

# **ACADEMIC CURRICULA 2015 - 16**

## **BACHELOR'S DEGREE PROGRAMME B.Tech (First Year)**

**Course Structure and Detailed Syllabi  
for students admitted during session 2015-16**



**KIIT UNIVERSITY**

Declared U/S 3 of U G C A c t, 1956  
B h u b a n e s w a r, O d i s h a , I n d i a





**COURSE STRUCTURE FOR FIRST YEAR B.TECH.PROGRAMME  
AT KIIT UNIVERSITY, BHUBANESWAR  
(FOR STUDENTS ADMITTED IN THE SESSION 2015-2016)  
(Syllabus common to All Branches of B. Tech. Programme)  
FIRST SEMESTER  
(SCHEME-I)**

<b>Theory</b>							
Sl. No	Course Code	Subject	L	T	P	Total	Credit
1.	MA-1001	Mathematics – I	3	1	0	4	4
2.	CS -1001	Programming in C	3	0	0	3	3
3.	PH -1003	Physics	3	1	0	4	4
4.	ME -1001	Engg. Mechanics	3	1	0	4	4
5.	EE -1003	Basic Electrical Engineering	3	0	0	3	3
<b>Total Theory</b>						<b>18</b>	<b>18</b>
<b>Practical</b>							
1.	CS -1091	Programming Lab in C	0	0	3	3	2
2.	PH -1093	Physics Lab	0	0	3	3	2
3.	EE - 1093	Basic Electrical Engineering Lab	0	0	3	3	2
<b>Sessional</b>							
1.	CE -1081	Engg. Graphics	0	0	3	3	2
<b>Total Practical &amp; Sessional</b>						<b>12</b>	<b>8</b>
<b>Semester Total</b>						<b>30</b>	<b>26</b>

**SECOND SEMESTER  
(SCHEME-I)**

<b>Theory</b>							
Sl. No	Course Code	Subject	L	T	P	Total	Credit
1.	MA-1002	Mathematics – II	3	1	0	4	4
2.	IT-1002	Object Oriented Programming	3	0	0	3	3
3.	CH-1003	Chemistry	3	0	0	3	3
4.	EC-1001	Basic Electronics	3	0	0	3	3
5.	HS-1003	Professional Communication	2	0	0	2	2
6.	CH-1005	Environmental Science	2	0	0	2	2
<b>Total Theory</b>						<b>17</b>	<b>17</b>
<b>Practical</b>							
1.	IT-1092	Object Oriented Programming Lab	0	0	3	3	2
2.	CH-1093	Chemistry Lab	0	0	3	3	2
3.	EC-1091	Basic Electronics Lab	0	0	3	3	2
<b>Sessionals</b>							
1.	ME-1081	Basic Manufacturing Systems	0	0	3	3	2
2.	HS -1083	Language Lab	0	0	2	2	1
<b>Total Practical &amp; Sessional</b>						<b>14</b>	<b>9</b>
<b>Semester Total</b>						<b>31</b>	<b>26</b>
3.	EAA – 1	Extra Academic Activity					P/NP



**FIRST SEMESTER  
(SCHEME-II)**

<b>Theory</b>							
Sl. No.	Course Code	Subject	L	T	P	Total	Credit
1.	MA-1001	Mathematics – I	3	1	0	4	4
2.	CS-1001	Programming in C	3	0	0	3	3
3.	CH-1003	Chemistry	3	0	0	3	3
4.	EC-1001	Basic Electronics	3	0	0	3	3
5.	HS-1003	Professional Communication	2	0	0	2	2
6.	CH-1005	Environmental Science	2	0	0	2	2
<b>Total Theory</b>						<b>17</b>	<b>17</b>
<b>Practical</b>							
1.	CS-1091	Programming Lab in C	0	0	3	3	2
2.	CH-1093	Chemistry Lab	0	0	3	3	2
3.	EC-1091	Basic Electronics Lab	0	0	3	3	2
<b>Sessionals</b>							
1.	ME-1081	Basic Manufacturing Systems	0	0	3	3	2
2.	HS-1083	Language Lab	0	0	2	2	1
<b>Total Practical &amp; Sessional</b>						<b>14</b>	<b>9</b>
<b>Semester Total</b>						<b>31</b>	<b>26</b>

**SECOND SEMESTER  
(SCHEME-II)**

<b>Theory</b>							
Sl. No.	Course Code	Subject	L	T	P	Total	Credit
1.	MA-1002	Mathematics – II	3	1	0	4	4
2.	IT-1002	Object Oriented Programming	3	0	0	3	3
3.	PH-1003	Physics	3	1	0	4	4
4.	ME-1001	Engg. Mechanics	3	1	0	4	4
5.	EE-1003	Basic Electrical Engineering	3	0	0	3	3
<b>Total Theory</b>						<b>18</b>	<b>18</b>
<b>Practical</b>							
1.	IT-1092	Objected Oriented Programming Lab	0	0	3	3	2
2.	PH-1093	Physics Lab	0	0	3	3	2
3.	EE-1093	Basic Electrical Engineering Lab	0	0	3	3	2
<b>Sessional</b>							
1.	CE-1081	Engg. Graphics	0	0	3	3	2
<b>Total Practical &amp; Sessional</b>						<b>12</b>	<b>8</b>
<b>Semester Total</b>						<b>30</b>	<b>26</b>
2.	EAA – 1	Extra Academic Activity					P/NP

## PHYSICS COURSE

PH-1003

Cr - 4

### Oscillations and Waves

(8 Hrs)

Damped and forced oscillations, Resonance, sharpness of resonance, types of waves and wave equation. Interference of light, analytical treatment of two source interference, distribution of energy, Newton's Rings, Applications. Diffraction of light, Types of diffraction, Fraunhofer diffraction by single slit, diffraction grating, determination of wavelength of light by grating.

