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]**

Text Books:
  a. D.C Kulasreshta, "Basic Electrical Engineering", TMH Edition, New Delhi.
  b. N.Narasimhaswamy,"Basic Electrical Engineering", First Edition 2015, EBPB Publishers

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

e-books:
  a. http://nptel.ac.in/courses/108105053/
  b. https://books.google.com/books?isbn=8121924405

On-line video lectures:
  a. http://nptel.ac.in/courses/108108076/
COURSE OUTCOMES:

CO 1	**Understand** the basic concepts and applications of DC, AC magnetic circuits and electrical machines.
CO 2	**Apply** the basic knowledge of mathematics & science to obtain the desired parameters/performance characteristics of electrical, magnetic circuits and
CO 3	**Analyze** the behavior of magnetic and electric circuits, electrical apparatus and compare their performance.
CO 4	Conduct a study on **safety** aspects, wiring and consumption of electrical energy in domestic installations

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5.13	COURSE CODE	14ME1ICEED / 14ME2ICEED	COURSE NAME	ELEMENTS OF ENGINEERING DRAWING
	CREDITS	04	L-T-P-S	2-0-2-0

SYLLABUS:

Introduction
Introduction, Drawing Instruments and their uses, BIS Conventions, Scaling, Lettering, Polygon constructions, dimensioning. **[2L + 2P Hrs]**

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 Hrs]

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 Hrs]

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 Hrs]

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 Hrs]**

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 Hrs

Demonstration of capabilities of a typical CAD software: 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. [**2P Hrs**]

REFERENCES:

Text books
1. Engineering Drawings Vols-1 & 2, K. R. Gopalakrishna, Subhas Stores, Bangalore, 2005.
2. Engineering Drawing, N.D. Bhat & V.M. Panchal, 45th Edition, Charotar Publishing, Gujarat, 2005.

Reference Books
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, 2008**.**
2. Textbook of Engineering Drawing, K. Venkat Reddy, BS Publications, Second Edition, 2009.

MOOCs
1. http://www.iitg.ac.in/cet/nptel.html

COURSE OUTCOMES:

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

CO 1	Apply the concepts of projections
CO 2	Prepare orthographic & Isometric projections
CO 3	Develop lateral surfaces of solids and appreciate their applications in the industry.
CO 4	Employ CAD software for solid modeling

ASSESSMENT:

CIE (Max.marks 50)

Average of better two performances among CIE 1, 2 & 3 (30 marks) + Drawing sheets submission (20 marks).

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5.14	COURSE	14CV1ICENM/	COURSE NAME	ENGINEERING MECHANICS

CODE	14CV2ICENM		
CREDITS	04	L-T-P-S	4-0-0-0

SYLLABUS:

INTRODUCTION TO ENGINEERING MECHANICS: Concept of force, force Characteristics, internal and external force, 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 and dot product.

[4 Hours]

Resolution and composition of force, Resultant and Equilibrant of force system, Parallelogram law, Triangle law, and Polygon law of forces, Varignon's theorem, resultant of coplanar concurrent and non-concurrent force system by method of resolution 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, particle and rigid body equilibrium; statically determinate beams, types of supports; support reactions with different types of loads on 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 incline planes, Wedge friction, problems on ladder friction, Belt friction 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, 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 and Perpendicular axis theorem**, product of Inertia**, 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.

[3 Hours]

KINETICS OF PARTICLES: Introduction**,** Newton's Second law of motion, D'Alembert's principle and its application to problems on connected bodies, banking of roads. Work, Power, energy and efficiency, Kinetic energy of particle, Work-Energy Principle and its application to particles and system of particles.

