J.C. Bose University of Science & Technology, YMCA, Faridabad
(A Haryana State Government University)
(Established by Haryana State Legislative Act No. 21 of 2009 & Recognized by UGC Act 1956 u/s 22 to Confer Degrees)
Accredited 'A' Grade by NAAC

Dated: 21/12/2022

Ref. No. _____

CERTIFICATE

This is to certify that the scheme & syllabi of B.Tech (CE/IT/CSE/CE(Hindi Medium)/CE with Specialization in Data Science/CE with Spec in AI ML) course name & scheme) is duly approved by the competent body/authority and to the best of my knowledge the contents of the same, are correct in all respect.

This Scheme & Syllabus has been approved in 15th (meeting no.) of BOS held on dated 12/10/2021.

Professor and
21/12/22

Signature & Stamp of Chairperson

Date: 21/12/2022

Name: Prof. Atul Mishra

Deptt. Name Computer Engineering

J C BOSE UNIVERSITY OF SCIENCE & TECHNOLOGY, YMCA, FARIDABAD

B.Tech (Computer Engineering/Information Technology/Computer Science & Engineering/ CE(Hindi Medium)/ CE with Specialization in Data Science/ CE with Specialization in Artificial Intelligence & Machine Learning)

Scheme of Studies/Examination

Semester -I Course Structure

S.No.	Course Notation	Category	Course Code	Course Title	Hours per week			Credits	Sessional Marks	External Marks	Total
					L	T	P				
1	B	BSC	BSC101D	Physics(Semiconductor Physics)	3	1	-	4	25	75	100
2	C	BSC	BSC103E	Mathematics-I (Calculus & Linear Algebra)	3	1	-	4	25	75	100
3	A	ESC	ESC101A	Basic Electrical Technology	3	1	-	4	25	75	100
4	B	ESC	ESC102A/21	Engineering Graphics & Design	-	-	4	2	30	70	100
5	A	BSC	BSC 102	Chemistry	3	1	-	4	25	75	100
6	B	ESC	ESC103	Programming for Problem solving	3	-	-	3	25	75	100
7	C	ESC	ESC104A/21	Workshop- I	-	-	4	2	30	70	100
8	A	HSMC	HSMC101	English	2	-	-	2	25	75	100
9	B	BSC	BSC104D	Physics lab	-	-	3	1.5	15	35	50
10	A	ESC	ESC107A	Basic Electrical Technology Laboratory	-	-	2	1	15	35	50
11	A	BSC	BSC 105	Chemistry Lab	-	-	3	1.5	15	35	50
12	B	ESC	ESC105	Programming for Problem solving Lab	-	-	4	2	15	35	50
13	A	HSMC	HSMC102	English Lab	-	-	2	1	15	35	50

Note: Exams duration will be as under

a. Theory exams will be of 03 hours duration.
b. Practical exams will be of 02 hours duration
c. Workshop exam will be of 03 hours duration

Important Notes:

Significance of the Course Notations used in this scheme: -

C = These courses are common to both the groups Group-A and Group-B.

A = Other compulsory courses for Group-A.

B = Other compulsory courses for Group-B.

Students will study either

Group A (BSC103,ESC101A, BSC102,ESC104A,HSMC101,ESC105,BSC105,HSMC102)

OR

Group B (BSC101, BSC103A/B,ESC102A/21,ESC103,ESC104A/21,BSC104,ESC105)

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Scheme of Studies/Examination

Semester -II Course Structure

S.No.	Course Notation	Category Code	Course Code	Course Title	Hours per week			Credits	Sessional Marks	External Marks	Total
					L	T	P				
1	A	BSC	BSC101D	Physics(Semi-Conductor Physics)	3	1	-	4	25	75	100
2	C	BSC	BSC106E	Mathematics-II (Probability and Statistics)	3	1	-	4	25	75	100
3	B	ESC	ESC101A	Basic Electrical Technology	3	1	-	4	25	75	100
4	A	ESC	ESC 102A/21	Engineering Graphics & Design	-	-	4	2	30	70	100
5	B	BSC	BSC 102	Chemistry	3	1	-	4	25	75	100
6	A	ESC	ESC103	Programming for Problem solving	3	-	-	3	25	75	100
7	C	ESC	ESC106A/21	Workshop- II	-	-	4	2	30	70	100
8	B	HSMC	HSMC101	English	2	-	-	2	25	75	100
9	A	BSC	BSC104D	Physics lab	-	-	3	1.5	15	35	50
10	B	ESC	ESC107A	Basic Electrical Technology Laboratory	-	-	2	1	15	35	50
11	B	BSC	BSC 105	Chemistry Lab	-	-	3	1.5	15	35	50
12	A	ESC	ESC105	Programming for Problem solving	-	-	4	2	15	35	50
13	B	HSMC	HSMC102	English Lab	-	-	2	1	15	35	50

