ಬಿ.ಎಂ.ಎಸ್. ತಾಂತ್ರಿಕ ಮಹಾವಿದ್ಯಾಲಯ

ಸ್ವಾಯತ್ತ ವಿದ್ಯಾ ಸಂಸ್ಥೆ

BMS COLLEGE OF ENGINEERING

Autonomous College under VTU

BACHELOR OF ENGINEERING
SCHEME & SYLLABUS FOR
I & II SEMESTERS
2015-16

BMS COLLEGE OF ENGINEERING, BENGALURU-19
Autonomous College under VTU

VISION

PROMOTING PROSPERITY OF MANKIND BY AUGMENTING HUMAN RESOURCE CAPITAL THROUGH QUALITY TECHNICAL EDUCATION & TRAINING

MISSION

ACCOMPLISH EXCELLENCE IN THE FIELD OF TECHNICAL EDUCATION THROUGH EDUCATION, RESEARCH AND SERVICE NEEDS OF SOCIETY

BMS COLLEGE OF ENGINEERING, BENGALURU-19

Autonomous College under VTU

FIRST YEAR SYLLABUS BOOK

With effect from the A.Y.2015-16

BMS COLLEGE OF ENGINEERING, BENGALURU-19
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-Selfstudy
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

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Scheme of Instruction for First Semester B.E. 2015-16
(PHYSICS CYCLE)

S No	Course Code	Course Title	Credits				
			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	14BT1ICBIE	Biology for Engineers	1	0	0	0	1
8	15HS1ICPDC	Personality Development & Communication	2	0	0	0	2
9	15HS1IMKAN	Kannada Language*	Mandatory Course				0
Total							

Scheme of Instruction for First Semester B.E. 2015-16
(CHEMISTRY CYCLE)

S No	Course Code	Course Title	Credits				
			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							

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

BMS COLLEGE OF ENGINEERING, BENGALURU-19
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Scheme of Instruction for Second Semester B.E. 2015-16
(CHEMISTRY CYCLE)

S No	Course Code	Course Title	Credits				
			L	T	P	S	Total
1	15MA2ICMAT	Engineering Mathematics – 2	3	1	0	0	4
2	14CY2ICCHY	Engineering Chemistry	4	0	1	0	5
3	14EE2ICBEE	Basic Electrical Engineering	4	0	0	0	4
4	14ME2ICEED	Elements of Engineering Drawing	2	0	2	0	4
5	14CV2ICENM	Engineering Mechanics	4	0	0	0	4
6	14ES2LCCL2	Co Lab - II	0	0	1	0	1
7	14HS2ICEVS	Environmental Studies	1	0	0	0	1
8	15HS2ICCIP	Constitution of India & Professional Ethics	2	0	0	0	2
9	15HS2IMENG	Functional English*	Mandatory Course				0
Total							

Scheme of Instruction for Second Semester B.E. 2015-16
(PHYSICS CYCLE)

S No	Course Code	Course Title	Credits				
			L	T	P	S	Total
1	15MA2ICMAT	Engineering Mathematics – 2	3	1	0	0	4
2	14PY2ICPHY	Engineering Physics	4	0	1	0	5
3	14EC2ICEEE	Elements of Electronics Engineering	4	0	0	0	4
4	14ME2ICEME	Elements of Mechanical Engineering	4	0	0	0	4
5	14CS2ICCCP	'C' Programming	3	0	1	0	4
6	14ME2ILCLI	Co-Lab – I	0	0	1	0	1
7	14BT2ICBIE	Biology for Engineers	1	0	0	0	1
8	15HS2ICPDC	Personality Development & Communication	2	0	0	0	2
9	15HS2IMKAN	Kannada Language*	Mandatory Course				0
Total							

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

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5.1			
COURSE CODE	**15MA1ICMAT**	**COURSE TITLE**	**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 **[9 hours]**

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.

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 **[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 expansions for functions of two variables.

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 [9 hours]

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 $Mx \quad Ny \quad 0$, case2: integrating factor for equations of the type

$f_1 \ xy \ \ y \, dx \quad f_2 \ xy \ \ x \, dy \quad 0$

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

Suggested Reading: Solution of differential equations of the type $Mdx \quad Ndy \quad 0$ where $i \ \frac{M_y \quad N_x}{N} \quad g \ x \quad ii \ \frac{N_x \quad M_y}{M} \quad h \ y$ Applications of ordinary differential equations to mixing problem.

