Curriculum Structure & Syllabi

of

B. Tech.

in

Computer Science and Engineering

(w.e.f. 2021-22)

Vision

Mission

Program Educational Objectives

Program Outcomes

Program Specific Outcomes

Overall Credit Structure

Curriculum

Syllabus

Offered By

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

M. M. M. UNIVERSITY OF TECHNOLOGY

GORAKHPUR-273 010, UP

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B. Tech. Computer Science and Engineering

Vision: To become a leader of education, research and innovation in the area of Computer Science and Engineering and to produce under graduates who are globally recognized as innovative and well-prepared computing professionals.

Mission:

1. To create, share and disseminate knowledge through research and education in the theory and application of computing.

2. To train the students in different aspects of computing discipline for enhancing, augmenting, and updating their technical skills

3. To inculcate the spirit of analysis, teamwork, innovation and professionalism among the students

Programme Educational Objectives (PEO)

PEO-1   To inculcate the knowledge of the fundamentals of the mathematics, science & engineering disciplines for developing the ability to formulate, solve and analyze the problems of Computer Science & Engineering field and to provide them the skills for the pursuit of under-graduate studies, research and development and higher education.

PEO-2   To provide the understanding of the prerequisite of the software, technical aspects, and design for coming up with the novel engineering solutions and efficient product developments.

PEO-3   To assist the students in the pursuit of the successful career by adopting the ethical practices and social responsibility.

PEO-4   To provide students the technical as well as soft skills required by the national as well as international organizations.

PEO-5   To elevate cognizance in the students toward the unending learning and to inculcate the ethical and moral ways.

PEO-6   To give students the knowledge of the contemporary technologies, practical experiences, and possibilities in the field of Computer Science & Engineering and to provide the multidisciplinary knowledge to develop the team spirit and leadership qualities by working on multidisciplinary projects.

Programme Outcome (POs)

PO-1   The students will develop the ability towards the application of fundamental knowledge

of computing, mathematics, algorithms and computer science & engineering precepts and rationales for developing the solutions of the critical engineering problems. (Rudimentary engineering analytical skills).

PO-2   The under graduating students will be able to model and carry out the experiments by using the fundamental knowledge of computer science & engineering discipline and derive the conclusions by analyzing and interpreting the data.

PO-3   The students will be able to analyze, design, implement and assess a computer-based information system, procedure, module, or program to fulfil the requirements along with the consideration of economic, social, privacy and reliability constraints. (Innovative skills)

PO-4   The students will be able to perform efficaciously in multi-disciplinary teams. (Team spirit)

PO-5   The students will develop the analytical skills to critically analyze, recognize, formulate, and devise solutions to the engineering problems by using the adequate computing and engineering skills and knowledge. (Engineering problem solving skills)

PO-6   The students will have the awareness towards the professional, ethical practices, legal, security & social consequences, and obligation. (Professional integrity).

PO-7   The students will have the efficient speaking skill and written/interpersonal communication skills. (Oral & written communication skill)

PO-8   To impart the exhaustive education in the students required to understand and analyze the local and global consequences of computer science & engineering solutions ranging from individuals and organizations to society. (Engineering consequences assessment skills)

PO-9   The students will develop the realization of the requirement of and the ability to indulge in maintaining professional growth and unending learning. (Continuing education cognizance).

PO-10   The students will have the cognition towards the current issues and problems. (Societal awareness)

PO-11   The students will possess the ability to utilize the knowledge of innovative computing equipment's required for engineering tasks. (Pragmatic skills)

PO-12   The students will be able to apply the design and evolution precepts in the development of software and hardware computer systems of variable complications. (Software hardware interface).

Programme Specific Outcome (PSOs):

PSO1.   Ability to be lifelong learner to adapt innovation.

PSO2.   Ability to learn the best practices regarding ideating, innovating and to be able to attain successful career with globally employable capabilities.

PSO3.   Ability to be open to international cultures and demands.

Syllabus and Credit Structure:

Credit Structure for B. Tech. (Computer Science & Engineering)

(**Session 2021-2022 and onwards**)

First Year, Semester I

S. No.	Category	Dept.	Subject	L	T	P	Credit
1.	BSM	BSM-104	Linear Algebra and Differential Equations	3	1	0	4
2.	EF	**BEE-101**	Fundamentals of Electrical Engineering	3	1	2	5
3.	HSS*	BHM-101	Professional Communication	2	0	2	3
4.	PS	BCS-102	Web Designing-1	1	0	2	2
5.	EF	BCS-103	Computer Troubleshooting & Maintenance	0	0	4	2
6.	PLBSE	BSM-144	Environment and Ecology	2	0	0	2
7.	HSSE**	HSSE*	Humanities & Social Science Electives	2	0	0	2
			Total	**13**	**2**	**10**	**20**
1.	ECA-I		Induction Program	-	-	-	**0**

First Year, Semester II

S. No.	Category	Dept.	Subject	L	T	P	Credit
1.	BSM	BSM-156	Applied Probability and Statistics	3	1	0	4
2.	EF	BCS-151	Introduction to C Programming	3	1	2	5
3.	BSM	BSM-179	Quantum Physics and Nanomaterials	3	1	0	4
4.	PS	BCS-152	Web Designing-2	1	0	2	2
5.	EF	BCS-153	IT Tools and Workshop-1	0	0	4	2
6.	PLBSE	BEC-154	Basic Electronic Components and Circuits	3	0	2	4
			Total	**13**	**3**	**10**	**21**
1.	ECA-II		Induction Program	-	-	-	**0**

Second Year, Semester III

S. No.	Category	Dept.	Subject	L	T	P	Credit
1.	BSM	MSC	Discrete Mathematics	3	1	0	4
2.	EF	CSE	Digital Logic and Design	3	0	2	4
3.	HSS***	HU	Cyber Ethics and IPR	2	0	0	2
4.	PC	CSE	Principles of Data Structures	3	1	2	5
5.	PC	CSE	Object Oriented Programming	3	1	2	5
6.	PLBSE	CSE	IT Tools and Workshop-2	0	0	4	2
			Total	**14**	**3**	**10**	**22**
	ECA-III	CS		-	-	-	0
	AC		Foreign Language	1/2	-	-	1/2