Note: Exams duration will be as under

a. Theory exams will be of 03 hours duration.
b. Practical exams will be of 02 hours duration
c. Workshop exam will be of 03 hours duration

S.No.	Course code	Course Title	Branch
1	**BSC101D**	**Physics** (Semiconductor Physics)	**Computer Engineering, Computer Science & Engineering, Information Technology. Computer Engineering (Specialization in Data Science)**
2	**BSC103 E**	**Mathematics-I (**Calculus and Linear Algebra)	**Computer Engineering, Computer Science & Engineering, Information Technology, Computer Engineering (Specialization in Data Science)**
3	**BSC106 E**	**Mathematics-II (**Probability & Statistics)	**Computer Engineering, Computer Science & Engineering, Information Technology, Computer Engineering (Specialization in Data Science)**

DETAILED CURRICULUM CONTENTS

Undergraduate Degree in Engineering & Technology

Branch/Course:

B.Tech (Computer Engineering/Information Technology/Computer Science & Engineering/ CE(Hindi Medium)/ CE with Specialization in Data Science/ CE with Specialization in Artificial Intelligence & Machine Learning)

First year (First & Second semester)

Course code	BSC102(Th)/BSC105(Lab)				
Category	Basic Science Course				
Course title	**Chemistry (Theory & Lab.)** **Contents** (i) Chemistry-I (Concepts in chemistry for engineering) (ii) Chemistry Laboratory				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester –I/II
	3	**1**	**3**	**5.5**	
Pre-requisites (if any)	-				

(i) Chemistry (Concepts in chemistry for engineering) [L : 3; T:1; P : 0 (4 credits)]

Detailed contents

(i) **ATOMIC AND MOLECULAR STRUCTURE (12 LECTURES)**

Schrodinger equation. Particle in a box solutions and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicenter orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

(ii) **SPECTROSCOPIC TECHNIQUES AND APPLICATIONS (8 LECTURES)**

Principles of spectroscopy and selection rules, Electronic spectroscopy, Fluorescence and its applications in medicine, Vibrational and rotational spectroscopy of diatomic molecules, Applications, Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques, Diffraction and scattering.

(iii) **INTERMOLECULAR F O R C E S AND POTENTIAL ENERGY SURFACES (4 LECTURES)**

Ionic, dipolar and van Der Waals interactions, Equations of state of real gases and critical phenomena, Potential energy surfaces of H3, H2F and HCN and trajectories on these surfaces.

(iv) **USE OF FREE ENERGY IN CHEMICAL EQUILIBRIA (6 LECTURES)**

Thermodynamic functions: energy, entropy and free energy, Estimations of entropy and free energies, Free energy and emf. Cell potentials, the Nernst equation and applications, Acid base, oxidation reduction and solubility equilibria, Water chemistry. Corrosion, Use of free energy considerations in metallurgy through Ellingham diagrams.

(v) **PERIODIC PROPERTIES (4 LECTURES)**

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

(vi) **STEREOCHEMISTRY (4 LECTURES)**

Representations of 3 dimensional structures, structural isomers and stereoisomers,

configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds

(vii) **ORGANIC REACTIONS AND SYNTHESIS OF A DRUG MOLECULE (4 LECTURES)**

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

Suggested Text Books

1. University chemistry, by B. H. Mahan
2. Chemistry: Principles and Applications, by M. J. Sienko and A. Plane
3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, amaluddin and M. S. Krishnan
5. Physical Chemistry, by P. W. Atkins
6. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition

Course Outcomes

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- List major chemical reactions that are used in the synthesis of molecules.