### Laser and Optical Fiber

(7Hrs)

Spontaneous and stimulated emission, population inversion, pumping, Ruby Laser, applications. Principle of optical fiber, optical fiber as wave guide, Types of optical fiber, acceptance angle, numerical aperture, Applications.

### Electromagnetic Theory

(8 Hrs)

Gradient, divergence and curl, Maxwell's equations in differential and integral form, electromagnetic wave equation in free space, plane wave solutions, transverse nature of electromagnetic waves.

### Quantum Mechanics

(8 Hrs)

Inadequacy of Classical mechanics, de Broglie hypothesis for matter waves, Phase velocity and Group velocity, Heisenberg's uncertainty principle, wave function and its physical interpretation, Schrodinger's equations, particle in one dimensional box, potential barrier, tunneling and applications.

### Thermodynamics

(6 Hrs)

Laws of thermodynamics, thermodynamic processes, variables, internal energy, enthalpy, entropy, Gibb's free energy, Maxwell's relations, T-S diagrams.

### Mechanical Properties of Matter

(5 Hrs)

Stress, strain, Hooke's law, elastic constants and their relations, torsional pendulum, cantilever, stress-strain diagrams.

### Crystallography

(6 Hrs)

Lattice, basis and crystal structure, unit cell, crystal systems, number of atoms per unit cell, coordination number, packing fraction for *cubic* lattice, lattice planes, Miller indices, relation between interplanar distance and Miller indices, X-ray diffraction and Bragg's law.

### Text Books:

1. Engineering Physics, B. K. Pandey and S. Chaturvedi, Cengage Publication, New Delhi, 2013.
2. Concepts of Modern Physics, A. Beiser, Tata McGraw-Hill Publication, 2007.

**Reference Books:**

1. Engineering Physics, Gaur and S. C. Gupta, Dhanpat Rai Publications, New Delhi, 2003.
2. Engineering Physics, Dutta R. Joshi, Tata McGraw-Hill Publication, 2010.
3. Quantum Mechanics, L. I. Schiff, Tata McGraw-Hill Publication, 2010.
4. Introduction to Solid State Physics, C. Kittel, Wiley India Pvt. Ltd. 7<sup>th</sup> Edition, 2007.
5. Elements of Properties of Matter, D. S. Mathur, 11 th edition, S. Chand and Co., New Delhi.

**PH-1093****PHYSICS LAB****Cr - 2**

1. Determination of wavelength ( $\lambda$ ) of monochromatic light by Newton's Rings.
2. Determination of grating element ( $e+d$ ) of a plane diffraction grating.
3. Determination of refractive index of a transparent liquid by Boy's method.
4. Determination of difference ( $d\lambda$ ) between wavelengths of sodium D-lines by Michelson's interferometer.
5. To find out the Young's modulus ( $Y$ ) of a material by bending of beam method.
6. Determination of rigidity modulus ( $\eta$ ) of a material by dynamic method.
7. To study the characteristics of a solar cell.
8. To study the characteristics of a photo cell.
9. Determination of acceleration due to gravity ( $g$ ) by bar pendulum.
10. Comparison of emfs of two primary cells using potentiometer.

**CHEMISTRY COURSE****CH-1003****CHEMISTRY****Cr - 3****Chemical Bonding**

(7 Hrs)

MO theory to explain bonding in homo and hetero nuclear diatomic molecules, Band theory: band diagrams for conductor, insulator and semiconductors, Bonding in complexes: VBT, CFT, Application of CFT in explaining magnetic moment and colour of complexes.

**Chemical Equilibrium and Thermodynamics**

(9 Hrs)

Internal Energy, enthalpy, entropy and free energy, dependence of free energy on temperature and pressure, Gibb's-Helmholtz equation, conditions of spontaneity and equilibrium, Equilibrium constants  $K_p$  and  $K_c$ , Free energy change and equilibrium constants, Le Chatelier's Principle and its applications to industrial syntheses, van't Hoff isotherm and isochore, Clapeyron-Clausius equation, partial molar properties, chemical potential, Gibb's -Duhem equation.

**Electrochemistry**

(7 Hrs)

Conductance, effect of concentration, ionic mobilities- Kohlrausch's law and application, transport number, determination by Hitroff's method, types of electrodes, electrode/Cell potential, Nernst equation and applications: to find electrode/cell potential, equilibrium constant, solubility product and pH, modern batteries : fuel cells (AFCs, PEMFs, SOFCs, MCFCs), Zn-air battery, Li- ion battery, Ni-MH battery), corrosion: mechanism of dry and wet corrosion, types of wet corrosion, prevention.

**Chemical Kinetics**

( 7 Hrs)

Rate of the reaction and rate law, rate laws of multi- step reactions (steady state approximation), parallel, opposing and consecutive reactions, theory of reaction: collision theory, Lindemann's modification and absolute reaction theory, catalysis: types, theories, kinetics of enzyme catalysis (Michaeli's Menten mechanism).

**Spectroscopy**

( 6 Hrs)

UV-Vis spectroscopy: Beer Lambert's law, types of transition, concept of auxochrome and chromophore, factors affecting  $\lambda_{max}$  and  $\epsilon$ , Woodward-Fieser rules for calculation of  $\lambda_{max}$  in diene systems, IR spectroscopy: types of vibration, Hooke's law, detection of functional groups like C-C, C=C, -OH, -NH<sub>2</sub> and -C=O.

