ACADEMIC CURRICULA

2014 - 15

BACHELORS' DEGREE PROGRAMME

B.Tech (First Year)

Course Structure and Detailed Syllabi for students admitted to KIIT University during 2014-15 Academic Session

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

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COURSE STRUCTURE FOR FIRST YEAR B.TECH.PROGRAMME AT KIIT UNIVERSITY, BHUBANESWAR
(FOR STUDENTS ADMITTED IN THE SESSION 2014-2015)
(Syllabus common to All Branches of B. Tech. Programme)

FIRST SEMESTER
(SCHEME-I)

Sl. No	Course Code	Subject	L	T	P	Total	Credit
	Theory						
1.	MA-1001	Mathematics – I	3	1	0	4	4
2.	PH-1001	Physics – I	3	0	0	3	3
3.	CH-1001	Chemistry	3	1	0	4	4
4.	ME-1001	Engg. Mechanics	3	1	0	4	4
5.	EE-1001	Electrical Science	3	0	0	3	3
	Total of Theory					**18**	**18**
	Practical						
1.	PH-1091	Physics Lab – I	0	0	3	3	2
2.	CH-1091	Chemistry Lab	0	0	3	3	2
3.	EE-1091	Electrical Science Lab	0	0	3	3	2
	Total of Practical					**9**	**6**
	Sessionals						
1.	CE-1081	Engg. Graphics	0	0	3	3	2
	Total of Sessional					**3**	**2**
	Grand Total					**30**	**26**

SECOND SEMESTER
(SCHEME-I)

Sl. No	Course Code	Subject	L	T	P	Total	Credit
	Theory						
1.	MA-1002	Mathematics – II	3	1	0	4	4
2.	PH-1002	Physics – II	3	0	0	3	3
3.	CS-1001	Programming in C	3	0	0	3	3
4.	EC-1001	Basic Electronics	3	0	0	3	3
5.	HS-1001	Professional Communication	3	0	0	3	3
	Total of Theory					**16**	**16**
	Practical						
1.	PH-1092	Physics Lab – II	0	0	3	3	2
2.	EC-1091	Basic Electronics Lab	0	0	3	3	2
3.	CS-1091	Computer Programming Lab	0	0	3	3	2
	Total of Practical					**9**	**6**
	Sessionals						
1.	ME-1081	Basic Manufacturing Systems	0	0	3	3	2
2.	HS-1081	Professional Communication Lab	0	0	2	2	1
	Total of Sessional					**5**	**3**
	Grand Total					**30**	**25**
3.	EAA – 1	Extra Academic Activity					P/NP

FIRST SEMESTER
(SCHEME-II)

Sl. No.	Course Code	Subject	L	T	P	Total	Credit
	Theory						
1.	MA-1001	Mathematics – I	3	1	0	4	4
2.	PH-	Physics – I	3	0	0	3	3
3.	CS-1001	Programming in C	3	0	0	3	3
4.	EC-1001	Basic Electronics	3	0	0	3	3
5.	HS-1001	Professional Communication	3	0	0	3	3
	Total of Theory					**16**	**16**
	Practical						
1.	PH-1091	Physics Lab – I	0	0	3	3	2
2.	EC-1091	Basic Electronics Lab	0	0	3	3	2
3.	CS-1091	Computer Programming Lab	0	0	3	3	2
	Total of Practical					**9**	**6**
	Sessionals						
1.	ME-1081	Basic Manufacturing Systems	0	0	3	3	2
2.	HS-1081	Professional Communication Lab	0	0	2	2	1
	Total of Sessionals					**5**	**3**
	Grand Total					**30**	**25**

SECOND SEMESTER
(SCHEME-II)

Sl. No.	Course Code	Subject	L	T	P	Total	Credit
	Theory						
1.	MA-1002	Mathematics – II	3	1	0	4	4
2.	PH-1002	Physics – II	3	0	0	3	3
3.	CH-1001	Chemistry	3	1	0	4	4
4.	ME-1001	Engg. Mechanics	3	1	0	4	4
5.	EE-1001	Electrical Science	3	0	0	3	3
	Total of Theory					**18**	**18**
	Practical						
1.	PH-1092	Physics Lab – II	0	0	3	3	2
2.	CH-1091	Chemistry Lab	0	0	3	3	2
3.	EE-1091	Electrical Science Lab	0	0	3	3	2
	Total of Practical					**9**	**6**
	Sessionals						
1.	CE-1081	Engg. Graphics	0	0	3	3	2
	Total of Sessional					**3**	**2**
	Grand Total					**30**	**26**
2.	EAA – 1	Extra Academic Activity					P/NP