UNIT-4

HIGHER ORDER ORDINARY DIFFERENTIAL EQUATIONS [10 hours]

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**.**

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 [11 hours]

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.

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.

Bibliography

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	Apply the standard calculus computations on parametric and polar curves.
	CO 2	Understand the use of Taylor's and Maclaurin's series of one and two variables.
	CO 3	Apply the concepts of functions of two or three variables.
	CO 4	Apply integration to find arc lengths, areas, volume and surface area of revolution.
	CO 5	Use analytic techniques to compute solutions for ordinary differential equations.
	CO 6	Demonstrate an understanding towards the nature of curves by tracing the same using certain properties.

5.2			
COURSE CODE	**14PY1ICPHY/ 14PY2ICPHY**	**COURSE TITLE**	**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. **[9Hours]**

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]**

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LIST OF EXPERIMENTS
(Ten to be performed)

S 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

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

5.3			
COURSE CODE	**14EC1ICEEE/ 14EC2ICEEE**	**COURSE TITLE**	**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 SantiramKal, 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, McGraw 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	Analyze and design the basic electronic circuits containing non-linear elements such as transistors.
CO 2	Identify the need of few analog Integrated Circuits and use them in realizing circuit applications.
CO 3	Analyze and implement basic Digital Electronic circuits for a given application.
CO 4	Identify the applications and significance of electronics in interdisciplinary engineering domains.

5.4			
COURSE CODE	**14ME1ICEME / 14ME2ICEME**	**COURSE TITLE**	**ELEMENTS OF MECHANICAL 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). **[08Hrs]**

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

5.5			
COURSE CODE	**14CS1ICCCP / 14CS2ICCCP**	**COURSE TITLE**	**C PROGRAMMING**
CREDITS	**04**	**L – T - P - S**	**3-0-1-0**

SYLLABUS:

UNIT-1

INTRODUCTION **[8 hours]**

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.

UNIT-2

BASIC PROGRAMMING **[6 hours]**

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

UNIT-3

STRUCTURED PROGRAMMING **[10 hours]**

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.

UNIT-4

USER-DEFINED-SPACE **[8 Hours]**

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.

UNIT-5

ADVANCED PROGRAMMING **[7 hours]**

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.

REFERENCES

Text Books:

1. Programming in C, ReemaThareja: Oxford University Press, 2012
2. Programming in ANSI C, Balaguruswamy: McGraw 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/

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List of Programs

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:

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

5.6			
COURSE CODE	**14ME1ILCL1 / 14ME2ILCL1**	**COURSE TITLE**	**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. **[4Hours]**

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, DhanpatRai& Sons, 1998.
2. Workshop Technology Vol. I, HajraChoudhury, 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	Understand the Basics of Civil Engineering.

5.7			
COURSE CODE	**14BT1ICBIE/ 14BT2ICBIE**	**COURSE TITLE**	**BIOLOGY FOR ENGINEERS**
CREDITS	**01**	**L – T - P - S**	**0-0-1-0**

Syllabus

Neurophysiology Virtual Lab (pilot)

Neurophysiology is the study of nervous system function. Primarily, it is connected with neurobiology, psychology, neurology, clinical neurophysiology, electrophysiology, biophysical neurophysiology, ethology, neuroanatomy, cognitive science and other brain sciences.

Neuron Simulation Virtual Lab (pilot)

This lab uses a graphical web-based Neuron simulator and models a section of excitable neuronal membrane using the Hodgkin-Huxley equations. Various experiments will deal with the several parameters of Hodgkin-Huxley equations and will model resting and action potentials, voltage and current clamp, pharmacological effects of drugs that block specific channels etc.

Biochemistry Virtual Lab I

Biochemistry is the study of the chemical processes in living organisms. It deals with the structures and functions of cellular components such as proteins, carbohydrates, lipids, nucleic acids and other biomolecules. The experiments are fundamental in nature, dealing with the identification and classification of various carbohydrates, acid-base titrations of amino acids, isolation of proteins from their natural sources, etc.

Population ecology Virtual Lab I

A population is a collection of individuals of the same species that live together in a region. Population ecology is the study of populations (especially population abundance) and how they change over time. Crucial to this study are the various interactions between a population and its resources. Studies on simple models of interacting species is the main focus this simulation oriented lab.

Immunology Virtual Lab I

The branch of biomedicine concerned with the structure and function of the

immune system, innate and acquired immunity, the bodily distinction of self from no self, and laboratory techniques involving the interaction of antigens with specific antibodies.

