Kanpur Institute of Technology

(An Autonomous Institute of Dr. A.P.J. Abdul Kalam Technical University, Lucknow)

Accredited grade 'A' by NAAC Approved

by AICTE, New Delhi

Autonomous status approved by UGC, New Delhi

Evaluation Scheme &

Syllabus For

B.Tech. First Year

- **Computer Science & Engineering**
- **Information Technology**
- **Computer Science and Engineering (Artificial Intelligence & Machine Learning)**

(Effective from the Session: 2024-25)

Department of Computer Science & Engineering

A-1, UPSIDC Industrial Area, Rooma, Kanpur 208001(U.P.)

India Website: www.kit.ac.in/kit, E-Mail:

info@kit.ac.in

Semester I										
S. NO	**COURSE CODE**	**COURSE TITLE**	**TYPE**	**PERIODS**			**FA**	**SA**	**Total**	**CREDIT**
				L	T	P				
1	AH11010	ENGINEERING MATHEMATICS-I	TH	2	1	0	70	30	100	3
2	CS11010	FUNDAMENTAL OF WEB DESIGNING	TH	2	0	0	70	30	100	2
3	CS11020	FUNDAMENTAL OF COMPUTERS AND EMERGING TECHNOLOGIES	TH	2	1	0	70	30	100	3
4	CS11030	PROGRAMMING FOR PROBLEM SOLVING	TH	3	1	0	70	30	100	4
5	AH11020	DESIGN THINKING AND INNOVATION	TH	2	0	0	70	30	100	2
6	CS11040	PROGRAMMING FOR PROBLEM SOLVING USING C LAB	PR	0	0	4	70	30	100	2
7	CS11050	PROFESSIONAL COMPUTING LAB	PR	0	0	4	70	30	100	2
8	CS11060	FUNDAMENTAL OF WEB DESIGNING LAB	PR	0	0	2	70	30	100	1
9	CA11010	CO-CURRICULAR ACTIVITIES	PR	0	0	0	100	-	100	0.5
10	GP11010	GENERAL PROFICIENCY	PR	0	0	0	100	-	100	0.5
Total ->				**11**	**3**	**10**	**760**	**240**	**1000**	**20**

Abbreviation used:

L: Lecture
T: Tutorial
P: Practical

FA: **F**ormative **A**ssessment
SA: **S**ummative **A**ssessment
TH: **Th**eory, **PR**: **Pr**actical

B.TECH. FIRST YEAR (SEMESTER-I)					
Course Code	**AH11010**	**L**	**T**	**P**	**Credit**
Course Title	**ENGINEERING MATHEMATICS-I**	**2**	**1**	**0**	**3**

Course Objectives:

The objective of this course is to familiarize the graduate engineers with techniques in matrix, calculus, multivariate analysis and vector calculus. It aims to equip the students with standard concepts and tools from intermediate to advanced level that will enable them to tackle more advanced level of mathematics and applications that they would find useful in their disciplines. The students will learn:

- The essential tools of matrices, Eigenvalues and its application in a Comprehensive-manner.
- To apply the knowledge of differential calculus in the field of engineering.
- To deal with functions of several variables that is essential in optimizing the results of real life problems.
- To apply integral calculus in various field of engineering and have a basic understanding of Beta and Gamma functions and application of Dirichlet's integral.
- To deal with vector calculus that is required in different branches of engineering to graduate engineer.

Pre-requisites: Knowledge of Mathematics unto 12th standard.

Course Contents / Syllabus		
UNIT-I	**Matrices**	**8 hours**
Elementary transformations, Inverse of a matrix, Rank of matrix, Solution of system of linear equations, Characteristic equation, Cayley-Hamilton Theorem and its application, Linear Dependence and Independence of vectors, Eigen values and Eigen vectors, ComplexMatrices, Hermitian, Skew-Hermitian and Unitary Matrices.		
UNIT-II	**Differential Calculus-I**	**8 hours**
Introduction of limits, continuity and differentiability, Rolle's Theorem, Lagrange's Mean value theorem and Cauchy mean value theorem, Successive Differentiation (nth order derivatives), Leibnitz theorem, Partial derivatives, Euler's Theorem for homogeneous functions, Total derivative.		
UNIT-III	**Differential Calculus-II**	**8 hours**
Expansion of functions by Taylor's and Maclaurin's theorems for functions of one and two variables, Maxima and Minima of functions of several variables, Lagrange's method of multipliers, Jacobians, Approximation of errors.		
UNIT-IV	**Multiple integration**	**10 hours**
Double integral, Triple integral, Change of order of integration, Change of variables, Beta and Gamma function and their properties, Dirichlet's integral and its applications to area and volume, Liouville's extensions of Dirichlet's integral.		
UNIT-V	**Vector Calculus**	**8 hours**
Vector differentiation: Gradient, Curl and Divergence and their Physical interpretation,Directional derivatives. **Vector Integration**: Line integral, Surface integral, Volume integral, Gauss's Divergencetheorem, Green's theorem and Stoke's theorem (without proof) and their applications.		