PHYSICS COURSE

Course Objective:

- ✓ Basics Principles of Optics & E.M. Theory
- ✓ Applications to different Sectors
  - (i) Optical Devices
  - (ii) Communication
  - (iii) Electromagnetic wave propagation
  - (iv) Radiating Systems (Antenna) applications

Physics -I (PH-1001) L-T-P-3-0-0 Cr-3

PART-1 (OPTICS)

(i) Interference: (6Hrs)

Condition of Interference, Analytical methods, Energy distribution, wedge shaped thin film, colors in thin film, Newton's ring (determination of λ and μ).

(ii) Diffraction : (5Hrs)

Types of diffraction, Fraunhoffer diffraction at single slit, plane transmission grating, determination of wavelength of light. Missing order spectra

(iii) Polarization : (5Hrs)

Polarization, circularly and elliptically polarized light, Malus law, Brewster's law, Double refraction, Nicol prism as polarizer and analyzer, optical activity (qualitative), Half shaded Plate.

(iv) Laser : (3Hrs)

Absorption, Spontaneous and stimulated emission, Einstein's coefficient in Laser, population inversion, pumping, Ruby and gas laser, Application.

(v) Fiber optics : (3Hrs)

Principle, types of fiber, acceptance angle, numerical aperture, signal propagation in optical fiber, attenuation, signal loss and dispersion.

PART- II (Electromagnetic theory): (14Hrs)

(i) Vector calculus: Elementary idea of gradient, divergence and curl of a vector field, Gauss's divergence theorem and Stokes' theorem (Statements only)

(ii) Coulomb's law in Electrostatics, Gauss's law in Electrostatics, Biot-savart's law, Ampere's circuital law, Faraday's law in electromagnetic induction, displacement current,

(iii) Maxwell's electromagnetic equations in differential and integral form,

(iv) Electromagnetic wave equations, Solution of wave equation in free space, Transverse nature of e. m. wave, Scalar and vector potential, Pointing vector.

Text Books:

1. Engineering Physics, B. K. Pandey & S. Chaturbedi, Pub.Cengage, New Delhi, 2013.
2. Concepts of Modern physics, A. Beiser, Pub. TMH, 1963
3. Elements of Electromagnetic, S.P. Seth, Pub. Dhanpat Rai, 2001

Reference Books:

1. *Engineering Physics*, *Gaur* and S.C. *Gupta*, *Dhanpat Rai Publications, New Delhi*, 2003.
2. Fundamentals of Optics. A.F.*Jenkins* & E.H.*White , Pub,McGraw-Hill , 1953*
3. Introduction to Electrodynamics, David J. Griffiths, Wily, 3rd Edition, 2003.
4. *Optics, A. K. Ghatak, TMH, 2nd Edition, New Delhi, 2008.*
5. *Elements of Electromagnetics, M.N.O. Sadiku*, *Oxford University Press*, 3rd edition New Delhi, 2009.
6. M*odern* Engineering Physics, *A.S. Vasudeva*, Pub. *S*. *Chand* , New Delhi, 2013

PHYSICS PRACTICAL-I (PH-1091) L-T-P- 0-0-3 CR-2

List of the Experiments:

1. Determination of “g” by Bar Pendulum
2. Determination of λ by Newton's Rings experiment.
3. Determination of (e+d) of plane diffraction grating by Spectrometer.
4. Study of transistor characteristics of 'BJT' calculation of its parameters.
5. Determination of μ of unknown liquid by Boy's method.
6. Determination of Young’s Modulus by Bending of Beam method.
7. Determination of time constant using “RC” circuit
8. Determination of λ and dλ by Michelson's Interferometer.
9. Determination of velocity of Sound by Resonance column method.