(ii) Chemistry Laboratory [L : 0; T:0 ; P : 3 (1.5 credits)]

Choice of 10-12 experiments from the following:

- Determination of surface tension and viscosity
- Thin layer chromatography
- Ion exchange column for removal of hardness of water
- Determination of chloride content of water
- Colligative properties using freezing point depression
- Determination of the rate constant of a reaction
- Determination of cell constant and conductance of solutions
- Potentiometry - determination of redox potentials and emfs
- Synthesis of a polymer/drug
- Saponification/acid value of an oil
- Chemical analysis of a salt
- Lattice structures and packing of spheres
- Models of potential energy surfaces
- Chemical oscillations- Iodine clock reaction
- Determination of the partition coefficient of a substance between two immiscible liquids

- Adsorption of acetic acid bycharcoal
- Use of the capillary viscometers to the demonstrate of the isoelectric point as the pH of minimum viscosity for gelatin sols and/or coagulation of the white part of egg.

Laboratory Outcomes

- The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:
- Estimate rate constants of reactions from concentration of reactants/products as a function of time
- Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc
- Synthesize a small drug molecule and analyse a salt sample

Course code	BSC101D (Th)/BSC104 (Lab)				
Category	Basic Science Course				
Course title	**Physics (Theory & Lab.)** **Contents** (i) Semiconductor Physics (ii) Physics Laboratory				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester –I/II
	3	**1**	**3**	**5.5**	
Pre-requisites (if any)	Introduction to Quantum Mechanics				

(i) Physics (Semiconductor Physics) [L : 3; T:1; P : 0 (4 credits)]

UNIT 1: ELECTRONIC MATERIALS (8)

Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect band gaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass, Phonons.

UNIT 2: SEMICONDUCTORS (10)

Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices.

UNIT 3: LIGHT-SEMICONDUCTOR INTERACTION (6)

Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Joint density of states, Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain; Photovoltaic effect, Exciton, Drude model.

UNIT 4: MEASUREMENTS (6)

Four-point probe and van der Pauw measurements for carrier density, resistivity, and hall mobility; Hot-point probe measurement, capacitance-voltage measurements, parameter extraction from diode I-V characteristics, DLTS, band gap by UV-Vis spectroscopy, absorption/transmission.

UNIT 5: ENGINEERING SEMICONDUCTOR MATERIALS (6)

Density of states in 2D, 1d and 0D (qualitatively). Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques. Heterojunctions and associated band-diagrams

References:

(i) J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
(ii) B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
(iii) S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
(iv) A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications,

OxfordUniversity Press, New York (2007).
(v) P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).
(vi) Online course: “Semiconductor Optoelectronics” by M R Shenoy on NPTEL
(vii) Online course: "Optoelectronic Materials and Devices" by Monica Katiyar and Deepak Guptaon NPTEL

(ii) Semiconductor Physics Laboratory [L : 0; T:0 ; P : 3 (1.5 credits)]

At least 06 experiments from the following:

1. To study the V-I characteristics of a Zener diode and its use as voltage regulator.
2. Study of V-I & power curves of solar cells, and find maximum power point & efficiency.
3. To study the characteristics of a Bipolar Junction Transistor in CE configuration.
4. To study the various biasing configurations of BJT for normal class A operation.
5. To design a CE transistor amplifier of a given gain (mid-gain) using voltage divider bias.
6. To study the frequency response of voltage gain of a two stage RC-coupled transistor amplifier.
7. To study Hall effect and to determine hall coefficient for a semiconductor specimen.
8. To study the four –probe method and to determine the energy gap of a semiconductor specimen using Four – probe technique.
9. To find out the unknown low resistance by using Carey-Fosters bridge.
10. To determine the high resistance by substitution method.
11. To compare the capacitance of two capacitors by using De-Sauty’s bridge.

Note: Experiments may be added or deleted as per the availability of equipments.

Reference Books:

- Basic Electronics: A text lab manual, P.B.Zbar, A.P.Malvino, M.A.Miller, 1994, Mc-Graw Hill.
- OP-Amps and Linear Integrated Circuit, R. A. Gayakwad, 4th edition, 2000, Prentice Hall.
- Electronic Principle, Albert Malvino, 2008, Tata Mc-Graw Hill.
- Electronic Devices & circuit Theory, R.L.Boylestad & L.D.Nashelsky, 2009, Pearson.