Second Year, Semester IV

S. No.	Category	Dept.	Subject	L	T	P	Credit
1.	BSM	MSC	Optimization Techniques	3	0	2	4
2.	PC	CSE	Database Management Systems	3	0	2	4
3.	PC	CSE	Theory of Computation	3	1	0	4
4.	PC	CSE	Design & Analysis of Algorithms	3	1	2	5
5.	PC	CSE	Computer Organization and Architecture	3	0	2	4
6.	PLBSE	ECE	Signal and Systems	3	1	0	4
			Total	**18**	**3**	**8**	**25**
	ECA-IV			-	-	-	0
	AC		Cyber Crime	1/2	-	-	½
	DM		Subject-1	3	0	0	3

Third Year, Semester V

S. N.	Category	Dept.	Subject	L	T	P	Credit
1.	M	MG	Engineering & Managerial Economics	2	0	0	2
2.	PC	CSE	Principles of Operating Systems	3	0	2	4
3.	PC	CSE	Principle of Compiler Design	3	1	2	5
4.	PC	CSE	Computer Networks	3	0	2	4
5.	PE1	CSE	Program Elective-1	3	1	0	4
6.	PLBSE	ECE	Microprocessor and Microcontroller	3	1	2	5
			Total	**17**	**3**	**8**	**24**
	ECA-V			-	-	-	0
	DM		**Subject-2**	**3**	**0**	**2**	**4**

Third Year, Semester VI

S. N.	Category	Dept.	Subject	L	T	P	Credit
	M	MG	Business Management	2	0	0	2
	PC	CSE	Artificial Intelligence	3	1	0	4
	PC	CSE	Software Engineering	3	1	0	4
	PC	CSE	Parallel & Distributed Programming	3	0	2	4
	PE2	CSE	Program Elective-2	3	1	0	4
	P	CSE	Project Part-I	0	0	4	2
	S	CSE	Seminar	0	0	4	2
			Total	**14**	**3**	**10**	**22**
	ECA-VI			-	-	-	0
	DM		Subject-3	3	0	2	4

Final Year, Semester VII

S. N.	Category	Dept.	Subject	L	T	P	Credit
	PC	CSE	Fault Tolerance Analysis	3	1	0	4
	PC	CSE	Cryptography and Information Security	3	1	0	4
	PC	CSE	Introduction to Functional and Logic Programming	3	0	2	4
	PE3	CSE	Program Elective-3	3	1	0	4
	OE		OE	2	1	0	3
	P	CSE	Project Part-II	0	0	6	3
			Total	**14**	**4**	**8**	**22**
	ECA-VII			-	-	-	0
	DM		Subject-4	3	1/0	0/2	4/5

Final Year, Semester VIII

S. N.	Category	Dept.	Subject	L	T	P	Credit
	IP	CSE	Industrial Practices	0	0	24	12
Without Industrial Practices (IP)							
	MP	CSE	Minor project	0	0	8	4
	IE#	CSE	Industrial Elective	3	1	0	4
	IE#	CSE	Industrial Elective	3	1	0	4
			Total	**6**	**2**	**8/24**	**12**
	DM		Research Project*	0	0	4	2

Credit Structure for B. Tech. CSE

Category / Semesters	I	II	III	IV	V	VI	VII	VIII	Total
Basic Sciences & Maths (BSM)	4	8	4	4	-	-	-	-	**20**
Engineering Fundamentals (EF)	7	7	4	-	-	-	-		**18**
Professional Skill (PS)	2	2	-	-	-	-	-		**4**
Program Core (PC)	-	-	10	17	13	12	12		**64**
Management (M)	-	-	-	-	2	2	-		**4**
Humanities & Social Science (HSS)	3	-	2	-	-	-	-		**5**

Humanities & Social Science Elective (HSSE)	2	-	-	-	-	-	-		2
Project (P)	-	-	-	-	-	2	3	4	**5/9**
Seminar (S)	-	-	-	-	-	2	-		**2**
Industrial Practice (IP)/ Industrial Elective (IE)#	-	-	-	-	-	-	-	12/8	**12/8**
Program link basic science and engineering courses (PLBSE) (To be decided by the department)	2	4	2	4	5	0	-		**15**
Program Electives (PE)	-	-	-	-	4	4	4		**12**
Open Electives (OE) (Other Departments)	-	-	-	-	-	-	3		**3**
Total	20	**21**	**22**	25	24	22	**22**	12	**166**

SYLLABI

BSM-104   Linear Algebra and Differential Equations

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Two Minor tests and One Major Theory Examination
Course Objectives	:	The course is aimed to develop the basic mathematical skills of engineering students that are imperative for effective understanding of engineering subjects.

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of basic differential operators in various engineering problems.
2. To understand the concept of convergence and divergence of sequences.
3. Solve linear system of equations using matrix algebra.
4. Know about qualitative applications of Gauss , Stoke's and Green's theorem.
5. To know the applications of double and triple integration in finding the area and volume.
6. To inculcate the habit of mathematical thinking and lifelong learning.

Topics Covered

UNIT-I   9
Sequences and Series of Real Numbers Sequence of real numbers, convergence of sequences, bounded and monotone sequences, convergence criteria for sequences of real numbers, Cauchy sequences, subsequences, Bolzano-Weierstrass theorem. Series of real numbers, absolute convergence, tests of convergence for series of positive terms, comparison test, ratio test, and root test; Leibniz test for convergence of alternating series.

UNIT-II   9
Linear Algebra: Symmetric, Skew-symmetric matrices, Hermitian, Skew Hermitian Matrices, orthogonal and unitary matrices and basic properties, linear independence and dependence of vectors, Rank of Matrix, Inverse of a Matrix, Elementary transformation,

Consistency of linear system of equations and their solution, Characteristic equation, Eigenvalues, Eigenvectors, Cayley-Hamilton theorem, Diagonalization of matrices.

UNIT-III 9

Functions of Two or Three Real Variables: Limit, continuity, partial derivatives, differentiability, Taylors Theorem, maxima, and minima. **Integral Calculus:** Double and triple integrals, change of order of integration, change of variables, calculating surface areas and volumes using double integrals, Dirichlet's Integral, calculating volumes using triple integrals.

UNIT-IV 9

Differential Equations: Linear differential equations with constant coefficients ($n^{th} order$), complementary function and particular integral. Simultaneous linear differential equations, solution of second order differential equations by changing dependent and independent variables, Method of variation of parameters.