[8 Hours]

REFERENCES

Text Books:
1. Mechanics for Engineers, Statics and Dynamics by Ferdinand Beer and E Russell Johnston,   McGraw Hill Company, New York
2. Engineering Mechanics by Nelson , McGraw Hill Publishers

Reference Books:
1. Engineering Mechanics by Timoshenko and Young; McGraw Hill Book Company , New Delhi
2. Engineering Mechanics , Statics and Dynamics by Meriam JL Kraige, Wiley Publishers, New Delhi
3. Applied Mechanics by I B Prasad

e-Books:
1. VTU e-learning center (Program number 13)
2. NPTEL Lecture Series on Engineering Mechanics, IIT Kanpur

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

COURSE OUTCOMES:

CO1:	Understand the fundamental concepts of statics and dynamics for the analysis of force systems.
CO2:	Apply the principles of mechanics for solving elementary engineering problems.
CO3:	Analyze the simple engineering structures using concepts of mechanics.

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5.15	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:
a. Determination of mechanical characteristics of DC & AC Motors.

COURSE OUTCOMES:

CO1:	**Apply** the basic principles of electrical and electronics to determine various performance parameters.
CO2:	**Analyze** the behavior of electronic circuits and electrical machines
CO3:	**Design** basic Analog and Digital electronic circuits for given specifications.

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.

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 OUTCOMES:

CO-1	**Apply** the knowledge of electronic components to conduct basic Analog and Digital experiments
CO-2	**Analyze** the given basic Analog and Digital electronic circuits to find the circuit parameters.
CO-3	**Design** basic Analog and Digital electronic circuits for given specifications.
CO-4	**Conduct** experiments to demonstrate a given problem statement in Analog and Digital electronic circuits **individually / in a team** and also prepare a report.

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5.16	COURSE	14HS1ICEVS/	COURSE NAME	ENVIRONMENTAL STUDIES

CODE	14HS2ICEVS		
CREDITS	01	L-T-P-S	1-0-0-0

SYLLABUS:

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 and construction of Dam and its benefits and associated 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]

Note: In the revised syllabus, emphasis is placed on specific issues like EIA, environmental Management Practices and self-study (Field Visits)

Field Visit:
- Visit to a Botanical Garden and Identification of endangered trees
- Visit to a Effluent treatment plants consisting of reuse and re-cycling of waste water
- Understanding rain water harvesting and roof water harvesting plants (Theme Park)
- Visit open rock quarry in and around Bangalore and study air pollution and noise pollution, GW and SW pollution.

- Other Environmental related sites like solid liquid waste management and providing appropriate remedial measures for the same.

REFERENCES

Text Books:
1. Environmental Studies by **Geeta Balakrishna** (Revised Edition)
2. Ecology by **Subramanyam** (Tata Mc Graw Hill Publications)

Reference Books:
1. Environmental Studies by **Benny Joseph**, Tata Mc Graw Hill, 2005.
2. Environmental Studies by **Dr. D. L. Manjunath**

e- books:
1. NPTEL (Open source/ power point and visuals)
2. Ecological studies/ IITR/Open source
3. Ministry of Environment and forest & wild life.

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

COURSE OUTCOMES:

CO1:	Understand the components and impacts of human activities on environment.(No PO)
CO2:	Apply the environmental concepts for conservation and protection of natural resources.
CO3:	Identify and establish relationship between social, economical and ethical values from environmental perspective.(PO8, PO12)

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5.17	COURSE CODE	15HS1ICCIP/15HS2ICCIP	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. To raise awareness and consciousness of the issues related to the profession and discuss the issue of liability of risks and safety at work place.

[**05 hours**]

UNIT-1

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

UNIT -2

Directive Principles of State Policy: Importance and its relevance.

Special Constitutional Provisions for Schedule Castes, Schedule Tribes & Other Backward Classes, Women & Children.

[**03 hours**]

UNIT -3

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

[**06 hours**]

UNIT-4

Election Commission of India – Powers & Functions – Electoral Process in India.
Methods of Constitutional Amendments and their Limitations.
Important Constitutional Amendments – 42nd, 44th, 61st, 74th, 76th, 77th, 86th and 91st.
Emergency Provisions. Case Studies.

[**04 hours**]

UNIT-5

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.