Course code	BSC103E				
Category	Basic Science Course				
Course title	**Mathematics –I (Calculus and Linear Algebra)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester - I
	3	**1**	**0**	**4**	
Pre-requisites (if any)	-				

MODULE 1: CALCULUS: (6 HOURS)

Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.

MODULE 2: CALCULUS: (6 HOURS)

Rolle's theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima.

MODULE 3:MATRICES (IN CASE VECTOR SPACES IS TO BE TAUGHT) (8 HOURS)

Matrices, vectors: addition and scalar multiplication, matrix multiplication; Linear systems of equations, linear Independence, rank of a matrix, determinants, Cramer's Rule, inverse of a matrix, Gauss elimination and Gauss-Jordan elimination.

MODULE 4:VECTOR SPACES (PREREQUISITE 4B) (10 HOURS)

Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank- nullity theorem, composition of linear maps, Matrix associated with a linear map.

MODULE 5:VECTOR SPACES (PREREQUISITE 4B-C) (10 HOURS)

Eigenvalues, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, eigenbases. Diagonalization; Inner product spaces, Gram-Schmidt orthogonalization.

Textbooks/References:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
4. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
5. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th

Reprint, 2010.

6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
8. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

Course code	BSC106E				
Category	Basic Science Course				
Course title	**Mathematics -II (Probability and Statistics)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester-II
	3	**1**	**0**	**4**	
Pre-requisites (if any)	**-**				

MODULE 1: BASIC PROBABILITY (12 HOURS)

Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient, Chebyshev's Inequality.

MODULE 2: CONTINUOUS PROBABILITY DISTRIBUTIONS (4 HOURS)

Continuous random variables and their properties, distribution functions and densities, normal, exponential and gamma densities.

MODULE 3: BIVARIATE DISTRIBUTIONS (4 HOURS)

Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule.

MODULE 4: BASIC STATISTICS (8 HOURS)

Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation.

MODULE 5: APPLIED STATISTICS (8 HOURS)

Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

MODULE 6: SMALL SAMPLES (4 HOURS)

Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Text / References:

1. E. Kreyszig, " Advanced Engineering Mathematics", John Wiley & Sons, 2006.
2. P. G. Hoel, S. C. Port and C. J. Stone, "Introduction to Probability Theory" , Universal Book Stall, 2003.
3. S. Ross, " A First Course in Probability" , Pearson Education India, 2002.
4. W. Feller, " An Introduction to Probability Theory and its Applications" , Vol. 1, Wiley, 1968.
5. N.P. Bali and M. Goyal, " A text book of Engineering Mathematics" , Laxmi Publications,2010.

6. B.S. Grewal, “ Higher Engineering Mathematics” , Khanna Publishers, 2000.
7. T. Veerarajan, “ Engineering Mathematics” , Tata McGraw-Hill, New Delhi, 2010.

Course code	ESC103(Th)/ESC105(Lab)				
Category	Engineering Science Course				
Course title	**Programming for Problem Solving (Theory & Lab.)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester – I/II
	3	**0**	**4**	**5**	
Pre-requisites (if any)	-				

(i) Programming for Problem Solving ([L : 3; T:0; P : 0 (3 credits)] [contact hrs : 40]

UNIT 1: INTRODUCTION TO PROGRAMMING (4 LECTURES)

Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) - **(1lecture).**

Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. **(1 lecture)**

From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code- **(2 lectures)**

UNIT 2: ARITHMETIC EXPRESSIONS AND PRECEDENCE (2 LECTURES)

Conditional Branching and Loops **(6 lectures)**

Writing and evaluation of conditionals and consequent branching **(3 lectures)**

Iteration and loops **(3 lectures)**

UNIT 3: ARRAYS (6 LECTURES)

Arrays (1-D, 2-D), Character arrays and Strings

UNIT 4: BASIC ALGORITHMS (6 LECTURES)

Searching, Basic Sorting Algorithms (Bubble, Insertion and Selection), Finding roots of equations, notion of order of complexity through example programs (no formal definition required)

UNIT 5: FUNCTION (5 LECTURES)

Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference

UNIT 6: RECURSION (4 -5 LECTURES)

Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.