**Text Books:**

1. Engineering Chemistry, Jain & Jain; 16th Edition, Dhanpat Rai Publishing Company
2. Elementary Organic Spectroscopy, Y. R. Sharma; Revised Edition, 4th Edition, S. Chand Group

**Reference Books:**

1. Advanced Inorganic Chemistry, Satya Prakash, G. D. Tuli, R. D. Madan; 2012, S. Chand Group
2. Principles of Physical Chemistry, B. R. Puri, L. R. Sharma, M. S. Pathania; 42<sup>nd</sup> Edition, 2007, Vishal Publishing Co.
3. Elements of Physical Chemistry, Samuel Glasstone; 2nd Edition, Macmillan
4. Spectrometric identification of organic compounds, R.M. Silverstein, F.X. Webster, D. Kiemle, 7th Edition, 2005, Wiley

**CH-1093****CHEMISTRY LAB****Cr-2**

1. Hardness of water sample by complexometric titration
2. Alkalinity of water.
3. Estimation of ferrous ion in Mohr salt.
4. Dissolved Oxygen by Winkler's method.
5. Kinetics of Ester Hydrolysis.
6. pH metric Titration.
7. Conductometric Titration.
8. Verification of Beer Lambert's law.
9. Partition coefficient of iodine.
10. Percentage of Cl<sub>2</sub> in Bleaching powder.

**CH-1005**

**ENVIRONMENTAL SCIENCE**

**Cr - 2**

**Overview**

( 5 Hrs)

Overview on environment, terminologies, components of earth: lithosphere, atmosphere and biosphere, concept of black body radiation and albedo. Importance, scope and principles of EIA.

**Air Pollution**

( 5 Hrs)

Primary and secondary air pollutants, smog (oxidizing and reducing), important environmental issues: ozone layer depletion, acid rain, green-house effect, controlling measures: electrostatic precipitator, cyclone separator, catalytic converter, scrubbing).

**Water Pollution**

( 5 Hrs)

Types and sources of water pollutants, sewage treatment: primary, secondary and tertiary treatments, Acid-Base chemistry, pH and buffer, analysis of water quality parameters like DO, BOD, alkalinity, hardness, chloride, fluoride, USEPA and WHO guidelines for drinking water.

**Green Chemistry**

( 4 Hrs)

Basic principles of green chemistry with examples, matrices to explain greenness,  $R^4M^4$  model with specific reference to eco-burette, life cycle analysis (Cradle to grave approach).

**Waste Management**

( 5 Hrs)

Classification of solid wastes, toxic and biochemical effects of solid wastes (heavy metals, bio-medical and radioactive wastes), sources and generation, management of solid wastes: collection, segregation, disposal).

**Text Books:**

1. Environmental Chemistry, A. K. De; 7th Edition, New Age International Publishers.

**Reference Books:**

1. Fundamentals of Environment and Ecology, D. De, D. De; 2013, S. Chand Group
2. Engineering Chemistry, Jain & Jain; 16th Edition, Dhanpat Rai Publishing Company
3. Environmental Science and Engineering, Aloka Debi, Second Edition; Universities Press
4. Text Book of Environmental Studies for Undergraduate Courses, Erach Bharucha; 2nd Edition, Universities Press
5. A Textbook of Environmental Studies, Sashi Chawla; 2012, Mc Graw Hill

**MATHEMATICS COURSE**

**MA-1001**

**MATHEMATICS**

**Cr - 4**

**Ordinary Differential Equations :**

(12 Hrs)

Basic concepts and definitions of 1<sup>st</sup> order differential equations; Formation of differential equations; solution of differential equations: variable separable, homogeneous, equations reducible to homogeneous form, exact



differential equation, equations reducible to exact form, linear differential equation, equations reducible to linear form (Bernoulli's equation); orthogonal trajectories, applications of differential equations.

**Linear Differential equations of 2<sup>nd</sup> and higher order :** (10 Hrs)

Second order linear homogeneous equations with constant coefficients; differential operators; solution of homogeneous equations; Euler-Cauchy equation; linear dependence and independence; Wronskian; Solution of non-homogeneous equations: general solution, complementary function, particular integral; solution by variation of parameters; undetermined coefficients; higher order linear homogeneous equations; applications.

**Differential Calculus(Two and Three variables):** (5 Hrs)

Taylor's Theorem, Maxima and Minima, Lagrange's multipliers

**Matrices, determinants, linear system of equations:** (11 Hrs)

Basic concepts of algebra of matrices; types of matrices; Vector Space, Sub-space, Basis and dimension, linear system of equations; consistency of linear systems; rank of matrix; Gauss elimination; inverse of a matrix by Gauss Jordan method; linear dependence and independence, linear transformation; inverse transformation; applications of matrices; determinants; Cramer's rule.

**Matrix-Eigen value problems:** (10 Hrs)

Eigen values, Eigen vectors, Cayley Hamilton theorem, basis, complex matrices; quadratic form; Hermitian, Skew-Hermitian forms; similar matrices; diagonalization of matrices; transformation of forms to principal axis (conic section).

**Text Books:**

1. Kreyszig E., Advanced Engineering Mathematics, Wiley, 9<sup>th</sup> edition.
2. Shanti Narayan and P.K.Mittal, Differential Calculus, S. Chand, reprint 2009

**References Books:**

1. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, 36<sup>th</sup> edition
2. Dass H.K., Introduction to engineering Mathematics, S.Chand & Co Ltd, 11<sup>th</sup> edition
3. Ramana B.V., Higher Engineering Mathematics, TMH, 1st edition
4. J.Sinha Roy and S Padhy, A course on ordinary and partial differential Equation, Kalyani Publication, 3rd edition

**MA-1002**

**MATHEMATICS-II**

**Cr-4**

**Laplace Transforms:** (10 Hrs)

Laplace Transform, Inverse Laplace Transform, Linearity, transform of derivatives and Integrals, Unit Step function, Dirac delta function, Second Shifting theorem, Differentiation and Integration of Transforms, Convolution, Integral Equation, Application to solve differential and integral equations, Systems of differential equations.

**Series Solution of Differential Equations:** (14 Hrs)

Power series; radius of convergence, power series method, Frobenius method; Special functions: Gamma function, Beta function; Legendre's and Bessel's equations; Legendre's function, Bessel's function, orthogonal functions; generating functions.