Microbiology Virtual Lab I

The study of microorganisms, which are unicellular or cell-cluster microscopic organisms. This includes eukaryotes such as fungi and, protists and prokaryotes. Viruses, though not strictly classed as living organisms, are also studied.

Molecular Biology Virtual Lab I

The study of biology at a molecular level. This field overlaps with other areas of biology and chemistry, particularly genetics and biochemistry. Molecular biology chiefly concerns itself with understanding the interactions between the various systems of a cell, including the interactions between DNA, RNA and protein biosynthesis as well as learning how these interactions are regulated.

Cell biology Virtual Lab I

Cell biology is an exciting and dynamic area that helps discover the fascinating world of cells. It includes the study of the structure and organization, growth, regulation, movements and interaction of the cells. Cell biology is closely related to other areas of biology such as genetics, molecular biology, and biochemistry.

Biological Image Analysis Virtual Lab

In this lab, students will learn to use image processing techniques to analyze and quantify image data from wet lab experiments such as those in cell biology, biochemistry, molecular biology and immunology laboratories.

Bioinformatics Virtual Lab I

Bioinformatics is a field which using techniques of informatics to gather, store, analyse and integrate biological data. This virtual lab is an introductory course for undergraduate students and deals with the storage and retrieval of data from different biological databases like Gene, Pubmed, GEO, TAIR, Prosite etc.

Systems Biology Virtual Lab

This virtual lab consist of modelling and simulation experiments for the students in bioinformatics and computational biology to understand biological processes using a systems biology approach.

Computer-Aided Drug Design Virtual Lab

This lab consists of various laboratory topics in computer-aided drug design.

Ecology Virtual Lab

Ecosystems are a complex and delicate balancing game.Ecosystems have an extremely complex web of cause and effect. The addition or removal of one species affects many other species with which it might compete for,or provide food.

Bio-inspired Robotics Virtual Labs (Remote Trigger)

This remote-triggerable online laboratory will teach experiments and offer to introduce biorobotics and neuronal robot techniques. The focus is on practical skills in using simple electronics to reinforce application of bio-inspired ideas. Many experiments will help working towards thesis projects.

Virtual Biophysics Lab (Remote Trigger)

This lab will provide an online experience via remote equipment to study biophysics and biophysical techniques.

Execution & Evaluation:

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 atleast 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.

COURSE OUTCOMES:

CO 1	A general overview of the relationship between living systems and engineering, and how biosystems can and do influence engineering design, from structural materials to systems engineering to the nature of design itself.
CO 2	Applications of bio-systems to optimal design in engineering.
CO 3	Allow students to engage in deeper study of specific areas of interest and to engage in cross-disciplinary study

5.8			
COURSE CODE	**15HS1ICPDC / 15HS2ICPDC**	**COURSE TITLE**	**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 MastersCengage Learning.
2. Personality Development and Soft Skills: BarunMitra, OUP India.

Communication Skills

1. Business Communication: P. D. Chaturvedi and MukeshChaturvedi, 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: BarunMitra, 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	Students develop better people skills.
CO 2	Improve their behavioral dimensions that have far reaching significance in the direction of organizational effectiveness.
CO 3	Improve the functional effectiveness through better communication skills.
CO 4	Improved managerial capabilities through team building and group dynamics.

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5.9			
COURSE CODE	**15HS1IMKAN/ 15HS2IMKAN**	**COURSE TITLE**	**KANNADAMANASU**
CREDITS	**0**	**L – T - P - S**	**2-0-0-0**

ಕನ್ನಡಮನಸು

(ONLYFORKARNATAKA STUDENTS)

OBJECTIVES : ಕರ್ನಾಟಕದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ 'ಕನ್ನಡಮನಸು' ಎಂಬ ಪಠ್ಯದಿಂದ ಕರ್ನಾಟಕದ ಸಂಸ್ಕೃತಿಯನ್ನು ಪರಿಚಯಿಸಲಾಗುತ್ತದೆ.