UNIT 7: STRUCTURE (4 LECTURES)

Structures, Defining structures and Array of Structures

UNIT 8: POINTERS (2 LECTURES)

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)

UNIT 9:

File handling (only if time is available, otherwise should be done as part of the lab)

Suggested Text Books

(i) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
(ii) E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Suggested Reference Books

(i) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Course Outcomes

The student will learn

- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical errors.
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

(ii)Laboratory - Programming for Problem Solving[L : 0; T:0 ; P : 4 (2credits)]

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting:
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls
Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation
Lab 11: Pointers and structures

Tutorial 12: File handling:
Lab 12: File operations

Laboratory Outcomes

- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program
- To be able to declare pointers of different types and use them in defining self- referential structures.
- To be able to create, read and write to and from simple text files.

Course code	HSMC 101(Th)/HSMC102(Lab)				
Category	Humanities and Social Sciences including Management courses				
Course title	**English (Theory & Lab.)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	Semester – I/II
	2	**0**	**2**	**3**	
Pre-requisites (if any)	-				

Detailed contents

1. VOCABULARY BUILDING

The concept of Word Formation
Root words from foreign languages and their use in English
Acquaintance with prefixes and suffixes from foreign languages in English to for derivatives. Synonyms, antonyms, andstandard abbreviations.

2. BASIC WRITING SKILLS

Sentence Structures
Use of phrases and clauses in sentences
Importance of proper punctuation
Creating coherence
Organizing principles of paragraphs in documents
Techniques for writing precisely

3. IDENTIFYING COMMON ERRORS IN WRITING

Subject-verb agreement
Noun-pronoun agreement
Misplaced modifiers
Articles
Prepositions
Redundancies
Clichés

4. NATURE AND STYLE OF SENSIBLE WRITING

Describing
Defining
Classifying
Providing examples or evidence

5. WRITING INTRODUCTION AND CONCLUSION

6. WRITING PRACTICES

Comprehension
Précis Writing
Essay Writing

English Lab (L: 0, T: 0, P: 2, Credit 1)

- Listening Comprehension
- Pronunciation, Intonation, Stress and Rhythm

- Common Everyday Situations: Conversations and Dialogues
- Communication at Workplace
- Interviews
- Formal Presentations

Suggested Readings:

(i) *Practical English Usage.* Michael Swan. OUP. 1995.
(ii) *Remedial English Grammar.* F.T. Wood. acmillan.2007
(iii) *On Writing Well.* William Zinsser. Harper Resource Book. 2001
(iv) *Study Writing.* Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
(v) *Communication Skills*. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
(vi) *Exercises in Spoken English.* Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Course Outcomes

The student will acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

ESC-101A BASIC ELECTRICAL TECHNOLOGY
B. Tech (Mechanical Engineering) I Semester

No. of Credits: 4
L T P Total
3 1 0 4
Duration of Exam: 3 Hours

Sessional: 25 Marks
Theory: 75 Marks
Total: 100 Marks

Pre- Requisite: Nil
Successive: Basic Electronics Engineering, Air Conditioning Equipments
Course Outcomes (COs): At the end of the course, the student shall be able to:
CO1- Analyze and solve D. C. networks by different analysis methods and theorems.
CO2- Formulate and solve complex AC single phase and three circuits.
CO3- Identify the type of electrical machines and their applications.
CO4- Introduce the components of low voltage electrical installations.

Unit 1
DC Circuits: Basic definitions, Electrical circuit elements (R, L and C), voltage and current sources, Ohm's law and its limitations, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation by mesh analysis and node analysis, Superposition, Thevenin's, Norton's and Maximum Power Transfer Theorems. (10)
Unit 2
AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. (10)
Unit 3
Poly Phase Systems: Advantages of 3-phase systems, generation of 3-phase voltages, three phase connections (star and delta), voltage and current relations in star and delta connections, three phase powers, analysis of 3-phase balanced circuits, measurement of 3-phase power- 2 wattmeter method. (7)
Unit 4
Transformers: Magnetic Circuits, construction and working of single phase transformer, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency, Auto-transformer (7)
Unit 5
Electrical Machines: Induction motor: Construction, principle and working of a three-phase induction motor, Single-phase induction motor: Construction, principle and working, Applications
DC machine: Construction, principle and working of dc motor and generator. Applications
Synchronous machine: Construction, principle and working of synchronous motor and generators. Applications. (9)
Unit 6
Electrical Installations: Components of LT Switchgear: Fuses, MCB, ELCB, MCCB, Types of Wires, Earthing, Power factor improvement. (7)

of Wires, Earthing, Power factor improvement. (7)

Recommended/ Reference Books:

1. D. P. Kothari and, I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill.
2. D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill.
3. L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press.
4. E. Hughes, “Electrical and Electronics Technology”, Pearson.
5. V. D. Toro, “Electrical Engineering Fundamentals”, Prentice Hall India.