Books & References
1. B.S. Grewal: Higher Engineering Mathematics; Khanna Publishers
2. Erwin kreyszig: Advanced Engineering Mathematics, John Wiley & Sons.
3. R. K. Jain and Iyenger: Advanced Engineering Mathematics, Narosa Publications.
4. B.V. Ramana: Higher Engineering Mathematics, Tata Mc. Graw Hill Education Pvt. Ltd.,

BEE-101/ 151   **FUNDAMENTALS OF ELECTRICAL ENGINEERING**

Course category	:	Engineering Fundamentals (EF)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and One Minor tests and One Major Theory & Practical Examination.
Course Objective	:	**1.** To demonstrate and understand the basic knowledge of electrical quantities such as current, voltage, power, energy, and frequency to understand the impact of technology in a global and societal context. **2.** To demonstrate and understand the basic concepts of analysis of simple DC and AC circuits, Magnetic Circuits, Transformers and Electrical Machines.

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course:
1. Understand the basic properties of electrical elements, and solve problem based on basic electrical circuits & DC network theorems.
2. Understand the fundamental behaviour of AC circuits and solve AC circuit problems.
3. Apply the knowledge gained to explain the behaviour of the circuit at series & parallel resonance of circuit & the effect of resonance.
4. Understand 3 phase balanced and unbalanced, star and delta connected supply and load and to measure power in 3 phase circuits
5. Explain construction and working principle of transformer with background of magnetic circuits.

6. Classify and compare different types of Electrical machines.

Topic Covered

UNIT I
D C Circuit Analysis and Network Theorems: **9**

Circuit Concepts: Concepts of network, Active and passive elements, Voltage and current sources, Concept of linearity and linear network, Unilateral and bilateral elements, R, L and C as linear elements, Source transformation, Kirchhoff's laws, Loop and nodal methods of analysis, Star-delta transformation, Network theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem.

UNIT II
Steady- State Analysis of Single-Phase AC Circuits: **9**

AC fundamentals: Sinusoidal, square and triangular waveforms – Average and effective values, Form and peak factors, Concept of phasor, phasor representation of sinusoidally varying voltage and current, Analysis of series, parallel and series-parallel RLC Circuits, Resonance in series and Parallel circuit

Three Phase AC Circuits: Three phase system-its necessity and advantages, Star and delta connections, Balanced supply and balanced load, Line and phase voltage/current relations, Three-phase power, and its measurement

UNIT III
Magnetic Circuit & Single-Phase Transformers: **9**

Magnetic circuit, concepts, analogy between electric & magnetic circuits, B-H curve, Hysteresis, and eddy current losses.

Single Phase Transformer: Principle of operation, Construction, EMF equation, Power losses, Efficiency, O.C & S.C Test and Introduction to auto transformer.

UNIT IV
Electrical Machines: **9**

Concept of electromechanical energy conversion DC machines: Types, EMF equation of generators and torque equation of motor, Characteristics, and applications of DC Generators & motors.

Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications.

Three Phase Induction Motor: Types, Principle of operation, Torque-slip characteristics, Applications

EXPERIMENTS
1. Verification of Kirchhoff's Law.
2. Verification of Norton's Theorem.
3. Verification of Thevenin's Theorem.
4. Verification of Superposition Theorem.
5. Verification of Maximum Power Transfer Theorem.
6. Verification of Series R-L-C circuit.
7. Verification of Parallel R-L-C circuit.
8. Measurement of Power and Power factor of three phase inductive load by two wattmeter method.
9. To perform O.C. and S.C. test of a single-phase transformer.
10. To draw the magnetization characteristics of separately excited dc motor.
11. To perform the external load characteristics of dc shunt motor.

Textbooks:
1. Fundamentals of Electric Circuits, C.K. Alexander and M.N.O. Sadiku; TATA McGraw-Hill.

2. Principles of Electrical Engineering, V. Del Toro; Prentice Hall International.
3. Electrical and Electronics Technology, Edward Hughes; Pearson.
4. Basic Electrical Engineering, D P Kothari, I.J. Nagarath; Tata McGraw Hill
5. Electrical Technology, B. L. Thareja and A. K. Thareja; S. Chand.

BHM-101/151		**PROFESSIONAL COMMUNICATION**
Course category	:	Humanities & Social Science (HSS)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 2, Tutorial: 0, Practical: 0
Number of Credits	:	2
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Two Minor tests and One Major Theory & Practical Examination.
Course Objective	:	The course aims:

1) To sensitize the students to understand the role& importance of communication for personal & professional success.
2) To enable learners to exhibit knowledge, skills, and judgment in and around human communication that facilitates their ability to work collaboratively with others in an interpersonal environment.
3) To develop awareness and understanding of applying appropriate communication strategies resulting into the enhancement of learners' employability skills.

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.
1) Use of various facets of communication skills, such as, Reading, Writing, Listening and speaking skills.
2) To identify, formulate and solve the real life problems with positive attitude.
3) To inculcate the habit of learning and developing the communication and soft skills by practice.
4) To enhance effortless speaking and writing skills with the help of rich word power.
5) To develop personality by introducing and inculcating effective presentation strategies.
6) To focus on audio, visual aids for effective oral communication skills

Topic Covered

UNIT-I
Verbal Communication:
Received Pronunciation; how to activate passive vocabulary; Technical/non-technical and Business Presentations; questioning and answer skills; soft skills for professionals; role of body postures, movements, gestures, facial expressions, dress in effective communication; Information/ Desk/ Front Office/ Telephone conversation; how to face an interview/press conference; Group discussions, debates, elocution.

UNIT-II

Reading Comprehension   **6**

Skimming and Scanning; factual and inferential comprehension; prediction; guessing meaning of words from context; word reference; use and interpretation of visuals and graphics in technical writing.

UNIT-III

Written Communication: **6**

Note Making and Note Taking; summarizing; invitation, advertisement, agenda, notice and memos; official and commercial letters; job application; resume and curriculum vitae; utility, technical, project and enquiry reports; paragraph writing: General – Specific, Problem – Solution, Process – Description, Data – Comment.