**Fourier series, Integrals and Transforms:** (10 Hrs)

Periodic functions, Even and Odd functions, Fourier series, Half Range Expansion, Fourier Integrals, Fourier sine and cosine transforms, Fourier Transform

**Vector Differential Calculus:** (4 Hrs)

Vector and Scalar functions and fields, Derivatives, Gradient of a scalar field, Directional derivative, Divergence of a vector field, Curl of a vector field.

**Vector Integral Calculus:** (10 Hrs)

Line integral, Double Integral, Green's theorem, Surface Integral, Triple Integral, Divergence Theorem for Gauss, Stoke's Theorem.

**Text books**

1. Kreyszig E., Advanced Engineering Mathematics, Wiley, 9<sup>th</sup> edition.

**Reference books**

1. Grewal B.S., Higher Engineering Mathematics, Khanna Publishers, 36<sup>th</sup> edition
2. Dass H.K., Introduction to engineering Mathematics, S.Chand & Co Ltd, 11<sup>th</sup> edition
3. Ramana B.V., Higher Engineering Mathematics, TMH, 1<sup>st</sup> edition
4. J.Sinha Roy and S Padhy, A course on ordinary and partial differential Equation, Kalyani Publication, 3<sup>rd</sup> edition

## HUMANITIES COURSE

**HS-1003**

**PROFESSIONAL COMMUNICATION**

**Cr-2**

**UNIT-1 Communication: Process, Methods of communication and Interpersonal communication** (6 Hrs)

Communication-Definition and Concept., Process of Communication

Elements of Communication, Steps/ Phases of Communication

Means/ Methods / Mode of Communication

Verbal- Oral, Written

Non Verbal- Sign Language, Body language

Flow of Communication: Formal and Informal

Barriers of Communication-Intrapersonal, interpersonal and organizational barriers

Listening-Definition, difference between hearing and listening, advantages of listening

**UNIT II- Business Writing** (5 Hrs)

Paragraph Writing- Techniques and skills

Business letter

Report writing

### Unit III- Basics of Grammar

( 6 Hrs)

Parts of Speech , Types of Verbs-Transitive & Intransitive, Stative & dynamic, Time and Tense, Articles and Preposition, Quantifiers . Active and Passive Voice, Error Detection in Sentences, Subject Verb Agreement & Modifier.

### UNIT-IV-Basic Sounds, Vocabulary & Reading Skill

(7 Hrs)

Introduction- Sound & Spelling mismatch; Problem sounds and MTI  
Analogy and Sentence Completion  
Rules of word formation, Antonyms & Synonyms  
Reading Skills

#### Text Book :

1. *Technical Communication Principles & Practices*. Meenakshi Raman and Sangeeta Sharma OUP. Second Edition-2011

#### Reference Books:

1. *A Communicative English Grammar*. Geoffrey Leech and Jan Svartvik. Third Edition. Routledge Publication. New York.2013.
2. *English Vocabulary in Use (advance)* Michael McCarthy, Felicity O Dell, Cam. Univ. Press. Second Edition.2001.
3. *Practical English Usage : International*.Michel Swan, OUP.2006.
4. *The Oxford Grammar (English )* Sidney Greenbaum, Oxford University Press India. 1<sup>st</sup> Edition. 2005
5. *Verbal Ability and Reading Comprehension for the CAT*. Arun Sharma and Meenakshi Upadhyay, TMH, New Delhi,2007
6. *Better English Pronunciation*, Cambridge University Press, J D O'Connor, 2<sup>nd</sup> Edition (Paper Back) 2013
7. *BCOM* . Carol M.Lehman, Debbie D.DuFrene and Mala Sinha Cengage Learning, New Delhi
8. *Communication Skills For Technical Students* by T.M. Farhathullah.Orient Blackswan.Chennai.2002.
9. *English and Communication Skills for Students of Science and Engineering*.SP Dhanavel, Orient Blackswan.Chennai.2009

**HS-1083**

**LANGUAGE LAB**

**Cr-1**

#### List of Assignments / Activities

1. Introduction
2. Reading Comprehension
3. Skit/ Role play practice
4. Listening comprehension
5. Time and Tense
6. Business Letter Writing
7. Subject-Verb Agreement and Analogy practice
8. Business reports Writing
9. Problem Sounds of English - Practice
10. Viva- Voce

## ENGINEERING MECHANICS COURSE

ME1001

Cr-4

**Concurrent Forces in a Plane:** (10 Hrs)

Introduction to Engineering Mechanics, Free-body diagrams, Composition and resolution of forces, Equilibrium of concurrent forces in a plane, Methods of projections, Methods of moments

**Friction:** (4 Hrs)

Static friction, Laws of dry friction, Applied of friction in inclined plane, Wedge friction, Belt friction

**Parallel Forces in a Plane:** (8 Hrs)

Parallel forces acting in the same and opposite directions, General case of parallel forces in a plane, Centre of parallel forces, Centroid and Centre of gravity, Theorem of Pappus, Centre of composite plane figures and Curves, Distributed forces in a plane.

**Moment of Inertia:** (3 Hrs)

M I of plane figures, Parallel Axis Theorem, Perpendicular axis theorem and MI of composite figures.

**Force analysis of Plane Trusses and Frames:** (6 Hrs)

Methods of joints, Method of Sections and Method of members.

**Principle of Virtual work:** (2 Hrs)

Equilibrium of Ideal Systems, Virtual work.

**Kinematics of Rectilinear Motion:** (7 Hrs)

Differential equations of rectilinear motion, Force proportional to displacement, Free vibration, D' Alembert's Principle, Momentum and Impulse, Work & Energy, Conservation of energy, Impact.

**Kinematics of Curvilinear Motion:** (4 Hrs)

Normal and Tangential acceleration, Motion of a Projectile, Work and Energy in curvilinear motion.

**Rotation of a rigid body:** (4 Hrs)

Kinematic s of rotation, Rotation under the action of a constant moment.