PHYSICS COURSE

Course Objective:

- ✓ Basics Principles of Quantum Physics
- ✓ Applications to different Sectors
  - (i) Semiconductor Devices
  - (ii) Superconductivity
  - (iii) Engineering Materials

Physics -II (PH-1002) L-T-P-3-0-0 Cr-3

PART-1: Quantum Mechanics: (18Hrs)

(i) **Particle nature of radiation**, Black body radiation, Photo-electric effect, Compton scattering,

(ii) **Dual nature of matter**, de- Broglie hypothesis, matter wave, Group velocity and Phase velocity, uncertainty relation,

(iii) **Schrodinger's wave equation** (time dependent and time independent). Wave function and its physical interpretation,

(iv) **One dimensional problems** involving particle in a box of infinite potential height, potential step, potential barrier and tunneling.

PART-2 Solid – State Physics: (18Hrs)

(i) **Crystallography:**

Lattice, basis and crystal structure, unit cell, crystal systems, no of atoms per unit cell, coordination number, packing fraction for cubic and hcp lattice, Lattice plane, Miller indices, relation between interplaner distance and miller indices, Bragg's law, X-ray diffraction.

(ii) **Semiconductor Physics :**

Energy Band in Solids, Classification of Solids: Conductor, Semiconductor and Insulator, Intrinsic and extrinsic semiconductors: Fermi level, carrier concentration, conductivity, mobility and resistivity.

(iii) **Superconductivity:**

Transition temperature, critical magnetic field, Meissner's effect, Type-I & Type-II superconductors

Text Books:

1. Engineering Physics, B. K. Pandey & S. Chaturbedi, Pub.Cengage, New Delhi, 2013.
2. Concepts of Modern physics, A. Beiser, Pub. TMH, 1963

Reference Books:

1. *Engineering Physics*, *Gaur* and S.C. *Gupta*, *Dhanpat Rai Publications, New Delhi*, 2003.
2. Quantum Physics, S. Gasiorowicz, John Wiley & Sons, 2nd Edition New York NY, 1996
3. M*odern* Engineering Physics, *A.S. Vasudeva*, Pub. *S*. *Chand*, New Delhi, 2013
4. *Introduction to Solid State Physics* , *Charles Kittel,,* Pub. *Wiley*; 8th edition, 2004.

PHYSICS PRACTICAL-I (PH-1092) L-T-P- 0-0-3 CR-2

List of the Experiments:

1. Study of 'FET' characteristics and calculation of parameters.
2. Determination of Specific Rotation of Sugar Solution using Polari meter.
3. Study of Photocell Characteristics.
4. Determination of Refractive Index of a solids / liquid using Travelling Microscope.
5. Study of Solar Cell characteristics
6. Determination of minimum deviation from I-D curve using Spectrometer
7. Determination of Modulus of rigidity by Dynamic Method.
8. Comparison of emfs of two primary cells using Potentiometer.
9. Determination of “d” of a thin wire by Diffraction method using Laser Source.

MATHEMATICS COURSE

Course Objective:

Mathematics is the base of engineering. Mathematics-I and Mathematics-II are the extension of higher secondary level. By covering this course, the students will be able to know mathematical techniques and tools in differential equations, calculus, matrixes, transforms and vector to solve the problems arising in engineering field.

Subject: Mathematics-I (MA-1001) L-T-P: 3-1-0 CR-4

Ordinary Differential Equations: (12 hours)

Basic concepts and definitions of 1^{st} 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^{nd} and higher order: (10 hours)

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 hours)

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

Matrices, determinants, linear system of equations: (11 hours)

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 hours)

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 ,9th 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,36th edition
2. Dass H.K., Introduction to engineering Mathematics, S.Chand & Co Ltd, 11th 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

Mathematics-II (MA-1002) L-T-P: 3-1-0 CR-4

Laplace Transforms: (10 hours)

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 hours)

Power series; radius of convergence, power series method, Frobenious 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 hours)

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

Vector Differential Calculus: (04 hours)

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 hours)

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, 9th edition.

Reference books

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

CHEMISTRY COURSE

Course Objectives:

- ✓ *Introduce students to fundamental aspects of Chemistry.*
- ✓ *To develop idea on feasibility, mechanism and rate of a process including a chemical reaction.*
- ✓ *Introduce students to environmental friendly design of chemical products and processes (Green Chemistry).*
- ✓ *To develop basic idea on spectroscopic techniques for characterization of organic molecules.*
- ✓ *To make the students aware of nano-materials.*