UNIT-IV

Short Essays: **6**

Description and Argument; comparison and contrast; illustration; using graphics in writing: tables and charts, diagrams and flow charts, maps and plans, graphs; how to write research paper; skills of editing and revising; skills of referencing; what is a bibliography and how to prepare it.

Textbooks:

1) Bansal, R.K. & Harrison J.B., (1972)*Spoken English*, Orient Longman, India.
2) Chauhan, Narender Kr. & Singh, Sudhir N., (2013) *Formal Letters,* Pankaj Publication International, New Delhi.
3) Chhabra T.N., (2019) *Business Communication*, Sun India Publication, New Delhi.
4) Dixon Robert J., (1986)*Complete Course in English,* Prentice Hall of India, New Delhi.
5) Jones, Daniel.(2012) *Cambridge English Pronouncing Dictionary*, 18thEdition, Paperback, CUP, India.
6) Lewis, Norman, (2015) *Word Power Made Easy*, Penguin India.
7) Sethi J. & Jindal, (1993)*Handbook of Pronunciation of English Words* - D.V.A, Prentice Hall of India, New Delhi.
8) Sharma R.C. & Mohan Krishna, (2017)*Business Correspondence and Report Writing*, Tata McGraw Hill.
9) Thomson, A. J. & and Martinet A. V., (1997)*A Practical English Grammar*,Paperback,Ed. IVth, Oxford

BCS-102	**Web Designing-1**
Course category	: Professional Skill (PF)
Pre-requisite Subject	: NIL
Contact hours/week	: Lecture: 1, Tutorial: 0, Practical: 2
Number of Credits	: 2
Course Assessment methods	: Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Two Minor tests and One Major Theory & Practical Examination.
Course Objective	: Web designing-I syllabus contains a basic introduction to familiarize students with the basics of designing a website to its tools, software applications and themes. Here are the key topics covered under the introduction to web designing.

1. How to design a website
2. Creating different themes for different layouts
3. How to design the look and feel of a website
4. How to create and design banners, advertisements, etc.

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course

1. Understand principle of Web page design and about types of websites.
2. Visualize and Recognize the basic concept of HTML and application in web designing.
3. Recognize and apply the elements of Creating Style Sheet (CSS).
4. Understanding the basic concept of Java Script and its application.
5. Understanding the basic concept Angular JS.
6. Learning about the tools and techniques of web design covers using software applications

Topic Covered

UNIT-I

HTML: Introduction to web site, Domains and Hosting, Responsive Web Designing, Types of Websites: Static and Dynamic, HTML5, Basic structure of an HTML document, HTML Tags: Heading, Paragraphs, Line Breaks, Text, Lists, Tables, Frames, Hyperlinks, Images, Multimedia, Forms, and their controls.   **3**

UNIT-II

Creating Style Sheet (CSS): Creating Style Sheet, CSS Properties, CSS Styling, CSS   **3** Id and Class, Box Model, CSS Advanced: Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector, CSS Colour. Basics of responsive web design using Bootstrap.

UNIT-III

Java Script: Introduction to Java Script, Variables, Operators, Conditions Statements,   **3** Loops, Popup Boxes, Events, Arrays, Objects, Functions in JS, Form Validation and regex, JSON.

UNIT-IV

Angular Java Script: Introduction to AngularJS, MVC Architecture, Expressions and   **3** Data Biding, Directives, Controllers, Filters, Forms, Modules, Introduction to Single page application.

EXPERIMENTS

1. To create a simple html file to demonstrate the use of different tags.
2. To create an html file to link to different html page which contains images, tables, and also link within a page.
3. To create an html page with different types of frames such as floating frame, navigation frame & mixed frame.
4. To create a registration form as mentioned below.
5. Procedure: Create an html page named as "registration.html"
    i. set background colors
    ii. use table for alignment
    iii. provide font colors& size
6. To create an html file by applying the different styles using inline, external & internal style sheets.
7. Create a sample HTML form using bootstrap.
8. To write a Javascript program to define a user defined function for sorting the values in an array.

9. To create an html page to explain the use of various predefined functions in a string and math object in java script.
10. To create an html page to explain the use of various predefined functions in a array & Date object in Javascript.
11. To create an html page to demonstrate exception handling in javascript
12. To display the calendar using javascript code by getting the year from the user.
13. To create a html registration form and to validate the form using javascript code.
14. To create a html file. To open new window from the current window using javascript.
15. To create an html page to change the background color for every click of a button using javascript.
16. To create an html page with 2 combo boxes populated with month & year, to display the calendar for the selected month & year from combo box using javascript.
17. To create a html page to display a new image & text when the mouse comes over the existing content in the page.
18. Create a single page application using concepts of Angular JS.

Textbooks:
1. Steven M. Schafer, "HTML, XHTML, and CSS Bible, 5ed", Wiley India.
2. Ian Pouncey, Richard York, "Beginning CSS: Cascading Style Sheets for Web Design", Wiley India
3. Douglas Crockford, JavaScript: The Good Parts: The Good Parts. O'Reilly Media, Inc.
4. Brad Green, Shyam Seshadri, AngularJS, O'Reilly Media, Inc

BCS-103		**Computer Troubleshooting and Maintenance**
Course category	:	Engineering Fundamental (EF)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 0, Tutorial: 0, Practical: 4
Number of Credits	:	2
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and major Practical Examination.
Course Objective	:	The main objective of this course is to introduce PC maintenance, upgrading, repairing. The students

    1. Can join industry as Technician and will progress further as Senior Technician, Supervisor and can rise to the level of Manager.
    2. Can become Entrepreneur in the related field.
    3. Can join Apprenticeship programs in different types of industries.

Course Outcomes:
The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course.
1. Understand basics of hardware components.
2. Acquire knowledge of finding faults in components
3. Install, configure, and maintain various components in computer system and peripherals.

4. Diagnose faults of different component
5. Repair and maintain computer system and its peripherals.
6. helps to fully understand the family of computers that has grown from the original IBM PC, including all PC-compatible systems.

EXPERIMENTS

The students will perform following experiments to get familiar with Computer.