Web Links:

1. NPTL Web Course, Basic Electrical Technology, Prof. G. D. Roy, Prof. N. K. De, Prof. T.K. Bhattacharya, IIT Kharagpur
(https://nptel.ac.in/courses/108/105/108105053/)
2. NPTL Web Course, Electrical Machines-I, Prof. P. Sasidhara Rao, Prof. G. Sridhara Rao, Dr. Krishna Vasudevan, IIT Madras
(https://nptel.ac.in/courses/108/106/108106071/)
3. NPTL Web Course, Electrical Machines-II, Prof. P. Sasidhara Rao, Prof. G. Sridhara Rao, Dr. Krishna Vasudevan, IIT Madras
https://nptel.ac.in/courses/108/106/108106072/

ESC-107A BASIC ELECTRICAL TECHNOLOGY LABORATORY

B. Tech (Mechanical Engineering) I Semester

No. of Credits: 1	**Sessional:**	**15 Marks**
L T P Total	**Practical:**	**35 Marks**
0 0 2 2	**Total:**	**50 Marks**

Duration of Exam: 2 Hours

Pre- Requisite: Basic Electrical Technology

Successive: Nil

Course Outcomes (COs): At the end of the course, the student shall be able to:

CO1- Get an exposure to common electrical components and their ratings.

CO2- Make electrical connections by wires of appropriate ratings.

CO3- Understand the usage of common electrical measuring instruments.

CO4- Understand the basic characteristics of transformers and electrical machines.

CO5- Get an exposure to the working of power electronic converters.

List of Experiments/ Demonstrations:

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.

2. Verification of network theorem in DC circuits, Thevenin's Theorem, Norton's, Theorem, Superposition Theorem etc.

3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Resonance in R-L-C circuits.

4. Poly phase systems, three phase connections (star and delta), measurement of three phase power.

5. Transformers: Observation of the no-load current waveform on an oscilloscope (non-sinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics). Loading of a transformer: measurement of primary and secondary voltages and cu

6. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.

7. Torque Speed Characteristic of separately excited dc motor.

8. Components of LT switchgear.

ESC- 102A/21 ENGINEERING GRAPHICS AND DRAWING
B. Tech (Mechanical Engineering) II Semester

No. of Credits: 2		Sessional:	30 Marks
L T P Total		Practical:	70 Marks
0 0 4 4		Total:	100 Marks

Duration of Exam: 3 Hours
Pre- Requisite: Nil
Successive: CAD/CAM

Course Objectives:

The objective of studying this course is to understand the basic principles of engineering drawing and graphics and to apply the same to daw different types of projections.

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

CO 1- Understand the basic principles of projections of points and lines.
CO 2- Know the different orientations and projections of planes and solids.
CO 3- Learn about the projections of sectioning of solids in different orientations and development of surfaces.
CO 4- Draw orthographic and isometric view of an object.
CO 5- Learn about the basics of AUTOCAD

Course Contents:

Unit 1:

Introduction: Importance, Significance and scope of Engineering Drawing, Usage of drawing Instruments, Dimensioning, Scales, Sense of proportioning, Different types of projections, Orthographic projections of simple engineering objects, B.I.S Specifications. (12)

Unit 2:

Projection of Points & Lines: Introduction of plane of projection, reference & auxiliary planes, projection of points and line in different quadrants, traces, inclinations & true lengths of the lines, projections on auxiliary plane, shortest distance intersecting and non intersecting lines. (8)

Unit 3:

Projection of Planes and Solids: Parallel to one reference plane, inclined to one plane but perpendicular to the other, inclined to both reference planes. Projection of Polyhedra, solids of revolution-in simple positions with axis perpendicular to a plane, with axis parallel to both planes, with axis parallel to one plane and inclined to the other. (8)

Unit 4:

Sectioning of Solids and Development of Surfaces: Projections of sections of prisms, pyramids, cylinders and cones. Development of simple object with and without sectioning. (4)

Unit 5:

Isometric Projections: Introduction, isometric scale, Isometric view of plane figures, prisms, pyramids and cylinders. (4)

Unit 6:

Overview of Computer Graphics: Introduction to AUTOCAD and practice of simple exercises related to the above units on CAD Software. (8)

Recommended/ Reference Books:

1. Machine Drawing - N D Bhatt and V M Panchal, Charotar Publishing House.
2. A Text Book of Machine Drawing - P S Gill Pub.: S K Kataria & Sons.
3. A Text Book of Engineering Drawing and Machine Drawing by M. L. Aggarwal and Sandhya Dixit: Dhanpat Rai & Co.
4. Textbook on Engineering Drawing , K. L. Narayana and P. Kannaiah, Scitech Publichers

Web Links:

S.N	Address of web source	Content
1.	https://youtu.be/2C8H2rIwhrA	Engineering Drawing
2.	https://youtu.be/xzi_R8lims0	Drawing Layouts

ESC-104A/21 WORKSHOP-I
B. Tech (Mechanical Engineering) I Semester

No. of Credits: 2		Sessional:	30Marks
L T P Total		Practical:	70 Marks
0 0 4 4		Total :	100Marks
Duration of Exam:	3Hours		

Pre- Requisite: Nil
Successive: Workshop- II, Workshop- III, Workshop- IV, Workshop- V, Workshop- VI, Workshop- VII
PART-A
Computer Engineering Workshop
Course Outcomes (COs): After the completion of the course the student will be able to:
CO1- Acquire skills in basic engineering practice.
CO2- Have working knowledge of various equipments used in workshop.
CO3- Have hands on experience about various machines and their components.
CO4- Obtain practical skills of basic operation and working of tools used in the workshop.

List of Exercises:
1. To study and demonstrate Block diagram of Digital Computer System and explanation of each unit.
2. To study and demonstrate internal parts of a Computer System (Card level) and other peripheral devices and explanation of POST & BIOS.
3. To study and demonstrate primary memory and secondary memory.
4. To demonstrate Mother Board/ Main Board and its parts, Chipset, Connectors, Add On Card.
5. To study various processor (Pentium-I, II, III, DUAL Core, i-3, i-5, i-7 etc).
6. To study various types of monitors: LCD /LED/TFT/PLASMA DISPLAY& New Technologies
7. To study different printer types and their working.
8. Assembly / Installation and Maintenance of Personnel Computer Systems: Practical exercise on assembly of Personnel Computer System, Installation of Operating System: Windows & Linux etc, Installation of other Application Softwares and Utility Softwares, Fault finding in Personnel Computers: Software or Hardware wise, Virus: Introduction, its Types & Removal techniques, Data Backup and Restore, Data Recovery Concepts, Typical causes of Data loss
9. Introduction to computer networking concepts: Introduction of Connecting devices: Hub, Switch & Router etc, Networking Cable preparation: Normal & Cross Cables, Data Transferring Techniques from one Computer System to another Computer System, Configuration of Switch/ Routers etc.
10. Introduction to system security and network security.

PART-B
Electrical Workshop
List of Exercises:
1. Introduction of Electrical Safety precautions, Electrical Symbols, Electrical Materials, abbreviations commonly used in Electrical Engg. and familiarization with tools used in Electrical Works.
2. To make a Straight Joint & Tee joint on 7/22 PVC wire and Britannia Joint on GI wire.
3. To study fluorescent Tube Light, Sodium Lamp and High Pressure Mercury Vapour Lamp.
4. To study different types of earthing and protection devices e.g. MCBs, ELCBs and fuses.
5. To study different types of domestic and industrial wiring and wire up a circuit used for Stair case and Godown wiring.
6. To make the connection of fan regulator with lamp to study the effect of increasing and decreasing resistance in steps on the lamp.
7. To fabricate half wave and full wave rectifiers with filters on PCB.
8. Maintenance and Repair of Electrical equipment i,e Electric Iron , Electric Toaster ,Water heater, Air coolers and Electric Fans etc.
9. To study soldering process with simple soldering exercises.
10. To make the connection of a three core cable to three pin power plug and connect the other cable end by secured eyes connection using 23/0.0076”or 40/0.0076”cable.