[06 hours]

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. Bijoe Emmanuel vs. State of Kerala.
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 Accident case study.
7. Balaji vs. State of Mysore.	15. The killer robot case study.
8. Unni Krishnan vs. State of Andhra Pradesh.	16. Apple Inc. v. Samsung Electronics Co.,Ltd.

Text Books:

1. "An Introduction to Constitution of India and Professional Ethics" by Merunandan K.B. and B.R. Venkatesh, Meragu Publications, 3rd edition, 2011.
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.

e-Books:
1. http://books.google.co.in/books/about/Constitution_of_India_and_Professional_E.html?id=VcvuVt-d88QC
Constitution of India and Professional Ethics, by G.B. Reddy and Mohd Suhaib, I.K. International Publishing House Pvt. Ltd., 2006.
2. http://www.scribd.com/doc/82372282/Indian-Constitution-M-Raja-Ram-2009#scribd
Indian Constitution, by M. Raja Ram, New Age International Pvt. Limited, 2009.

COURSE OUTCOMES:

CO1:	Understand and explain the significance of Indian Constitution as the Fundamental Law of the Land.
CO2:	Apply the practice of ethical responsibilities and duties to protect the welfare and safety of the public.
CO3:	Analyse the Indian political system, the powers and the functions of the Union Executives and State Executives.

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5.18	COURSE CODE	15HS1IMENG/15HS2IMENG	COURSE NAME	FUNCTIONAL ENGLISH
	CREDITS	00	L-T-P-S	0-0-0-0

Course Objectives:
- Enable the students to acquire LSRW: (Language Learning Skills) and to understand, speak, read and write effectively.
- Enable them to apply these skills effectively for specific purposes and be on par with global standards.

UNIT - 1

Communication: Specific Focus

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.   **[04 hours]**

UNIT - 2

Grammar: Remedial Focus

Parts of Speech, Tenses- Usage of Tenses, Articles and Prepositions, Punctuation, Types of Sentences, Voice, Reported Speech. **[03 hours]**

UNIT - 3

Vocabulary: Specific Focus

Identifying errors in sentences, Using Idioms and Phrases - Words commonly misused and confused – Right choice of words in a given context. Antonyms – Synonyms – One-word Equivalents. **[04 hours]**

UNIT - 4

Writing Skills: Specific Focus

Paragraph Writing - Expansion of Ideas – Précis Writing – Letter Writing –Job Applications / Official Letters – Writing a Resume / Curriculum Vitae. **[06 hours]**

UNIT - 5

Technical Writing: Specific Focus

Presentations - Reports – Interpersonal Communication – Information skills – Group Discussion-Problem Solving. **[07 hours]**

Reference Books:
1. Making Sense of English - M.Yadugiri, Viva Publications, New Delhi.
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 Ms. Rajalakshmi S., Faculty of English, Dept. of Mathematics & Humanities.

Course Delivery:
* Through Class – Room Teaching, Interaction , Group Discussion, Presentations.
* English Lab Classes – Exercises for Practice of Language Usage;
  Voice / Accent Practice and Self-Study.
* Work Book completion.

COURSE OUTCOMES:

CO1:	Identify, comprehend and construct basic sentence structures.
CO2:	Gain ability to develop ideas to paragraphs; Transform from one medium to another.
CO3:	Express command over both spoken and written language.
CO4:	Demonstrate the usage of language effectively, creatively and successfully in both general and specific contexts.
CO5:	Be prepared to face the challenges of the globalized world with confidence and with the best communicative skills.

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5.19	**COURSE CODE**	**15MA2ICMAT**	**COURSE NAME**	**ENGINEERING MATHEMATICS -2**
	CREDITS	**04**	**L-T-P-S**	**3 - 1 – 0 - 0**

CONTACT HOURS	48 hours (36L+12T)		

Prerequisites: Basic Trigonometric concepts, Trigonometric formulas, methods of differentiation, methods of integration, reduction formulae, vector algebra.