1. Disassemble a personal computer and assemble the same system again. Boot the system and observe the procedure of assembling a computer system.
2. Observe various connectors, ports back and front side of the computer. Write their purpose and specifications. (e.g., Power, PS/2 keyboard and mouse, Serial and parallel, USB, VGA, LAN, Audio & microphone, Firewire, HDMI, games, SATA etc.)
3. Identify BIOS settings, demonstrate starting BIOS, identify how to disable unused devices to decrease security risks. Change booting of computer with different secondary storage CD, HDD, USB etc.
4. Perform low level and high-level formatting of Hard Disk. Format the given Hard Disk using any one technique and create three partitions, two for operation systems and one for data. Install OS of different types. Also search for various data recovery software apply on pen drive/HDD.
5. Observe different types of printers (dot matrix, inkjet & laser, multifunction). Install driver and interface the printers with PC/Laptop on any operating system (connect the printer to one PC directly using USB/Serial/Parallel ports as per the availability; test the functioning of the printer.)
6. Learn the interfacing, installation and working of various devices such as scanner, projector, web cam etc. Connect all these devices with the given PC, install & test them.
7. Recognize common symptoms associated with diagnosing and troubleshooting PCs and utilize Windows built-in diagnostic tools.
   a. Identify general troubleshooting techniques and strategies
   b. Utilize scandisk, control panel, boot-up menu, and start-up disk as diagnostic tools.
   c. Access Microsoft knowledge base on the internet to solve common problems.
   d. Identify the common problems associated with shutdown, configuration, and cabling.
   e. Identify problems associated with heating and cooling of the internal components.
   f. Identify problems with installing internal devices such as hard drive, tape drives, or CD-ROM drive.
   g. Recognize and interpret the meaning of common error codes and start-up messages.
   h. Recognize windows-specific printing problems and corrections.
   i. Identify the various problems associated with network using diagnostic tools
   j. Learn disk and device driver management.
8. Define registry file operation and maintenance. Using various tools available for the registry. Operate and maintain registry file. Describe registry file operations & demonstrate proper registry file maintenance practices.
9. Perform computer maintenance and preventative maintenance functions.
   a. Perform physical cleaning (internal and external) of personal computer.
   b. Demonstrate how to adjust basic performance settings.
   c. Perform hard drive file system maintenance.

d. Identify anti-virus software and applications
10. Introduction to Virtualization. Demonstration of installation and working on Virtual Box.
11. Introduction to windows networking, data sharing, printer sharing, remote desktop connection using Windows RDC, creating shared folders for each user, assigning access rights, and changing ownership for shared folders using file server wizard.

BSM-144	**Environment and Ecology**

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 2, Tutorial: 0, Practical: 0
Number of Credits	:	2
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Two Minor tests and One Major Theory & Practical Examination.
Course Objective	:	1. Solve environmental engineering problems and persue higher studies using solid foundation in Chemistry and environmental science. 2. Design and operate various environmental systems in industries as well as higher studies through interactive education

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.
1. Students will acquire basic knowledge about Environment, which allows students to gain qualitative and quantitative skills.
2. Students will aware of environmental pollution and control methods along with quality standards of air, water etc along with waste management.
3. Students will able to give systematic account of natural resources their use and environmental problems due to overexploitation.
4. Students will acquire basic knowledge about the chemical reactions taking place in the environment.
5. To acquire awareness for ethical principle of environment.
6. To gain knowledge as a leader in multidisciplinary areas

Topic Covered

UNIT-I

Basic concept of Environmental chemistry, Introduction to atmospheric chemistry, **6** Layers of the atmosphere and their chemical composition, chemistry of gaseous and particulate pollutants, Ozone and its control, Green House Effect.

UNIT-II

The Chemistry of Natural Waters, Oxidation-Reduction Chemistry in Natural Waters, **6** Ion Concentrations in Natural and potable Water, Water Pollution and Purification of

Water, Water Disinfection, Ground water: Its Supply, Chemical Contamination, and Remediation The Chemical Contamination and Treatment of Wastewater and Sewage .

UNIT-III

Toxic Heavy Metals, Murcury, Lead, Arsenic and cadmium. Soil pollution, Domestic and Commercial Garbage: solid waste managment. The Recycling of Household and Commercial Waste, Hazardous Wastes and methods of disposal **6**

UNIT-IV

Toxic Organic Compounds, Pesticides, Insecticides, Herbicides, Dioxins, Furans, and PCBs, Polynuclear Aromatic Hydrocarbons Chemistry of food additives, dyes, detergents and bleaching agents **6**

Textbooks:

1. Environmental Chemistry - Colin Baird and Michael Cann, W. H. Freeman
2. Environmental Chemistry - Stanley E. Manahan, CRC Press; 9th edition.
3. Sonja Krause, Herbert M. Clark, James P. Ferris, Robert L. Strong Chemistry of the Environment,Elsevier Science & Technology Books.
4. Eugene R. Weiner Applications of Environmental Chemistry, CRC Press, LLC.
5. By Clair N.Sawyer,Perry L. McCarty, Gene F.Parkin Chemistry for environmental engineering and science (5th edition), McGraw-Hill Professional.

BHM-113/163		**Industrial Psychology**
Course category	:	Humanities & Social Science Elective (HSSE)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 2, Tutorial: 0, Practical: 0
Number of Credits	:	
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Two Minor tests and One Major Theory & Practical Examination.
Course Objective	:	1. To understand the behaviour of people in a work setting; how people can become effective, satisfied, fulfilled, and rewarded, and how these outcomes can be maintained. 2. To study how the organization can be sustained and developed by applying psychological principles, theory, research, and interventions to design and implement practical solutions to solve organizational challenges.

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.
1) Use of various facets of psychology, it problems and understanding.
2) To identify, formulate and solve the real life problems with positive attitude.
3) To inculcate the habit of learning and developing the industrial problems from psychological eyes.
4) Acquire the necessary interpersonal, behavioral and technical skills for application in the work setting;
5) Demonstrate writing, reading, critical thinking, speaking and collaboration skills;
6) Perform effectively in a capstone experience that involves the application of our research in I/O Psychology.