### Text Book

1. Engineering Mechanics – S Timoshenko, D. H Young & J.V. Rao-TMH

### Reference Books

1. Engineering Mechanics (Statics and Dynamics) - Bear and Johnson, TMH
2. Engineering Mechanics –S.S. Bhavikatti, New Age International

## BASIC ELECTRICAL ENGINEERING

**EE- 1003**

**Cr-3**

**Introduction:**

( 3 Hrs)

Essence of electricity, different electric wiring techniques, necessity of earthing and fuse, power system layout, electrical safety rules.

**DC Circuits :**

( 7 Hrs)

Active & passive elements, ohm's law, Kirchhoff's law, star-delta transformation, mesh analysis, nodal analysis, Superposition theorem, Thevenin's Theorem, Norton's Theorem (Elementary treatment only), DC transients (RL, RC series circuits).

**AC circuits :**

(7 Hrs)

Fundamentals of AC circuits: Amplitude, time period, frequency, phase, phase difference, average value, R.M.S value, form factor, peak factor, phasor representation of alternating quantities, Phasor Algebra, Series A.C circuit, Resonance in series Circuits. AC parallel circuits, Three phase AC circuits: star and delta connections, comparison between Single phase and Three phase supply system, Measurement of power and power factor by two-wattmeter method

**Magnetic circuits :**

(5 Hrs)

Basic definitions, magnetizing force, reluctance, permeance, magnetic field, magnetic permeability, self & mutual inductance, leakage flux; Faraday's laws of electromagnetic induction, analogy between electric circuit and magnetic circuits, analysis of series magnetic circuit, B-H curve, hysteresis and eddy current loss.

**DC Machines :**

(4 Hrs)

Principles of electrical machines, E.M.F equation in a dc generator, Torque production in a DC Motor, Operation of a dc machine as a generator, operation of a dc machine as a motor,

**AC Machines :**

(4 Hrs)

Single Phase transformer: principle, construction, Uses, E.M.F equation; Auto transformer, Principle, Types and uses of Three Phase Induction Motor, Torque-Slip characteristics.

**Basic Instruments :**

(4 Hrs)

Classification of electrical instruments, essential features of analog measuring instruments, moving coil instruments (PMMC), moving iron instruments, extension of range , Dynamometer type Watt meter

**Illumination :**

(2 Hrs)

Luminous flux, luminous intensity, lumen, candela power, illumination, brightness;

**Text Books:**

1. Basic Electrical Engineering by D.C. Kulshreshtha, Tata Mcgraw publication, 1<sup>st</sup> Edition 2011.
2. Basic Electrical Engineering, T.K. Nagasarkar and M.S. Sukhija, Oxford University press, 2<sup>nd</sup> Edition 2011.

**Reference Books:**

1. Basics Electrical Engineering Sanjeev Sharma, I.K. International, New Delhi.(Third Reprint 2010).
2. Principles of Electrical Engineering and Electronics- V K Mehta, Rohit Mehta,S Chand and Company,New Delhi(Revised Edition 2013)
3. Basic Electrical Engineering Abhijit Chakrabarti,Sudip Nath,Chandan Kumar Chnada,Tata McGraw Hill Publishing Limited,New Delhi,2007

**BASIC ELECTRICAL ENGINEERING LAB****EE-1093****Cr-2****List of Experiments**

1. Measurement of resistance of tungsten filament lamp.
2. Verification of Superposition Theorem.
3. Verification of KCL and KVL.
4. Measurement of inductance of iron cored choke coil.
5. Study and use of Megger.
6. Study of different parts of DC machine.
7. Study of different parts of three phase induction motor.
8. Measurement of voltage transformation ratio of single phase transformer.
9. To perform open circuit test of single phase transformer.
10. Study of three phase star-delta connection.
11. Study and connection of sodium vapour lamp
12. Study and connection of fluorescent lamp.
13. Load test on single phase energy meter.

**BASIC ELECTRONICS COURSE****EC-1001****Cr-3****Semiconductors :****(4 Hrs)**

Energy band concept of materials, difference between metal, insulator and semiconductor, Intrinsic and extrinsic semiconductors (n-type & p-type), current conduction in semiconductor, Photodiode, photo-transistor, LED and seven-segment display.

**Junction Diodes :****(7 Hrs)**

Operation of p-n junction diode, diode characteristics, half-wave, full-wave and bridge rectifiers, rectifiers with C, LC and LC  $\pi$  filter, clipper and clamper circuits, breakdown mechanisms, Zener diode and voltage regulator.

**Bipolar Junction Transistor (BJT) :** (6 Hrs)

Transistor operation and current components in p-n-p and n-p-n transistors, CE, CB, CC configurations and characteristics, biasing, load line analysis.

**Field Effect Transistors (FET) :** (3 Hrs)

Operations of p-channel and n-channel JFETs, characteristics of JFET, operation of MOSFET and its characteristics.

**Power Amplifiers :** (2 Hrs)

Class A, B, C and push-pull amplifiers.

**Feedback Concept :** (2 Hrs)

General feedback structure, properties and advantages of negative feedback, Barkhausen criteria for oscillation.

**Operational Amplifiers (OPAMP) :** (4 Hrs)

Ideal OPAMP, CMRR, virtual ground, Inverting and non-inverting OPAMPs, summing amplifiers, Differential amplifier, integrator & differentiator.

**Digital Electronics :** (5 Hrs)

Number systems, conversions and codes, Logic gates & Truth tables (OR, AND, NAND, EX-OR), flip-flops (RS flip-flop, D flip-flop, JK flip-flop and MS flip-flop).

Shift register, Asynchronous(ripple) counter.

**Electronic Instruments :** (3 Hrs)

Operation of CRO and its applications, Signal Generator.