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

UNIT-1

LAPLACE TRANSFORMS

Definitions, properties, transforms of elementary functions, transforms of derivatives and integrals. **[9 hours]**

Applications: Laplace transforms of Periodic functions and Unit step function. **(7L+2T)**
Suggested Reading: Laplace transform of Unit impulse function-Dirac delta function.

UNIT-2

INVERSE LAPLACE TRANSFORMS

Inverse Laplace Transforms-properties, inverse transforms of standard functions, $L^{-1}\left[\dfrac{F(s)}{s}\right]$, $L^{-1}\left[e^{-as}F(s)\right]$, $L^{-1}\left[F'(s)\right]$. **[10 hours]**

Applications: Solving ordinary differential equations using Laplace transforms (initial and boundary value problems) arising in the study of deflection of beams and RLC Circuits. **(8L+2T)**

Suggested Reading: Convolution theorem (without proof) and problems, solutions of a system of differential equations using Laplace transform.

UNIT-3

MULTIPLE INTEGRALS AND BETA, GAMMA FUNCTIONS

Double integrals, evaluation of double integrals by change of order of integration, evaluation of double integrals by changing to polar form, Triple integrals. **[10 hours]**

Applications: Computation of area using double integrals in polar form and volume using triple integrals.

BETA AND GAMMA FUNCTIONS

Properties, relation between Beta and Gamma functions and related problems. **(7L+3T)**

Suggested Reading: applications of double integrals to find area, mass and centroid (Cartesian forms).

UNIT-4

VECTOR CALCULUS

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

Vector identities: $\text{div}\,\text{curl}\,\vec{A}$, $\text{curl}\,\text{grad}\,w$, $\text{div}\left(w\vec{A}\right)$, $\text{curl}\left(w\vec{A}\right)$, $\text{div}\left(\vec{A}\times\vec{B}\right)$, $\text{curl}\,\text{curl}\,\vec{A}$. and

problems on vector identities. **[11 hours]**

Applications: Vector integration– Statement and problems on Green's theorem, Stokes' theorem and Gauss divergence theorem (without proof). **(8L+3T)**

Suggested Reading: Tangent curves, velocity and acceleration.

UNIT-5

ORTHOGONAL CURVILINEAR COORDINATES (OCC):

Definitions - Orthogonal curvilinear coordinates, scale factors, base vectors, cylindrical and spherical coordinate systems, expressing a given vector in cylindrical and spherical coordinates.
[8 hours]

Applications: 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.

MATHEMATICS LAB

- Laplace transforms of standard functions.

- Double and Triple integrals.
- Compute area and volume using multiple integrals.

Text Books

(1) Advanced Engineering Mathematics, P. V. O'Neil, 5th Indian reprint, 2009, Cengage Learning India Pvt. Ltd.
(2) Advanced Engineering Mathematics, Dennis Zill, Warren S Wright, Michael R. Cullen, 4th edition, 2011, Jones & Bartlett Learning.

Reference Books

(1) Advanced Engineering Mathematics, Erwin Kreyszig, 10th edition Vol.1 and Vol.2, 2014, Wiley-India.
(2) Advanced Modern Engineering Mathematics, Glyn James 3rd edition, 2004, Pearson Education.
(3) Higher Engineering Mathematics, B.S. Grewal, 43rd edition, 2013, Khanna Publishers.

e-books and online learning materials

(1) 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
(2) 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
(3) http://ocw.mit.edu/courses/mathematics/

Online Courses and Video Lectures:
(1) **http://nptel.ac.in/courses.php?disciplineId=111**
(2) khanacamedy.org/Math

On completion of the course, the student will have the ability to:

Course Code	CO	COURSE OUTCOME (CO)
15MA2ICMAT	CO 1	Understand the concepts of Laplace transform, Multiple integrals,

		Beta & Gamma functions and vector calculus.
	CO 2	Apply the concepts of transforms and calculus to Engineering problems.
	CO 3	Demonstrate an understanding of the Laplace transforms of functions and multiple integrals.

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