Topic Covered
UNIT-I

Introduction to Industrial Psychology and its basic concepts Nature, Importance and scope of Industrial Psychology, Scientific management, Time and motion study and human relations school **6**

UNIT-II

Individual in workplace Motivation and job satisfaction, Stress management, Organisational culture, Leadership and group dynamic. **6**

UNIT-III

Work environment, Recruitment and selection Engineering Psychology, Fatigue and boredom, Work environment, Accident and safety, Job analysis, Recruitment and selection, Psychological tests. **6**

UNIT-IV

Performance management and training Performance appraisal, Importance and Methods of Performance appraisal, Training and development- Concepts and Benefits to the organization **6**

Textbooks:
1. Aamodt, M. G. (2007) *Industrial/Organization Psychology: An Applied Approach* (5ᵗʰ Edition) Wadsworth /Thompson: Belmont, C. A.
2. Aswathappa K. (2008) *Human Resource Management (Fifth edition)* New Delhi: Tata McGraw Hill.
3. Blum & Naylor (1962) *Industrial Psychology. Its Theoretical & Social Foundations,* CBS Publication.
4. Despandey, Archana., (2010) *Industrial Psychology*, Sun India Publications, New Delhi.
5. Miner, J. B. (1992). *Industrial/Organizational Psychology*, N Y: McGraw Hill.

BSM-156   Applied Probability and Statistics
Course category   : Basic Sciences & Maths (BSM)
Pre-requisite Subject : NIL
Contact hours/week   : Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits   : 4

Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Two Minor tests and One Major Theory Examination
Course Objectives	:	The course is aimed to develop the basic mathematical skills of engineering students that are imperative for effective understanding of engineering subjects.
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To understand the basic concepts of probability and probability Distributions.
2. To understand the central tendency, correlation, and correlation coefficient and also regression.
3. To understand the fitting of various curves by method of least square
4. To apply the statistics for testing the significance of the given large and small sample data by using t- test, F- test and Chi-square test.
5. Application of probability and statistics in real life.
6. To inculcate the habit of statistical thinking and lifelong learning.

Topics Covered

UNIT-I 9

Basic Statistics: Frequency distribution, Mean, Median, Mode, Moments, Moment Generating function, Skewness, Types of Skewness, Measurement of Skewness, Kurtosis, and its types. Curve fitting: Method of Least Squares, Fitting of Straight lines, Fitting of Parabola of second degree.

UNIT-II 9

Applied Statistics: Correlation, Correlation coefficient, Spearman's rank correlation coefficient, Regression, Equation of regression lines, linear, and non-linear regression analysis. Relation between Regression Analysis and Correlation Analysis

UNIT-III 9

Probability: Random experiment, outcome, trial and event, Exhaustive events, favourable events, independent events, sample space, classical and empirical definition of probability, addition theorem of probability, multiplication theorem of probability, conditional probability, Baye's theorem.

UNIT-IV 9

Probability Distribution: Discrete and continuous random variable and their properties, distribution functions, Binomial, Poisson and Normal Distribution and evaluation of statistical parameter of these three distributions. **Test of significance:** sampling, large sample test for single proportion, difference of proportions, single mean, difference of means and difference of standard deviation, Chi-square test for goodness of fit.

Books & References

1. D. C. Montgomery and G. C. Runger, Applied Statistics and Probability for Engineers, Wiley.
2. J. L. Devore, Probability and Statistics for Engineering and the Sciences, Cengage Learning.
3. S.M. Ross, Introduction to Probability and Statistics for Engineers and Scientists, Academic Press; 5th edition
4. Robert V Hogg, Joseph McKean, Allen T Craig, Introduction to Mathematical Statistics, Pearson Edu.
5. Mood, Graybill and Boes, Introduction to the Theory of Statistics, Tata McGraw-Hill.

BCS-105		**Introduction to C Programming**

Course category	:	Engineering Fundamental (EF)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Two Minor tests and One Major Theory & Practical Examination.
Course Objective	:	The course covers the basics of programming and demonstrates fundamental programming techniques, customs and terms including the most common library functions and the usage of the pre-processor.

1. To develop C Programs using basic programming constructs
2. To develop C programs using arrays and strings
3. To develop applications in C using functions and structures

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course.

1. Basic terminology used in computer programming.
2. Programs development in C Language by writing, compiling and debugging.
3. Design of programs involving simple statements, conditional statements, iterative statements, array, strings, functions, recursion, structure and union.
4. Difference between call by value and call by reference.
5. Dynamic memory allocations and use of pointers.
6. Basic operations on a file.
7. Basics of dynamic memory.

Topic Covered

UNIT-I

Basics of programming: Approaches to Problem Solving, Concept of Algorithm and Flow Charts, Types of Computer Languages: Machine Language, Assembly Language and High-Level Language, Concept of Assembler, Compiler, Linker and Loader. Data types, Storage Classes: Auto, Extern, Register and Static. Operators, Expressions, Operator Precedence and Associativity. **Fundamentals of C Programming:** Structure of C Program, Writing and Executing the First C Program, Components of C Language, Standard I/O, Formatted I/O. Conditional Program Execution: Applying if and switch Statements, Nesting if and else. Program Loops and Iterations: Use of while, do while and for Loops, Multiple Loop Variables, Use of break and continue Statements, goto Statement.   **9**

UNIT-II

Arrays: One Dimensional, Multidimensional Array and Their Applications, Declaration and Manipulation of Arrays. **Strings:** String Variable, String Handling Functions, Array of Strings.   **9**
Functions: Designing Structured Programs, Functions in C, User Defined and Standard Functions, Formal vs. Actual Arguments, Function Category, Function Prototype, Parameter Passing, Recursive Functions.
Storage Classes revisited.

UNIT-III

Pointers: Pointer Variable and its Importance, Pointer Arithmetic Pointers and Arrays, **9**
Pointer and Character Strings, Pointers and Functions, Array of Pointers, Pointers to
Pointers. **Structure:** Declaration and Initialization of Structures, Structure as Function
Parameters, Structure Pointers. **Union:** Declaration and Initialization of Unions, Union
as Function Parameters, Union Pointers.

UNIT-IV

Dynamic Memory Allocation: malloc, calloc, realloc, free functions. **File** **9**
Management: Defining and Opening a File, Closing a File, Input/ Output Operations
in Files. The Pre-processor Directives, Macros. Command Line Arguments.
Introduction to Graphics Programming.