PART- C

Electronics Workshop

List of Exercises:

1. To study and demonstrate basic electronic components, Diode, Transistor, Resistance, Inductor and capacitor.
2. To study and demonstrate resistance color coding, measurement using color code and multimeter and error calculation considering tolerance of resistance.
3. To study and demonstrate multimeter and CRO- front panel controls, description of block diagram of CRT and block diagram of CRO.
4. To study and demonstrate Vp (peak voltage),Vpp (peak to peak voltage), Time, frequency and phase using CRO.
5. Introduction to function generator. Functions of front panel controls and measurement of different functions on CRO.
6. To study and demonstrate variable DC regulated power supply, function of controls and DC measurement using multimeter and CRO.
7. Soldering practice on wire mesh or a resistance decade board includes fabrication, soldering, lacing, harnessing forming and observation.
8. Testing of components using multimeter and CRO like diode, transistor, resistance capacitor, Zener diode and LED.
9. To study and demonstrate rectification, half wave, Full wave and bridge rectifier. Fabrication, assembly and wave form observation.
10. To design and fabricate a printed circuit board of a Zener regulated/ series regulated power supply and various measurements, testing of power supply.

Note: At least 8 exercises are to be performed from each part by the students.

ESC-106A/21 WORK SHOP-II
B. Tech (Mechanical Engineering) II Semester

MECHANICAL ENGINEERING WORKSHOP

No. of Credits: 2	Sessional: 30Marks
L T P Total	Practical: 70 Marks
0 0 4 4	Total : 100Marks
Duration of Exam: 3 Hours	

Pre- Requisite: Workshop -I
Successive: Workshop- III, Workshop- IV, Workshop- V, Workshop- VI, Workshop- VII
Course Outcomes (COs): After studying this course the students will be able to:

CO 1- Acquire skills on basic engineering materials and safety aspects.
CO 2- Understand the fundamental concept of various basic engineering practices namely fitting, sheet metal, carpentry, pattern making and welding etc.
CO 3- Learn and use different marking & measuring instruments used in machine shop, fitting shop, sheet metal shop, carpentry & pattern making shop etc.
CO 4- Practice real time job preparation using various operations related to fitting, sheet metal, carpentry, welding & foundry etc.

List of Exercises:
Machine shop, fitting shop, sheet metal shop, carpentry & pattern making shop, welding shop, foundry shop, forging (smith) shop and injection moulding shop.

Section (A): Machine Shop
1. To understand the layout, safety measures and fundamental concept of different engineering materials used in the workshop.
2. To study and demonstrate the various parts, specifications & operations on lathe, milling and shaping machine.
3. To study different types of measuring tools used in metrology and determine the least count of vernier calipers, vernier height gauges and micrometers.

Section (B): Fitting & Sheet Metal Shop
4. To study different types of tools, equipments, devices and machines used in fitting shop.
5. To prepare a job involving filing, drilling, tapping and hacksaw cutting operations on mild steel plate.
6. To study various types of sheet metal tools and prepare a simple sheet metal joint.

Section (C): Carpentry and Pattern Making Shop
7. To study various types of carpentry and pattern making tools and equipments.
8. To prepare a simple wooden joint (cross lap / Tee-lap/dovetail joint) using kail wood in carpentry shop.
9. To prepare single piece pattern / split pattern using kail wood in pattern making shop.

Section (D): Welding Shop
10. To practice striking an arc and prepare straight short bead on given M.S plate in flat positionby arc welding.
11. To prepare straight continuous bead and re start of electrode in flat position by arc welding on given M.S. plate as per size.
12. To practice tack weld &close butt joint in flat position by arc welding on given M.S. plate as per size.

Section (E): Foundry, Forging (Smithy) & Injection Moulding shop
13. To study various types of foundry tools and prepare a mould cavity using single/split pattern in moulding sand.
14. To study various types of forging / black smithy tools and prepare a ring or hook by hand forging operation.
15. To study the working of injection molding machine and prepare a simple component by injection moulding.

NOTE: - Total twelve exercises should be performed from the above list. At least two from each section and remaining two may either be performed from above list or designed by the concerned institution as per the scope of the syllabus and facilities available in institute.