Chemistry (CH-1001) L-T-P: 3-1-0 CR-4

1. **Structure & Bonding**: Failure of classical mechanics, Dual character of matter (with verification), Heisenberg uncertainty principle, Scrodinger equation (derivation not required), idea of quantization in boundary system, Significance and interpretation of wave function, Concept of orbitals, origin of radial and angular wave function and corresponding plots, LCAO-MO theory, energy level diagrams for homo and hetero nuclear diatomic molecules, Metallic bonding (Band theory), Bonding in complexes (VBT and CFT), application in explaining magnetic moment and color in complexes**.** **(11Hrs)**
2. **Electrochemistry and Corrosion**: Brief introduction to equilibrium thermodynamics, Conductance, dilution effect**,** Electrochemical cell, types of electrodes, electrode and cell potential and their measurement, Nernst equation and applications (EMF, pH, K_{SP} and K_{eq}), Thermodynamics of Cell, Primary and Secondary cell, Different types of fuel cells, Corrosion (types and mechanism) and prevention. **(09 Hrs)**
3. **Kinetics and Catalysis**: Rate laws, rate laws for multi step reactions using steady state approximation (excluding chain reactions), theories of reaction rate: Collision theory (rate expression), Lindeman modification, Absolute reaction rate theory (rate expression), Catalysis: types, theories, kinetics of enzyme catalysis**,** introduction to Green Chemistry with reference to catalysis. **(08 Hrs)**
4. **Spectroscopy**: Interaction and relation with matter, types of spectroscopy. UV-Vis spectroscopy: different electronic transitions, basic concept of selection rule, factors affecting λ_{max}**,** calculation of λ_{max} for ene- and enone- system, IR spectroscopy: different vibrational modes, fundamental band and overtones, calculation of stretching frequencies, application to functional group transformation and distinction of functional isomers. **(08 Hrs)**
5. **Organic Reaction Mechanism**: Electronic effects and reaction intermediates, Nucleophilic substitution reactions, electrophilic aromatic substitution, electrophilic and free radical addition reactions, Nucleophilic addition to carbonyl groups, Organo-metallic compounds, study of selected organic reactions. **(09 Hrs)**

6. **Nano Materials**: Introduction to confined electronic system, nano-materials, Graphite, Fullerenes, Carbon nano-tubes, nano-wires, nano-cones, Application of nano-materials. **(03 Hrs)**

Text Books

1. A Text Book Of Engineering Chemistry, Shashi Chawala, 2013, Dhanpat Rai & Co.
2. Elementary Organic Spectroscopy; Principles And Chemical Applications, Y.R. Sharma, 5th Edition, S. Chand & Company Ltd.

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*; 42nd Edition, 2007, Vishal Publishing Co.
3. Elements of Physical Chemistry- *Samuel Glasstone;* 2nd Edition, Macmillan
4. Organic Chemistry, *R.T. Morrison and R.N. Boyd;* 6th Edition, Prentice Hall International
5. Reaction mechanism in Organic Chemistry- *S.M. Mukharjee and S.P. Singh;* 3rd Edition, 2000, Macmillan
6. Spectrometric identification of Organic compounds, 7th Edition- Robert M. ***Silverstein,*** *Francis X. Webster, David J. Kiemle;* John Wiley & Sons, INC.
7. Nano-Materials- *A.K. Bandopadhya;* 2008, New Age International
8. Green Chemistry: Environment Friendly Alternatives*, R. Sanghi, M.M. Srivastava* ; 2003, Alpha Science

International Limited

9. Engineering Chemistry-I- *B.B. Patra, B. Samantray,* 2011*,* Pearson
10. Engineering Chemistry- *P. Rath*, 3rd Edition, Cengage Learning

CHEMISTRY PRACTICAL (CH-1091) L-T-P - 0 - 0-3 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_2 in Bleaching powder.

HUMANITIES COURSE

Course Objective:

The objective of the course is to equip the students with the four important skills of communication, i.e LSRW skills. The course aims at helping the taught:

- To know the importance and techniques of active listening skills in order to improve professional communication skills. (to be covered in the Professional communication lab classes)
- To enhance the speaking skill through pronunciation, stress and tone.
- To improve reading skill through reading, comprehending and retaining information.
- To develop writing skill by applying writing techniques / tools in practice sessions.
- To orient the students on vocabulary, analogy,sentence completion and sentence correction and GDPI techniques .