Course Outcome (CO)	Knowledge Level

At the end of course, the student will be able to:		
CO 1	Understand the concept of complex matrices, Eigen values, Eigen vec tors and applythe concept of rank to evaluate linear simultaneous equations	K2 & K5
CO 2	Remember the concept of differentiation to find successive dif ferentiation,Leibnitz Theorem, and create curve tracing, and find par tial and total derivatives	K1 & K5
CO 3	Applying the concept of partial differentiation to evaluate extrema, series expansion,error approximation of functions and Jacobians	K3 &K5
CO 4	Remember the concept of Beta and Gamma function; analyze area and volume andDirichlet's theorem in multiple integral	K1 & K4
CO 5	Apply the concept of Vector Calculus to analyze and evaluate directi onal derivative, line, surface and volume integrals.	K3, K4& K5

TEXT BOOKS
(1) B. V. Ramana, Higher Engineering Mathematics, Tata Mc Graw-Hill Publishing Company Ltd..
(2) B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher.
(3) R K. Jain & S R K. Iyenger , Advance Engineering Mathematics, Narosa Publishing House .
REFERENCE BOOKS:
(1) E. Kreyszig, Advance Engineering Mathematics, John Wiley & Sons.
(2) Peter V. O'Neil, Advance Engineering Mathematics, Thomson (Cengage) Learning.
(3) Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas, Calculus, Eleventh Edition, Pearson.
(4) D. Poole, Linear Algebra : A Modern Introduction, 2nd Edition, Brooks/Cole.
(5) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi.
(6) Ray Wylie C and Louis C Barret, Advanced Engineering Mathematics, Tata Mc-Graw-Hill; Sixth Edition.
(7) P. Sivaramakrishna Das and C. Vijayakumari, Engineering Mathematics, 1st Edition,Pearson Education
(8) Advanced Engineering Mathematics. Chandrika Prasad, Reena Garg
SUGGESTED VIDEO LINKS:
1. https://www.youtube.com/watch?v=04OKphtBN7I 2. https://www.youtube.com/watch?v=4Augy2kdEUE&list=PLNKD1qB9pptuJlYVeM-wIETemi5iw_oRQ 3. https://www.youtube.com/watch?v=AMr5etyUEL8&list=PLhSp9OSVmeyJUJH0kaIjylaJvxaylI64O 4. https://www.youtube.com/watch?v=Xfl0BIvLiV4&list=PLNKD1qB9pptvcOzCxiYxwif-AZYR7T5-q 5. https://www.youtube.com/watch?v=8d9Fo8Hj50M&list=PLNKD1qB9pptscjgENMRaCT2Jni9ukZm2Q 6. https://www.youtube.com/watch?v=fupOsH1YYkI&list=PLNKD1qB9pptvVqDg21UAS0vkid7tVUI2G 7. https://www.youtube.com/watch?v=DUuTx2nbizM 8. https://www.youtube.com/watch?v=Kttt5nobHqM 9. https://www.youtube.com/watch?v=s2QNhckjSq0&list=PL2xF3HCNxGM9_4QCssdTcmaQc260tuSux 10. https://www.youtube.com/watch?v=IFtjDDB8fzo&list=PLU6SqdYcYsfJlpLH35MEWnKAQYFJoLCy9 11. https://www.youtube.com/watch?v=g-jrrHPT-d4 12. https://www.youtube.com/watch?v=KijGLjxKlsY&list=PLU6SqdYcYsfLLAU6Hxi0C_TnrZeqgbJMJ 13. https://www.youtube.com/watch?v=EGnI8WyYb3o&list=PLU6SqdYcYsfIsER5aEx21e8CSoIZhb-Rd 14. https://www.youtube.com/watch?v=bTs7ncA_AtY 15. https://www.youtube.com/watch?v=9GKfvknvTQk 16. https://www.youtube.com/watch?v=1c5mCr8QFRA&list=PLpklqhIbn1jonjRbrpRdjL5uHwgNvIy9d 17. https://www.youtube.com/watch?v=Ac1mr2WrOg&list=PLU6SqdYcYsfKEgfOKHsHUdEq3uA8KA0w0