**Text Books :**

1. Electronic Devices and Circuits – D. A. Bell - 5<sup>th</sup> Edition (Oxford)
2. Electronics –Fundamentals & Applications –D. Chattopadhyay and P. C. Rakshit - 11<sup>th</sup> Edition (New Age International)

**Reference Books :**

1. Electronic Devices & Circuits – R. L. Boylestad & L. Mashelsky – 10<sup>th</sup> Edition (Pearson)
2. Electronic Principles – A. Malvino & D. J. Bates - 7<sup>th</sup> Edition (TMH)
3. Digital Principles and Applications– A. Malvino and Leach - 7<sup>th</sup> Edition (TMH)
4. Integrated Electronics – J. Millman, Halkias & Parikh - 2<sup>nd</sup> Edition (TMH)

## **BASIC ELECTRONICS LAB**

**EC-1091**

**Cr-2**

### **List of the Experiments :**

- 1 Familiarization with electronic components (Active & Passive)
- 2 Familiarization with electronic equipments (multimeters, CROs and function generators)
- 3
  - a) Study of the characteristics of P-N junction diode
  - b) Study of the characteristics of Zener diode
- 4
  - a) Construction of half-wave rectifier and full wave rectifier circuits & study of their output waveforms by CRO and calculation of efficiency and ripple factor
  - b) Construction of an unregulated DC power supply (using transformer, fullwave rectifier and capacitor filter) and study of its output waveform by CRO.
- 5
  - a) Construction of positive, negative and biased clipper circuits & study of their output waveforms by CRO.
  - b) Construction of positive and negative clamper circuits & study of their output waveforms by CRO.
- 6 Study of the output characteristics of a Common Emitter Transistor.
- 7 Study of inverting and non inverting amplifiers using Op-Amp.
- 8 Study of summing amplifier, integrator and differentiator using Op-Amp and observe their outputs using CRO.
- 9
  - a) Study of truth tables of different logic gates (AND, OR, NAND).
  - b) Study of truth tables of JK flip flop and D flipflop.
- 10 Construction of a Binary Counter.

## **PROGRAMMING IN C**

**CS-1001**

**Cr-3**

### **Fundamentals of Computer :**

(3 Hrs)

Basic concepts of computer organizations. CPU. Memory. I/O units such as hard disk, floppy disk, pen drives, CD ROM/Writer, scanner, printers, keyboards etc. Number System Representation.

### **Introduction to programming languages :**

(3 Hrs)

Evolution of programming languages, structured programming, the compilation process, object code, source code, executable code, operating systems, interpreters, linkers, loaders, fundamentals of algorithms, flow charts.



**C Language Fundamentals :** (5 Hrs)

Character set, Identifiers, Keywords, Data Types, Constant and Variables, Statements, Expressions, Operators, Precedence of operators, Input-output Assignments, Control structures, Decision making and Branching, Decision making & looping.

**C Functions :** (5 Hrs)

User defined and standard functions, Formal and Actual arguments, Functions category, function prototypes, parameter passing, Call-by-value, Call-by-reference, Recursion, Storage Classes.

**Arrays and Strings :** (5 Hrs)

One dimensional Array, Multidimensional Array declaration and their applications, String Manipulation.

**Pointers :** (4 Hrs)

Pointer variable and its importance, Pointer Arithmetic, passing parameters by reference, pointer to pointer, linked list, pointers to functions, dynamic memory allocation.

**Structures, Unions :** (4 Hrs)

Declaration of structures, declaration of unions, pointer to structure & unions.

**File Handling :** (4 Hrs)

Console input output functions, Disk input output functions, Data files.

**Additional Features in C :** (3 Hrs)

Command line arguments, bit wise operators, enumerated data types, type casting, macros, the C preprocessor, more about library functions.

**Text Books**

1. Computer fundamentals and programming in C – Pradip Dey & Manas Ghosh, OXFORD, Second Edition, 2013.

**Reference Books**

1. Programming in ANSI C - Balaguruswami, TMH
2. C The Complete Reference - H.Sohildt, TMH
3. Let us C - Y.Kanetkar, BPB Publications
4. A Structured Programming Approach using C – B.A. Forouzan & R.F. Gillberg, THOMSON Indian Edition.
5. Programming in C - Gottfried B.S., TMH
6. The 'C' programming language - B.W.Kernighan, D.M.Ritchie, PHI

## PROGRAMMING IN C LAB

CS-1091

Cr-2

### List of experiments

#### Assignment - 1

- WAP to input any two integers and display the sum of two integers.
- WAP to input any two integers, and provide a menu to the user to select any of the options as add, subtract, multiply, divide and display the result accordingly.
- WAP to input any two integers distinct and display the greater of two integers.
- WAP to input any three integers distinct and display the greatest of three integers.
- WAP to input any two integers and display whether both the integers are same or different.

#### Assignment - 2

- WAP to input any two integers, and provide a menu to the user to select any of the options as add, subtract, multiply, divide and display the result accordingly using switch case.
- WAP to input any three integers distinct and display the greatest of three integers using ternary operator.
- WAP to print your name 5 times using a loop.
- WAP to input any integer and print your name that many times.
- Use all types of loops to execute the above programs.

#### Assignment - 3

- Print the number series as 1 2 3 4 5..10
- Print the number series as 1 3 7 15 31...100
- Print the number series as 1 1 2 3 5 8 13 ...100
- Print the number series as 3 5 7 11 13 17....100
- Print the following series using loop as  
1  
2 1  
1 2 3  
4 3 2 1

#### Assignment - 4

- WAP to input 5 integers into an array of size 5. Print all the elements.
- WAP to input 5 integers into an array of size 5. Print all the elements that are 3 digit even integers.
- WAP to input 5 integers into an array of size 5. Print the largest even integer.
- WAP to input 5 integers into an array of size 5. Print all the odd elements in ascending order.
- WAP to input 5 integers into an array of size 5. Print all the odd elements in descending order.

#### Assignment - 5

- WAP to input any character in upper case and print in lower case.
- WAP to input any character in any case and print in lower case.

- WAP to input a set of characters in upper case and print in lower case.
- WAP to input a sentence and count the number of characters, words in it.
- WAP to input two strings and check whether equal or not, without using built-in function.
- WAP to input any string and copy the content into another.
- WAP to input any two strings and merge them into the third string and print the same.