PROFESSIONAL COMMUNICATION (HS1001) L-T-P-3-0-0 CR-3

UNIT-1 - OVERVIEW OF COMMUNICATION **10hrs**

Concept and Meaning, Process of Communication, Methods-Verbal/Non-Verbal, Spoken/Written, Channels, Barriers of Communication

UNIT-2 - FUNDAMENTALS OF GRAMMAR **8hrs**

Time, Tense & Aspect, Types of Verbs, Subject-Verb Agreement, Articles, Prepositions, Active-Passive Voice, Vocabulary, Verbal Analogy, Sentence completion, Reading Comprehension.

UNIT-3 - WRITTEN COMMUNICATION & ANALYSIS **10hrs**

Principles of Effective Writing, Plain English and Bias-free English, Writing Business Letters (Enquiries, Quotations, Orders, Complaint Letters),Writing short Technical Reports -Types, Formats, Importance, pre-writing, structure of report, revising a report, editing, proof reading of report and sample reports

UNIT-4 - EFFECTIVE ORAL COMMUNICATION **8hrs**

Basic Sounds of English, Stress, Intonation,
Group Discussion Strategies, Job Interviews

Text Book:

1. *Technical Communication Principle & Practice.*Minakshi Raman & Sangeeta Sharma, OUP.

Reference Books:

1. *Effective Technical Communication.* M. Ashraf Rizvi, TMH Publication.

2. *Speaking and Writing for Effective Business Communication.* Francis Soundaryaraj. Macmilan: India.
3. *Communicative Grammar.* Geoffery Leech & Jan Svartvik, Longman: London.
4. *Business Communication.* S.M.Rai and Urmila Rai, Himalaya Publication: Mumbai.
5. *Placement Interviews,Skills for Success.* S. Anandamurugan.Tata McGraw Hill Education Private Limited:New Delhi
6. *BCOM,A South-Asian Perspective*.2e.Carol.M.Lehman.,Debbie D. Dufrene and Mala Sinha. Cengage Learning Pvt. Ltd.: New Delhi
7. How to prepare for Group Discussion and Interview. 2nd Edition. Hari Mohan Prasad and Rajnish Mohan,Tata McGraw Hill:New Delhi 2006
8. English Vocabulary in use (advance) by Michacl McCarthy, Felicity O Dell, Cambridge University Press,UK,1st edition, 2002
9. Practical English usage by Michel Swan, Oxford University Press,USA,3rd edition,2005
10. Oxford English Grammar by Sidney Greenbaum, Oxford University Press:USA,1st Edition,1996
11. Verbal Ability and Reading Comprehension for the CAT. Arun Sharma and Meenakshi Upadhyay,Tata Mcgraw-Hill:New Delhi.

PROFESSIONAL COMMUNICATION LAB HS1081 L-T-P-0-0-2 CR-01 (Sessional)

Course Objective

To impart and augment basic communication skills in English through intensive practice so as to enable the learners to use the target language in the professional sphere of their life.

Assignments

1. Time & tense are not the same
2. Subject-Verb Agreement & Formulae Expression
3. Job Application Letter & Functional Resume
4. Aural Skills
5. Oral Presentation
6. Reading Comprehension
7. Idioms / Articles / Vocabulary / Preposition
8. Group Discussion
9. Attendance and Record
10. Viva

Minimum 7 assignments out of 8 assignments has to be carried out in one semester.

ENGINEERING MECHANICS COURSE

Course Objective:

C1 : To impart knowledge in basic analytical method and techniques in Engineering Mechanics.

C2 : To enhance students ability to design by requiring the solution of open ended problems.

C3 : To prepare the students for higher level courses such as courses in Mechanics of Solids, mechanical Design and Structural Analysis.

Engineering Mechanics (ME-1001) L-T-P-3-0-0 CR-4

Concurrent Forces in a Plane: (10 Hrs)

Introduction to Engg. 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 of Plane Figures: (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: **(3 Hrs)**

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

Rotation of a rigid body: **(2 Hrs)**

Kinematics of rotation, Rotation under the action of a constant moment

Text Book

1. *Engineering Mechanics – S Timoshenko, D.H Young & J.V. Rao-TMH ,2012*

Reference Books

1. *Engineering Mechanics (Statics and Dynamics)- Bear and Johnson, TMH, 6/e, 2009*
2. *Engineering Mechanics –S.S. Bhavikatti, New Age International, 2008 Edition*

ELECTRICAL SCIENCE COURSE

Course Objective:

Engineering education has a number of specializations in B Tech programmes. A fundamental knowledge of Electrical Engineering is essential for students of any discipline for future studies. In Electrical Science, students will learn basic concepts of electrical and magnetic circuits, electrical machines, electrical measurements, power systems and illumination.