ಭಾಗ–1(ಕಥೆ/ಕವನ) **[10hours]**

1. ಬೆಡ್ ನಂಬರ್ ಏಳು – ತ್ರಿವೇಣಿ
2. ಗಾಂಧಿ – ಡಾ. ಬೆಸಗರಹಳ್ಳಿ ರಾಮಣ್ಣ
3. ಶ್ರಾವಣ – ಸು. ರಂ. ಎಕ್ಕುಂಡಿ
4. ರೊಟ್ಟ ಮತ್ತು ಕೋವಿ – ಸವಿತಾ ನಾಗಭೂಷಣ
5. ಎಲ್ಲ ಹುಡುಗಿಯರ ಕನಸು – ಡಾ. ಸಿದ್ದಲಿಂಗಯ್ಯ

ಭಾಗ – 2 (ಸಂಸ್ಕೃತಿ/ಪ್ರವಾಸ ಕಥನ/ಅಂಕಣ ಬರಹ/ವಿನೋದ) **[10hours]**

1. ಕರ್ನಾಟಕಸಂಸ್ಕೃತಿಒಂದುಚಿತ್ರ – ರಹಮತ್‌ತರೀಕೆರೆ
2. ಶಾಸನಗಳಲ್ಲಿಕರ್ನಾಟಕಸಂಸ್ಕೃತಿ – ಡಾ.ವಿ.ಜಯರಾಮ್
3. ದೋಣಿಹರಿಗೋಲುಗಳಲ್ಲಿ – ಡಾ.ಕೆ.ಶಿವರಾಮಕಾರಂತ
4. ಗುಬ್ಬಚ್ಚಿಯಗೂಡು – ಪಿ.ಲಂಕೇಶ್
5. ನಮ್ಮಎಮ್ಮೆಗೆಮಾತುತಿಳಿಯುವುದೇ? – ಗೊರೂರುರಾಮಸ್ವಾಮಿಅಯ್ಯಂಗಾರ್

ಭಾಗ–3(ವ್ಯಕ್ತಿಚಿತ್ರ/ಪ್ರಬಂಧ/ತಂತ್ರಜ್ಞಾನಬರಹ/ಪರಿಸರಲೇಖನ) **[06hours]**

1. ಡಾ.ವಿಶ್ವೇಶ್ವರಯ್ಯ – ಡಾ.ಎ.ಎನ್.ಮೂರ್ತಿರಾವ್
2. ಅಣ್ಣಪ್ಪನ ರೇಷ್ಮೆ ಕಾಯಿಲೆ – ಕುವೆಂಪು

3. ವೃತ್ತಿ ಶಿಕ್ಷಣದಲ್ಲಿ ಕನ್ನಡ ಮಾಧ್ಯಮ – ಎಸ್. ಸುಂದರ್
4. ಚೀಂಕ್ರ ಮೇಸ್ತ್ರೀ ಮತ್ತು ಅರಿಸ್ಟಾಟಲ್ – ಕೆ.ಪಿ.ಪೂರ್ಣಚಂದ್ರ ತೇಜಸ್ವಿ

OUTCOMES : ಕರ್ನಾಟಕದ ವಿದ್ಯಾರ್ಥಿಗಳು ಸಂಸ್ಕೃತಿ ಅಧ್ಯಯನದ ಮೂಲಕ ಕರ್ನಾಟಕ ಚರಿತ್ರೆ, ಪರಿಸರ, ಧರ್ಮ, ಆದಾರ, ವಿಚಾರ ಮುಂತಾದ ವಿಷಯಗಳನ್ನು ಮೈಗೂಡಿಸಿ ಕೊಳ್ಳುತ್ತಾರೆ.

ಪಠ್ಯಪುಸ್ತಕ:

1. ಕನ್ನಡಮನಸು,ಪ್ರಸಾರಂಗ,ಕನ್ನಡವಿಶ್ವವಿದ್ಯಾಲಯ,ಹಂಪಿ.

ಪಾರಮಾರ್ಶನಗ್ರಂಥಗಳು:

1. ಗ್ರಾಮಾಯಣ–ರಾವ್‌ಬಹುದ್ದೂರ್
2. ಕಾನೂರುಹೆಗ್ಗಡತಿ–ಕುವೆಂಪು
3. ನಮ್ಮಹೊಟ್ಟೆಯಲ್ಲಿದಕ್ಷಿಣಅಮೇರಿಕಾ–ಬಿ.ಜಿ.ಎಲ್.ಸ್ವಾಮಿ
4. ಬಹುಮುಖಿ–ಡಾ.ವಿ.ಜಯರಾಮ್

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5.10			
COURSE CODE	**15HS1IMKAN/ 15HS2IMKAN**	**COURSE TITLE**	**KANNADAKALI**
CREDITS	**0**	**L – T - P - S**	**2-0-0-0**

KANNADAKALI

(ONLYFORNON-KARNATAKASTUDENTS)

OBJECTIVES: ಕನ್ನಡೇತರ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ 'ಕನ್ನಡ ಕಲಿ' ಎಂಬ ಪಠ್ಯದಿಂದ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಸಲಾಗುತ್ತದೆ.