EXPERIMENTS

1. Write programs to print statements in sequential order using simple printf, scanf input/output functions.
2. Write programs to implement if-else condition (simple as well as nested) on suitable problems.
3. Write program to implement switch-case conditional logic on suitable examples.
4. Write programs to implement for, while and do-while loop control statements on suitable problems.
5. Write programs to implement 1D & 2D array concepts on suitable problems such as sorting of elements, searching of element, matrix addition, subtraction, multiplication etc.
6. Write programs to implement string related concepts such as sorting of a string, finding its length, reversing, concatenation, comparing two strings etc.
7. Write programs to implement concept of user defined functions (call by value, call by reference, recursive calling etc.) on suitable examples.
8. Write programs to implement concepts of pointer.
9. Write programs to implement the concept of structure and union.
10. Write programs to implement dynamic memory allocation functions (calloc, malloc, free, realloc)
11. Write programs to implement file handling concepts such as reading from a file, writing to a file using file related functions (fclose, fopen, sscanf, sprint, fread, fwrite, getc, putc, getw, putw etc.)

Textbooks:

1. Jeri R. Hanly and Elliot B. Koffman, Problem Solving and Program Design in C, 7th Edition, Pearson.
2. Schildt, Herbert, Complete Reference with C, Tata McGraw Hill.
3. Kerninghan and Ritchie, The C programming Language, 2nd Edition, Prentice Hall.
4. Richard Bird, Introduction to Functional Programming using Haskell, 2nd Edition, Prentice-Hall International, 1998.

Reference Books

1. Greg Michaelson, An Introduction to Functional Programming Through Lambda Calculus, Dover Edition, Addition Wesley Publication.
2. Samuel P. Harbison, and Guy L. Steele Jr., C-A Reference Manual, Fifth Edition, Prentice Hall, 2002.

BSM-129/179   **Quantum Physics and Nanomaterials**

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	Physics at 12th standard
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 0
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Two Minor tests and One Major Theory & Practical Examination.
Course Objective	:	Understanding of the principle and concepts of Solid State Physics, : :Electronics and Devices, Quantum Mechanics and Advanced Materials for their applications in Computer Science and Engineering

Course Outcomes:

The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Basics of Band theory of solids and its application in Engineering
2. Basic Principles of Semiconductor and its application to understand semiconducting devices
3. Quantum Mechanics and its application to understand material properties at atomic level.
4. Basic principles of Electronics Devices
5. Basic Principles of advanced materials and their application in Engineering.
6. Basics of Nanomaterials and its application to nanoscience and technology.

Topic Covered

UNIT-I

Solid State Physics: Band theory of solids: Band theory of solids, Conductors, insulators and semiconductors, Thermal properties of Materials: Thermal properties of **9** solids, Lattice vibration, specific heat, Debye theory, Einstein theory, Magnetic properties of Materials: Magnetism: Dia, para and ferro magnetism.

UNIT-II

Semiconductor Devices: Intrinsic and extrinsic semiconductors, p-n junction, p-n-p and **9** transistors, Amplifiers, Oscillators, and Op-amps, FET and MOSFET, Digital Electr Boolean Algebra, Demorgan's laws, Logic gates and truth tables.

UNIT-III

Quantum Mechanics: Broglie waves and Group velocity concept, Uncertainty **9** principle and its application, Davisson-Germer experiment, Stern Gerlach experiment, electron spin, Derivation of Schrodinger equation for time independent and time dependent cases. Postulates of quantum mechanics, Significance of wave function, Application of Schrodinger wave equation for a free particle; Particle in a box (one dimensional)

UNIT-IV

Physics of Advanced Materials: Temperature dependence of resistivity in **9** superconducting materials, Effect of magnetic field (Meissner effect), Type I and Type II superconductors, BCS theory (Qualitative), Nanomaterials: Introduction of nanoscience and technology

Textbooks:

1. Introduction to Solid State Physics- Kittel , 7th edition, Wiley Eastern Ltd.
2. Solid State Physics - S. O. Pillai, 5th edition, New Age International.
3. Quantum Physics by H. C. Verma, 3rd Edition, Surya Publication Ghaziabad,
4. Introduction to Electrodynamics- David J. Griffiths Pearson, New International Edition
5. Semiconductor Devices and Application - S.M. Sze, Wiley
6. Introduction to Nano Technology - Poole Owens, Wiley India
7. Master Hand book of Acoustics - F. Alton Everest and Ken Pohlmann, 5th edition, McGraw Hill
8. Engineering Physics by B. K. Pandey and S. Chaturvedi, 2e Cengage Learning Pvt. Limited, India.

BCS-152		**Web Designing-2**
Course category	:	Professional Skill (PF)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 1, Tutorial: 0, Practical: 2
Number of Credits	:	2
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Two Minor tests and One Major Theory & Practical Examination.
Course Objective	:	The Advanced Web Design course is designed to prepare students for professional web design work. The class will be a mix of theoretical/soft skills and more practical front-end techniques. The objective will be

1. To design web sites which use HTML tables, forms, frames, and Cascading Style Sheets.
2. To learn the advantages of HTML tables, forms, frames Cascading Style Sheets and CSS box model and when they are best utilized.
3. To provide definitions and explanations for a large number of technical terms and acronyms related to web site design.
4. To apply the techniques and features of imagemaps to web site navigation.
5. To understand the issues related to web graphics (size versus resolution) as well as how to create, optimize, and display graphic images.
6. Be able to create and edit simple animated web graphics.

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course
1. Understand principle of Web application design.
2. Understand principle of Application Programming Interface (API).
3. Apply the knowledge of Node JS on web application development.
4. Host the web application on web server.

5. learn how to employ meta tags and HTML cookies to improve the experience of web site visitors.

  6. be able to create, validate, transform and display XML files.

Topic Covered

UNIT-I

Introduction to Node JS, Setup Dev Environment, Node JS Modules, Node Package **3**
Manager.

UNIT-II

Creating Web server, File System, Debugging Node JS Application, Events, Express.JS, **3**
Serving Static Resources.

UNIT-III

Basics of MySQL, Query building, Database connectivity using Node JS **3**

UNIT-IV

Introduction to Nginx server, Introduction to AWS EC2, Web application hosting on **3**
AWS.

EXPERIMENTS

1. Create API to authentication using Node JS.
2. Create API for session management in Node JS.
3. Create a web application to search an employee from an employee database.
4. Create a web application to generate salary receipt of an employee of an organization.
5. Create a web application for leave management of employees of an organization.
6. Host the employee web application on AWS EC2 server.