Electrical Science (EE-1001) L-T-P-3-0-0 CR-3

Contents

Introduction to Networks: Basic Quantities: Electric Field, Electro Motive Force, Electric field intensity, Work, Power, Energy, Potential gradient, Basic Circuit Elements: Resistances, Inductance, Capacitance; Ohm's law, Kirchhoff's law **(3 Hrs)**

DC Circuit Analysis: Series and Parallel Networks, Current Division Rule, Star-Delta Transformation, Mesh Analysis, Nodal Analysis, Network Theorems: Superposition Theorem, Thevenin's theorem, Norton's theorem**.** **(6 Hrs)**

AC circuits: Terminology related to AC: Instantaneous value, Wave Form, Cycle, Period, Frequency, Amplitude, RMS Value, Average Value, Form Factor, Peak Factor, Phasor Algebra, Power in AC Circuits, power factor, AC series and parallel circuits, Resonance in series and parallel circuits, Three phase AC circuits: Three phase voltage and current, star and delta connections, Measurement of power and power factor by two-wattmeter method. **(8 Hrs)**

Magnetic circuits: Concepts of Magnetism and Electromagnetism, Basic Definitions: MMF, magnetizing force, magnetic flux, flux density, permeability, reluctance, permeance, leakage flux, Analogy between Electric Circuit and Magnetic Circuits, B-H curve, hysteresis and eddy current loss, Faraday's Laws of Electromagnetic Induction**.** **(3Hrs)**

Electrical Machines: DC Generator, DC Motor, Single-phase transformer, Three-Phase Induction Motor, Three-phase alternator. (*Only briefing about Definition, Types, Construction, principle of operation, and Uses, No Derivation is required*). **(8 Hrs)**

Measurement of Electrical Quantity: Principle and uses of moving coil instruments, Principle and uses of Moving Iron Instruments, Principle and uses of dynamometer type wattmeter, Principle and uses of induction type energy-meter**.** **(3 Hrs)**

Power System: Components, General lay out of Power System, Primary Sources of Energy, Types and characteristics of Generating Station (Thermal, Hydel, Solar Plant)Types and uses of domestic wiring, Earthing, Electrical safety in Industry. **(6 Hrs)**

Illumination: Terminology: Luminous Flux, Luminous Intensity, Lumen, Candela Power, Illumination, Brightness, Types of lamps: Incandescent lamp, Fluorescent Tube Lamp, Compact Fluorescent lamp, Light Emitting Diode Lamp. **(3 Hrs)**

Text Books

1. Basic Electrical Engineering-D P Kothari, I J Nagrath, Tata Mcgraw-Hill Publishing Company, New Delhi (Revised 3rd Edition)
2. Principles of Electrical Engineering and Electronics- V K Mehta, Rohit Mehta , S Chand and Company , New Delhi. (Revised Edition,2013)

Reference Books

1. Basic Electrical Engineering- T.K.Nagsarkar and M.S.Sukhija, Oxford University Press.
2. Electrical Engineering, Concepts and Applications, P.V.Prasad and S.Sivanagarraju, CENGAGE Learning.
3. Basics Electrical Engineering Sanjeev Sharma, I.K.International, New Delhi. (Third Reprint 2010).
4. Basic Electrical Engineering Abhijit Chakrabarti, Sudip Nath, Chandan Kumar Chnada, Tata McGraw-Hill publishing Limited, New Delhi.

ELECTRICAL SCIENCE LAB (EE-1091) L-T-P- (0-0-3) CR-2

List of Experiments:

1. Measurement of Resistance of Tungsten Filament Lamp.
2. Measurement of Inductance of a Iron Core Choke coil.
3. Study and use of Megger.
4. Study of different parts of D.C machine.
5. Study of different parts of Three phase Induction motor
6. Study of different parts of 3-phase core type transformer.
7. Measurement of voltage transformation ratio of single phase transformer.
8. Speed control of DC shunt motor by Field Flux Control Method.
9. Speed control of DC shunt motor by Armature Rheostatic Control Method.
10. Starting and speed control of three phase slip-ring and squirrel cage induction motor.
11. To perform open circuit and short circuit test on a single phase transformer.
12. Study of 3Ø Connection (Star/Delta)
13. Study and Connection of Fluorescent Lamp and Sodium Vapour Lamp.
14. Verification of KCL and KVL (Series and parallel Network)

BASIC ELECTRONICS COURSE

Course objective:
To learn the fundamentals of Electronics Engineering required to comprehend engineering problems related to Electronics domain.