PART-1 **[10hours]**

Lesson-1: Introducing each other-1.Personal Pronouns, Possessive forms, Interrogative forms

Lesson-2: Introducing each other-2.Personal Pronouns, Possessive forms, Yes/Notype, 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: Inhotel-dative case defective verbs.

Lesson-7: Vegetable market, Numeral, Plurals.

PART-2 **[08hours]**

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-pastcontinuous.

Lesson-11: Discussing about a film, past tense, negation.

Lesson-12: About BrindavanGarden, 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 futureplan, simple conditional and negative.

PART-3 **[06hours]**

Lesson-17: Karnataka (Lesson for reading)

Lesson-18: KannadaBhaashe(Lesson for reading)

Lesson-19: ManataruvaSangatialla(Lesson for reading)

Lesson-20: BekuBedagalu(Lesson for reading)

ReferenceBooks:

1. KannadaKali–Dr.LingadevaruHalemane
2. KannadaPaatagalu–Editor:Dr.ChandrashekaraKambra.

OUTCOMES: ಕನ್ನಡೇತರ ವಿದ್ಯಾರ್ಥಿಗಳು ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯುವುದರಿಂದ ಕರ್ನಾಟಕದಲ್ಲಿ ಓದುವ ಸಂದರ್ಭದಲ್ಲಿ ಕನ್ನಡಿಗರೊಂದಿಗೆ ವ್ಯವಹರಿಸಲು ಸಾಧ್ಯವಾಗುತ್ತದೆ.

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5.11			
COURSE CODE	**14CY1ICCHY / 14CY2ICCHY**	**COURSE TITLE**	**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 pHusing 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 – galvanizing 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, (mouldingconstituents), 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]**

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 NityanandaShetty, 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 BenajahAllyn; 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

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

COURSE OUTCOMES:

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

CO 1	Ability to test, measure and arrive at valid conclusions by applying various chemical process on water
CO 2	Ability to define, describe and calculate different electrochemical processes
CO 3	Ability to understand different types of chemical fuels and photovoltaics
CO 4	Ability to interpret types of corrosion and its control by various methods including metal finishing techniques
CO 5	Ability to differentiate different types of polymers and study their applications
CO 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

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5.12			
COURSE CODE	**14EE1ICBEE/ 14EE2ICBEE**	**COURSE TITLE**	**BASIC ELECTRICAL ENGINEERING**
CREDITS	**05**	**L – T - P - S**	**4-0-1-0**

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

5.13			
COURSE CODE	**14ME1ICEED / 14ME2ICEED**	**COURSE TITLE**	**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 BasantAgrawal, 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	Understand the concepts of projections.
CO 2	Prepare orthographic & Isometric projections.
CO 3	Prepare developments of lateral surfaces of solids and appreciate their applications in the industry.
CO 4	Apply the fundamental knowledge of drawing for modeling in CAD

ASSESSMENT:

CIE (Max.marks 50)

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

5.14			
COURSE CODE	**14CV1ICENM/ 14CV2ICENM**	**COURSE TITLE**	**ENGINEERING MECHANICS**
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 Eequilibrant 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:

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

5.15			
COURSE CODE	**14ES1ILCL2/ 14ES2ILCL2**	**COURSE TITLE**	**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:

CO 1	Identify the protection mechanisms needed for an electrical installation.
CO 2	Distinguish the significant features of single phase and three phase systems.
CO 3	Estimate the load capacity of a domestic installation.
CO 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.

Text Books:

1. Electronic Devices and Circuits By David A Bell,PHI,5th edition ,2007
2. Basic Electronics Devices, Circuits and its Fundamentals By SantiramKal, 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, McGraw 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	Student will be able to identify the fundamental electronic discrete components.
CO 2	Student will get knowledge of using CRO, with hands on sessions measuring few electrical/electronic circuit variables.
CO 3	Student will learn to build basic electronics circuits using analog and digital components.