Textbooks:

1. Ethan Brown, Web Development with Node and Express: Leveraging the JavaScript Stack, O'Reilly Media, Inc.
2. David Stokes, MySQL and JSON: A Practical Programming Guide, Oracle Press.

BCS-153		**IT Tools and Workshop-1**
Course category	:	Engineering Fundamental (EF)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 0, Tutorial: 0, Practical: 4
Number of Credits	:	2
Course Assessment methods	:	Continuous assessment through three Viva voce, Practical work/record, attendance, and Major Practical Examination
Course Objective	:	The IT tools and Workshop-I is a training lab course to get training on PC Hardware, Internet & World Wide Web, and Productivity tools for documentation, Spreadsheet computations, and Presentation. It is
		1. To introduce to a personal computer and its basic peripherals, the process of assembling a personal computer,

installation of system software like MS Windows, Linux and the required device drivers, hardware, and software.
2. Install, configure Operating Systems and device drivers.

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course
1. Understand basics knowledge of report and presentation software's.
2. Understand the basic knowledge of Excel.
3. Understand the basic knowledge of photo and video editing tools.
4. Understand the basic knowledge of tools supporting program writing and management.
5. Apply the tools for preparation of PPT, Documentation and budget sheet etc.
6. Apply knowledge for computer assembling and software installation.

EXPERIMENTS
The students will perform following experiments to get familiar with Computer.
1. Introduction to all the features of Microsoft Word and preparation of a report based on observed features.
2. Introduction to all features of Microsoft PowerPoint and preparation of a presentation based on observed features.
3. Introduction to all features of Microsoft Excel for data analysis and management using macros. Perform analysis of student database of university.
4. Introduction to all features of Adobe Photoshop for photograph editing and editing various photographs of university departments.
5. Introduction to all features of Adobe Premiere Pro for video editing creating a campus tour of university.
6. Working on Linux operating system and its various commands.
7. Introduction to Visual Studio Code for programs writing.
8. Introduction to Git for source code management.
9. Creating an animated video using latest open-source software

BEC-154		**Basic Electronic Components and Circuits**
Course category	:	Engineering Fundamentals (PLBSE)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 0, Practical: 2
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Two Minor tests and One Major Theory & Practical Examination.
Course Objective	:	The objective of this course is to develop an understanding of the different types of different electronic components and circuits such as BJT, MOSFET etc. and study the working principles of different instruments.

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Able to memorize the basic concept of electronic circuits using Diode, BJT, FET, etc.
2. Able to execute and examine the general characteristic of electronic circuits.
3. Illustrate the basics of Boolean algebra and logic gates with their realisation using discrete electronic components.
4. Compute different parameters for characterising different circuits like rectifier, amplifiers, integrators, etc.
5. Examine the working principle of digital voltmeter, millimetre using block diagram approach.
6. Discuss and calculate voltage, current, phase and frequency using CRO.

Topic Covered

UNIT-I

Semiconductor materials and properties: electron-hole concepts, Basic concepts of energy **9** bands in materials, concept of forbidden gap, Intrinsic and extrinsic semiconductors, donors and acceptors impurities, Junction diode, p-n junction, depletion layer, v-icharacteristics, diode resistance, capacitance, diode ratings (average current, repetitive peak current, non-repetitive current, peak-inverse voltage). Diode Applications in rectifier, filters, voltage multipliers, load regulators, clipper and clamper circuits, Breakdown mechanism (Zenerand avalanche),Breakdowncharacteristics,Zenerresistance,Zenerdioderatings,Zenerdiodeapplic ationasshuntregulator

UNIT-II

Transistors(BJT and FET);Basic construction, transistor action, CB, CE and CC **9** configurations, input/output characteristics, Biasing of transistors-fixed bias, emitter bias, potential divider bias, comparison of biasing circuits. Transistor Amplifier: Graphical analysis of CE amplifier, concept of voltage gain, current gain, h- parameter model (low frequency), computation of Ai, Av, Ri, Ro of single transistor CE and CC amplifier configurations.

UNIT-III

JFET & MOSFET/ Switching theory and logic design: **9**
Field Effect Transistors (JFET and MOSFET): Basic construction, transistor action, concept of pinch off, maximum drain saturation current, input and transfer characteristics, characteristic equation CG, CS and CD configurations, fixed & self-biasing. application of MOSFET as an amplifier and switch
Number systems, conversion of bases, Boolean algebra, logic gates, concept of universal gate, canonical forms, Minimization using K-map

UNIT-IV

Operational Amplifier: Concept of ideal operational amplifiers, ideal op-amp parameters, **9** inverting, non-inverting and unity gain amplifiers, adders, difference amplifiers, integrators, Other Circuits based on Operational Amplifiers

EXPERIMENTS
Note: Minimum Five experiments are to be performed
1. To plot the forward/ Reverse Characteristics of Si P-N junction diode.
2. To plot the forward/Reverse Characteristics of Zener diode
3. Study and plot the characteristic of Zener diode as voltage regulator

4. Study of half wave rectifier and draw the nature of input / output signal. Calculate the value of I_{dc}, I_{rms} and ripple factor.
5. Study of Full wave rectifier and draw the nature of input / output signal. Calculate the value of I_{dc}, I_{rms} and ripple factor.
6. Study of Bridge Rectifier and draw the nature of input / output signal. Calculate the value of I_{dc}, I_{rms} and ripple factor.
7. Draw input output characteristic curve of n-p-n transistor in CE configuration
8. Draw input output characteristic curve of n-p-n transistor in CB configuration
9. Draw the drain and transfer curve of JFET
10. Study of OPAMP(741)and calculate the gain in(i)Inverting mode and (ii)Non-inverting mode
11. Study of OP-AMP as a (i) Summer (ii) Integrator (iii) Differentiator; and plot the nature of input & output waveform
12. Study of CRO and multi-meter measurement voltage, frequency, phase difference using CRO along with the testing of electronics component

Textbooks:

1. Electronic Devices and Circuits-Boylestadand Nashelsky, 6e, PHI, 2001
2. Electronic Devices and Circuits, A Mottershead, PHI,2000, 6e
3. Digital Computer Design, Morris Mano, PHI,2003
4. Electronic Instrumentation-H.S. Kalsi, 2e,TMH, 2007