#### Assignment - 6

- WAP to input integers into a 3X3 matrix and print the same.
- WAP to input integers into two 3X3 matrix. Calculate the sum of two matrices and print the same.
- WAP to input integers into two 3X3 matrix. Calculate the product of two matrices and print the same.
- WAP to input 5 names of max length 15. Print all the names.
- WAP to input 5 names of max length 15. Print all the names in alphabetical order.

#### Assignment - 7

- Design a structure using the data members as Roll, Name[11], Branch[11], semester. Write a C program to store 5 student records. Print all the records.
- Design a structure using the data members as Roll, Name[11], Branch[11], semester. Write a C program to store 5 student records. Print all the records of 1<sup>st</sup> semester.
- Design a structure using the data members as Roll, Name[11], Branch[11], semester. Write a C program to store 5 student records. Print all the records of “CSE” branch.
- Design a structure using the data members as Roll, Name[11], Branch[11], semester. Write a C program to store 5 student records. Search a roll number as per user-input from the array. If found print the student detail else print a message “Record Not Found”.
- Design a structure using the data members as Roll, Name[11], Branch[11], semester. Further add the following data members as qr\_no, area, city into another structure to form a nested structure. Write a C program to store 5 student records. Print all the records.

#### Assignment - 8

- Write a program to input any two integers. Calculate the sum using a function and print.
- Write a program to input any two integers. Check the greater integer using a function and print.
- Write a program to input 5 integers into an integer array. Calculate the sum of all the integers using a function and print.
- Write a program to input any string, count the number of characters using a function and print.
- Design a recursive function to calculate the sum of all the even digits of any given integer.

#### Assignment - 9

- Write a program to input any two integers in two memory. Swap the content of the memory using a function.
- Write a program to input 5 integers into an array. Calculate the sum using a function and pointer to array. Print the sum.
- Write a program to input any string. Count the number of characters using a function and pointer to array. print the result.
- Demonstrate call by value and call by reference with a suitable example/s.
- Write a program in C to show the usage of the following storage classes as auto, static.

#### Assignment - 10

- Write a Program in C to open a file and write a sentence to a file. Close the file. Re open the file to read the sentence and print.
- Write a Program in C to open a file and write a set of records to a file as per user choice. Close the file. Re open the file to read and print all the records. The record contains Roll, name[11], branch[11], semester of a student.
- Write a Program in C to open a file and write a set of records to a file as per user choice. Close the file. Re open the file to read and copy the content into another file. The record contains Roll, name[11], branch[11], semester of a student.
- Write a Program in C to open a file and write a set of records to a file as per user choice. Close the file. Re open the file to read and search for a record as per user input from the file and print a message whether found or not. The record contains Roll, name[11], branch[11], semester of a student.
- Write a Program in C to open a file and write a set of records to a file as per user choice. Close the file. Re open the file to read and search for a record as per user input from the file and delete the record from the file. print all the records from the file. The record contains Roll, name[11], branch[11], semester of a student.

#### Assignment - 11

- Doubt clearing

#### Assignment - 12

Doubt clearing

## OBJECT ORIENTED PROGRAMMING

**IT- 1002**

**Cr-3**

### **Object oriented paradigm:**

(4 Hrs)

Evolution of programming paradigm, structured versus object-oriented development, Object oriented programming concepts: Objects, classes, encapsulation and abstraction, inheritance, polymorphism, dynamic binding, message passing.

### **Moving from C to C++:**

(4 Hrs)

Introduction to C++, streams based I/O, name space, scope resolution operator (::), variable declaration at the point of use, variable aliases-reference variables, strict type checking, parameter passing by reference, inline function, function overloading, default arguments.

### **Object and Classes:**

(10 Hrs)

Specifying and using classes, access specifiers: private, public, functions and data members, default arguments, function overloading, friend functions, static members. Objects: memory considerations for objects, new and delete operators.

Constructors - default constructor, parameterized constructor, constructor with dynamic allocation, copy constructor, destructors.

Operator overloading, overloading through friend and member functions.

**Inheritance:** (6 Hrs)

Derived and base classes, Class hierarchies, public, private, and protected derivations, constructors in derived classes, destructors in derived classes, constructors invocation and data members initialization in derived classes, classes within classes, virtual base class.

**Polymorphism:** (5 Hrs)

Pointer to objects, pointer to derived class object, this pointer, run time and compile time polymorphism, virtual functions, pure virtual functions, abstract class, virtual destructor.

**Files and Streams:** (4 Hrs)

Introduction to file handling, hierarchy of file stream classes, opening and closing of files, file modes, file pointers and their manipulators, sequential access, random access.

**Exception handling and Templates** (2 Hrs)

Introduction to exception handling and Templates

#### **Text Book**

1. Object Oriented Programming with C++, E. Balaguruswamy, 6<sup>th</sup> Edition, 2013 TMG Hill

#### **Reference Book**

1. C++ completes reference, Herbert Schildt, TMG Hill, 4<sup>th</sup> Edition, 2002.
2. C++ How to Program, Deitel and Deitel, Pearson Education Asia, 8<sup>th</sup> Edition, 2011.
3. Object Oriented Programming with Ansi and Turbo C++, Ashok N Kamthane, Pearson Education, 1<sup>st</sup> Edition, 2003.

## **OBJECT ORIENTED PROGRAMMING LAB**

**IT-1092**

**Cr - 2**

#### **List of experiments**

Assignment -01 (Structure)

- WAP to store the author, title, price of 10 books & display the book details.
- Define a structure to store the employee name, id, date of birth, basic salary of an employee. WAP to store 10 employee details. Display the employee information having highest salary. Sort the employee details according to the basic salary.

Assignment -02(Basic Class Concept)

1.(a)Create a class to store the following information about an employee:

Name, Emp. Id, Salary.