5.16			
COURSE CODE	**14HS1ICEVS/ 14HS2ICEVS**	**COURSE TITLE**	**ENVIRONMENTAL STUDIES**
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 GeetaBalakrishna(Revised Edition)
2. Ecology by Subramanyam (Tata McGraw Hill Publications)

Reference Books:

1. Environmental Studies by Benny Joseph, Tata McGraw 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:

CO 1	Describe the fundamental scientific issues associated with environmental science. (PO1, PO2)
CO 2	Describe primary environmental problems and potential solutions in solving environmental issues. (PO4, PO6, PO7)
CO 3	Identify the complex relationship between scientific approaches to environmental issues and social, economic and ethical perspective on the environment.(PO8, PO10, Po12)

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5.17			
COURSE CODE	**15HS1ICCIP/ 15HS2ICCIP**	**COURSE TITLE**	**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.

UNIT-1 **[05 hours]**

Framing of the Indian constitution: Role of the Constituent Assembly - Preamble andSalient features of the Constitution of India, Fundamental Rights and its limitations.

Fundamental Duties and their significance. Case Studies.

UNIT -2 **[03 hours]**

Directive Principles of State Policy: Importance and its 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 andthe Council of Ministers. The Union Parliament – LokSabha&RajyaSabha.

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.

UNIT-4 **[04 hours]**

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.

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. KesavanandBharati 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. NargeshMeerza.	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. &. RoohiMakol E R , Kalyani Publishers.1stedition, 2009.

e-Book:

1. https://books.google.co.in/books/about/Constitution_of_India_and_Professional_E.ht ml?id=VcvuVt-d88QC

Constitution of India and Professional Ethics, by G.B. Reddy and MohdSuhaib, 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:

CO 1	Recognise and understand the significance of Indian Constitution as the Fundamental Law of the Land.
CO 2	Identify the importance of Directive Principles of the State Policy in administering or formulating the policies for the State government.
CO 3	Be aware of and assess the Indian political system, the powers and the functions of the Union Executives and State Executives.
CO 4	Identify the role of an individual in forming a responsible government and necessity of amendments for better functioning of the society.
CO 5	Practice the ethical responsibilities and duties to protect the welfare and safety of the public by suggesting solutions to the social problems.

5.18			
COURSE CODE	**15HS1IMENG/ 15HS2IMENG**	**COURSE TITLE**	**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 **[04 hours]**

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.

UNIT - 2 **[03 hours]**

Grammar: Remedial Focus

Parts of Speech, Tenses- Usage of Tenses, Articles and Prepositions, Punctuation, Types of Sentences, Voice, Reported Speech.

UNIT - 3 **[04 hours]**

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.

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: Specific Focus

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

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:

CO 1	Identify, comprehend and construct basic sentence structures.
CO 2	Gain ability to develop ideas to paragraphs; Transform from one medium to another.
CO 3	Express command over both spoken and written language.
CO 4	Demonstrate the usage of language effectively, creatively and successfully in both general and specific contexts.
CO 5	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 TITLE**	**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 **[9 hours]**

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

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 **[10 hours]**

Inverse Laplace Transforms-properties, inverse transforms of standard functions,

$$L^{-1}\left[\frac{F(s)}{s}\right],\ L^{-1}\left[e^{-as}F(s)\right],\ L^{-1}\left[F(s)\right].$$

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 [10 hours]

Double integrals, evaluation of double integrals by change of order of integration, evaluation of double integrals by changing to polar form, Triple integrals.

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 [11 hours]

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: $\mathrm{div}\,\mathrm{curl}\vec{A}$, $\mathrm{curl}\,\mathrm{grad}$, $\mathrm{div}\ \vec{A}$, $\mathrm{curl}\ \vec{A}$, $\mathrm{div}\ \vec{A}\ \vec{B}$, $\mathrm{curl}\,\mathrm{curl}\vec{A}.$ and problems on vector identities.

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): [8 hours]

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

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.

Bibliography

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, AlanJeffrey, Academic Press, 19-Jun-2001. http://books.google.co.in/books/about/Advanced_Engineering_Mathematics.html?id=9nFDvk9yr3kC&redir_esc=y

(2) EngineeringMathematics, 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

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

COURSE CODE	CO #	COURSE OUTCOME (CO)
15MA2ICMAT	CO 1	Use Laplace transforms to solve differential equations
	CO 2	Apply double integrals to compute areas and triple integrals in computing volumes.
	CO 3	Demonstrate an understanding of vector calculus which finds application in electromagnetic fields, gravitational fields and fluid flow problems.
	CO 4	Ability to understand the use of multiple integrals in vector fields.
	CO 5	Use Gamma and Beta functions to evaluate integrals.
	CO 6	Appreciate the use of orthogonal curvilinear coordinates in solving engineering problems with different geometry.

NOTE