Basic Electronics (EC-1001) L-T-P-3-0-0 CR-3

Course content:

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 π 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

3. Electronic Devices and Circuits – D. A. Bell - 5th Edition (Oxford)
4. Electronics –Fundamentals & Applications –D. Chattopadhyay and P. C. Rakshit - 11th Edition (New Age International)

Reference Books

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

BASIC ELECTRONICS LAB (EC-1091) L-T-P 0-0-3 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.

COMPUTER PROGRAMMING COURSE

Course Objective:

- ✓ To gain basic knowledge of computer organization, number systems and software
- ✓ To gain skills of writing, compiling and executing C programs
- ✓ To develop problem solving skills through algorithms and C programming

Programming in C (CS-1001) L-T-P-3-0-0 CR-3

Introduction to Computer and Programming: (5 Hrs)
Basic concepts of computer organization, CPU, Memory. I/O devices, Number Systems,
Evolution of programming languages, structured programming,
Compilation process, source code, object code, executable code,
Operating systems, interpreters, linkers, loaders,
Algorithms, flow charts, pseudo-code

Program Constructs: (5 Hrs)
Character set, Identifiers, Keywords, Data Types, Constant and Variables,
Operators: Precedence and associativity, Expressions, Statements,
Input and Output functions, Control structures: Branching & Looping.

Functions: (5 Hrs)
Library and User defined functions, Formal and Actual parameters, function prototypes,
Parameter passing: Call-by-value, Call-by-reference, Recursion, Storage Classes.

Arrays and Strings: (5 Hrs)
One dimensional Array, Multidimensional Array and their applications, String Manipulation.

Pointers: (4 Hrs)
Pointer variable, Pointer Arithmetic, passing parameters by reference, pointer to pointer,
pointers to functions, dynamic memory allocation.

Structures, Unions: (4 Hrs)
Structures, Unions, pointer to structure & pointer to union, linked list,

File Handling: (4 Hrs)
Declaration of file pointer, opening and closing files, Working with text and binary files

Additional Features: (4 Hrs)
Command line arguments, bit wise operators, enumerated data types, type casting, macros,
Preprocessor directives.

Text Books

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

Reference Books

1. Programming in C – Byron Gottfried,Third Edition, 2010, TMH
2. The 'C' programming language , Ritchi, Kernighan, Second Edition, 2012 D.M.Ritchie, PHI
3. Programming in ANSI C – E. Balaguruswami, Sixth Edition, TMH
4. C The Complete Reference - H.Sohildt, Fourth edition,2000 TMH
5. Let us C - Y. Kanetkar, Twelfth Edition, 2012, BPB Publications
6. Computer Science - A Structured Programming Approach using C – B.A. Forouzan & R.F. Gillberg, Third Edition, 2007, Cengage Learning

COMPUTER PROGRAMMING LAB (CS-1091) L – T – P : 0 – 0 – 3 CR-2

List of Experiments:

1. Learning some of the Linux Commands
2. Programming in C to learn basic printf and scanf functions in C
3. Programming in C to learn the use of control statements
   (if-else, nested if-else, switch-case, conditional operators etc.)
4. Programming in C to learn various looping constructs
   (while, do-while, for, if and goto, break, continue etc.)
5. Programming in C to learn single dimensional and multi dimensional arrays
   (integer arrays, float arrays, matrix operations etc.)
6. Programming in C to learn functions
   (library functions, user defined functions, parameter passing by values, passing arrays etc.)
7. Programming in C to learn about recursive functions
8. Programming in C to learn about strings and operations on strings
   (strlen, strcpy, strcnp, strcat etc.)
9. Programming in C to learn about pointers
   (parameter passing by reference, passing arrays and functions as parameters, pointer arithmetic etc.)
10. Programming in C to learn about structures and unions
    (records inputting, processing and outputting, passing structures as parameters, addition of time, addition of distance etc.)

11. Programming in C to learn file handling
    (file opening, file closing, file copying, file appending etc.)
12. Programming in C to learn about special features in C
    (command line arguments, macros, enum data types, bitwise operators etc.)

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