Store the information of 10 employees. Calculate gross salary. Display all the information of all the employees in tabular form. Display the size of the class.

(b)Modify the above program to call the function to calculate the gross salary from another member function.

2. (a) Create a class which stores the real & imaginary part of a complex number. Add two complex numbers & display the result. Find the conjugate of a given complex number. The complex number should be displayed in the form :“real+i imaginary”.

(b) Modify the program in (a) part to add 2 complex numbers & store the result in an object & display. To add/sub 2 complex number, function having 2 object argument no return value.

### Assignment -03

(Function overloading, Reference variable, Default argument, Inline function)

1. WAP using function overloading to find the area of rectangle, circle, triangle & square.
2. WAP to find the area & circumference of a circle using reference variables.
3. WAP to swap two numbers using reference variables.
4. WAP to calculate simple interest using default argument for rate =20%.  
simple interest = principal \* time \* rate
5. Define a class complex to store the real and imaginary numbers of a complex number. WAP to add to complex numbers using member function having two objects as argument with no reference value.
6. WAP using inline function to find out the area of rectangle, triangle, circle & square.

### Assignment -04

(Static data members & member functions, Friend function)

1. Define a class student with following details;  
private members: regdno, name, marks and avg mark of class.  
public members:  
input () to accept all the values  
display () to display all data members on screen  
findavg () to find avg marks of the entire class  
showavg () static function to display the avg. marks.  
Input details for 10 students, find their average marks and display it.
2. Create a class with one integer data member. Include the member functions to input the value and to display the value of data member. WAP to count the number of times the input() function is called and display it.
3. WAP to swap the values in the private data members of two classes.

### Assignment -05(Constructors & Destructors)

1. Create a class time which stores the time in hours and minutes. When the object is created, the data members should be initialized with zero. Take the input through the constructors. Include the copy constructor and destructor. WAP to call all the constructors and destructors.
2. Define a class 'fixed deposit' with following members  
private: principal, time-period, rate-of-interest, amount  
public : input(), display()  
constructor  
default - to initialize the data members by zero  
parameterized to initialize the data members through arguments.  
copy constructor to copy  
destructor  
WAP to calculate the amount.
3. WAP to demonstrate the order of call of constructors and destructors. Create objects in different scopes.

Assignment -06 (Inheritance)

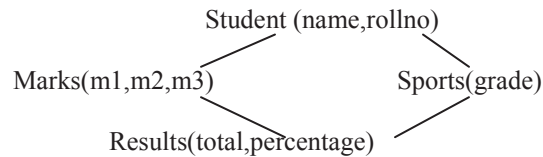
1. Multiple inheritance :



Define the classes according to the hierarchy in the figure.

Class student stores the name and roll no. of a student. Class marks stores the marks of a student in three subjects. Class result stores the total marks and percentage of a student. Take the input for 10 students. Find the percentage & display. Include all the constructors.

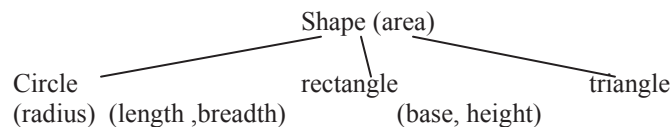
2.



Modify the program 1 to include class sports which stores the sport marks of a student. WAP to calculate total & percentage.

$$\text{total} = m1+m2+m3+\text{grade.}$$

3.



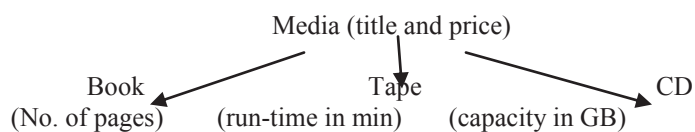
Create the classes as given in the figure. Find the area of a circle, a rectangle and a triangle.

Assignment -07 (Operator overloading)

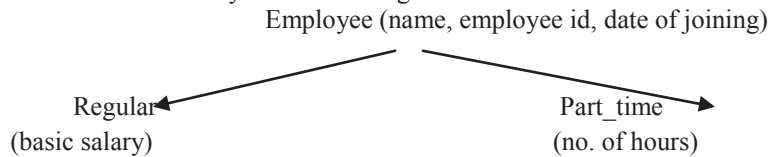
- WAP using operator overloading ++ for distance class object (both for pre & post increment). Also overload unary – for an object.
- Overload insertion (<<<), extraction (>>>) & assignment (=) operator for time class.  
Also overload binary + in the following formats:  
d1 + 4  
5 + d1  
d1 + d2 (where d1 and d2 are objects of distance class)
- Overload binary + to concatenate two strings & == to compare length of two strings.
- WAP to convert the 12 hour time format to 24 hour time format using type casting.

Assignment -08 (Dynamic polymorphism)

- Define the class hierarchy as given in assignment no.3 on Inheritance. Find the area of a circle, a rectangle and a triangle using virtual function. Creation of base class object should not be allowed.
- Define class hierarchy as shown in fig below:



- Store the information of a book, a tape and a cd. Display the information using base class pointer. You should not be able to make the object of the base class.
3. Define class hierarchy as shown in fig below:



Include a member function to calculate gross salary of a regular employee using formula:

Gross salary = basic salary + DA + HRA.

DA and HRA should be stores as constant static data members of the class.

Include a member function to calculate the salary of a part-time employee using formula:-

Salary= no. of hours \*pay per hour

Pay per hour should be stored as constant static data members of the class.

Calculate the salary of a both types of employees using virtual function and display it.

#### Assignment -09 (Exception handling & Templates)

1. WAP to handle division by zero exception.
2. WAP to throw different types of exceptions & catch them in different catch blocks.  
(Also throw an object)
3. WAP to re-throw an exception.
4. WAP to handle array out-of-bounds exception.
5. Create a class template which stores an array. Include member functions
  - i. To search an element in the array.
  - ii. To find sum of elements in the array.
  - iii. To find largest element in the array.

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