18. https://www.youtube.com/watch?v=NpR91wexqHA
19. https://www.youtube.com/watch?v=FrD7uu6chP0
20. https://www.youtube.com/watch?v=PiOR9mZhy68&list=PLaQmrLy_gXgBFT8O9H6aiuC453d2DZ7gF
21. https://www.youtube.com/watch?v=fXMyLYwBB3s
22. https://www.youtube.com/watch?v=ffNpqBVyYew&list=PLhSp9OSVmeyIADP2WgrRNsoj3OdItMqSv
23. https://www.youtube.com/watch?v=db7d_a0wiUg&list=PLU6SqdYcYsfLoKyzF_dwxAQf8lIi6VC54
24. https://www.youtube.com/watch?v=Itnrbn4OhPE
25. https://www.youtube.com/watch?v=PB8epN7Hb2w&list=PLdhH6lJ5Nz1f8Zpfz5oUuj2U3MUkmRUJa
26. https://www.youtube.com/watch?v=mnFUAJflNtU
27. https://www.youtube.com/watch?v=JLBEIF3FS_U&list=PLAPKGqvQGg6qOR7D7nsz2dZWjb_REFKBp
28. https://www.youtube.com/watch?v=_PNsPatRNVA&t=98s
29. https://www.youtube.com/watch?v=6fJE3vvjB8o
30. https://www.youtube.com/watch?v=gu08BWK6cv8

B.TECH. FIRST YEAR (SEMESTER-I)					
Course Code	**CS11010**	**L**	**T**	**P**	**Credit**
Course Title	**FUNDAMENTAL OF WEB DESIGNING**	**2**	**0**	**0**	**2**

Course Objectives: The "Fundamentals of Web Designing" course aims to teach students essential skills for creating functional and attractive websites. It covers internet basics, HTML, CSS, responsive design, web graphics, and JavaScript for interactivity. Students learn to use development tools, apply UX/UI principles, follow web standards for accessibility, and implement basic SEO techniques. The course culminates in a project where students design, develop, and deploy a user-friendly website.

Pre-requisites: The pre-requisites for "Fundamentals of Web Designing" include basic computer skills, internet familiarity, and a willingness to learn coding. Optional but helpful pre-requisites are a basic understanding of HTML, CSS, and design principles, as well as experience with graphic design software like Photoshop. A keen interest in web design is essential.

Course Contents / Syllabus		
UNIT-I	**Introduction**	**8 hours**

Introduction: Basic principles involved in developing a web site, Planning process, Internet protocols like TCP/IP, http, telnet and ftp, Domains and Hosting, Responsive Web Designing, Types of Websites (Static and Dynamic Websites), Key issues to be considered in web site design

UNIT-II	**Introduction To HTML**	**8 hours**

What is HTML Basic structure of an HTML, Creating an HTML document Mark up Tags, Heading-Paragraphs, Inserting text, images, hyperlinks, Backgrounds and Color Control, Table layout & presentation, constructing tables in a web page, List: Ordered and unordered lists, Frames: Developing Web pages using frames. Advantages and disadvantages of frames. Creating forms.

UNIT-III	**Cascading style-sheet (CSS) in HTML**	**8 hours**

Introduction to Cascading Style Sheets (CSS), Creating Style Sheet, Types of Style Sheets (Inline, Internal and External), Types of various CSS Selectors, CSS Id and Class, Working with Lists and Tables, Type Properties, Background Properties, Block Properties, Border Properties, Positioning Properties, Box Model. Curser, Curser Hover, Grouping, Dimension, Floating, Align, Pseudo class, Transitions and Animations

UNIT-IV	**Introduction to Java Script**	**8 hours**

Role of java script in a web page, Javascript Data Types, variables, Operators, Conditions Statements and switch in JS, Java Script Loops, JS String, JS Arrays, Working with Arrays, Navigating DOM (Document Object Model), JS Functions, Alert, Prompt, Confirm functions in JS, JS Popup Boxes, JS Events.

UNIT-V	**Memory managements, Pointer and Error Handling**	**8 hours**

Error Handling in JS, Validations, Animations and Multimedia, Promises, fetch (), Async and Await, Iterators, Generators

Concepts of SEO : Basics of SEO, Importance of SEO, Onpage Optimization Basics

Course Outcome (CO)		**Knowledge Level**
At the end of course, the student will be able to:		
CO 1	Understand principle of Web page designing and about various protocols	K2, K3
CO 2	Recognize and implement the concept of HTML and application in web designing.	K3

CO 3	Add Interactivity to a Web Page by applying the elements of Creating Style Sheet (CSS).	K3
CO 4	Understanding the concept of Java Script and its application	K4
CO 5	Understanding the concept of advance Java Script and implement the concept of SEO	K2, K3

TEXT BOOKS:

(1). Steven M. Schafer, "HTML, XHTML, and CSS Bible", Wiley India

(2). Ian Pouncey, Richard York, "Beginning CSS: Cascading Style Sheets for Web Design", Wiley India

REFERENCE BOOKS:

(1). Jon Duckett, HTML and CSS: Design And Build Websites, Wiley

(2). Jon Duckett, JavaScript and Jquery: Interactive Front-End Web Development, Wiley

(3). Jennifer Niederst Robbins, Learning Web Design: A Beginner's Guide To HTML, CSS, JavaScript, And Web Graphics, O'reilly

SUGGESTED VIDEO LINKS :

1. https://youtu.be/pnoWCK82apU?si=cDxRCxWsa_Y1HJa3
2. https://youtu.be/VQ92H8eS7Ig?si=jFyKf1W8OloEf46y
3. https://youtu.be/GfaHdjApnhU?si=KKZOZZDVY4YCdUGh
4. https://youtu.be/gL-yy-ETSok?si=F8CxlGrZJfn8WEYg
5. https://youtu.be/1DYIm6GTlcc?si=KxVHCLb4_K63r3bq
6. https://youtu.be/_wFJj94kSTU?si=GtYJh9zFaWY7IKcW
7. https://youtu.be/IA8JWGP13dI?si=_ulZHrK_UgDNKgHo
8. https://youtu.be/EZCc_4abdcE?si=qaZkzJf8pkhjd3QE
9. https://youtu.be/z6H22xGAZEA?si=6nqFIDefnfFwHODs
10. https://youtu.be/N69xumSjg5Q?si=laIv-lj4TgCZf0T5
11. https://youtu.be/MkfFaB04Tc8?si=CD7j04wzFzMB1TF4
12. https://youtu.be/KqJikDzb3l4?si=iTB5pNF25CrUqywA
13. https://youtu.be/PVBqZRAOZL8?si=HSpr1tmdF7hYB_Lf
14. https://youtu.be/0e8L7yLYXJ4?si=xDxfvr8lho3SwAkO
15. https://youtu.be/Bf1Vq3pGNao?si=uApj7H32TTYwKlbr
16. https://youtu.be/oJXmXzfjrBY?si=djB4iOdAUmQvzj8F
17. https://youtu.be/hr4JiDr7Aec?si=U5ingpUyUc4Bskbg
18. https://youtu.be/x0prF61CpHY?si=KF3C9PIo3aj-L33i
19. https://youtu.be/8ydac49C1Pc?si=iAX5K964ij3dgoG9
20. https://youtu.be/xv82yODVXqo?si=R63dJXysBLWWTt4d
21. https://youtu.be/vBNo70N3EwU?si=cfhYbJYRDwA73ZXb
22. https://youtu.be/tOqn-XxVFUM?si=VI-Baooxbfs0UF4k
23. https://youtu.be/cc8OOwqj258?si=VeJKd6GCtAYepF64
24. https://youtu.be/-oVdqCaL3DQ?si=uqV2EkaHFH-gPaJU
25. https://youtu.be/cEWLPtRhiio?si=pzO1ItQX1M1QaoUK
26. https://youtu.be/SIHwNLrMXvU?si=6zZxBumId3iar8RO
27. https://youtu.be/pdqXYAe1kKA?si=xkvyvY279y1jlFG8
28. https://youtu.be/d4PN2rJD98g?si=Fq95jyTREfXLTDDz
29. https://youtu.be/rHQ1etbQpmQ?si=j34Hz8hJzZgG5pxm
30. https://youtu.be/WLUCzSaH5kI?si=H5o3cQmRJJ69SlYe
31. https://youtu.be/h_0lq1Dc89o?si=Ixp3QZNWC4dV9kxV
32. https://youtu.be/CfNsy4K9atY?si=IDOeUskK79oAZ3Uq
33. https://youtu.be/9YNGAxXGJzM?si=jcQhtAv4-p2wcznR
34. https://youtu.be/XFEAMyB85RA?si=3zrpMk2gOduuwMbb
35. https://youtu.be/VnR_5eE36yM?si=GF7Cd2R2bllCV3nz
36. https://youtu.be/Qkcwveti-lE?si=EIuDf6Et8LoUrPmG

B.TECH. FIRST YEAR (SEMESTER-I)					
Course Code	**CS11020**	**L**	**T**	**P**	**Credit**
Course Title	**FUNDAMENTAL OF COMPUTERS AND EMERGING TECHNOLOGIES**	**2**	**1**	**0**	**3**
Course Objectives: Course covers computer basics, operating systems, and networks. It includes Internet architecture, IoT, blockchain, cryptocurrencies, and cloud computing. It also explores emerging technologies like AR, VR, and quantum computing.					
Pre-requisites: Students should have basic computer literacy, a fundamental understanding of mathematics, and some knowledge of computer science fundamentals and networking. These prerequisites will help in grasping the advanced topics covered in the syllabus.					

Course Contents /Syllabus		
UNIT-I	**Introduction to computer, Computer Languages & Data Representation**	**8 hours**
Introduction to Computer: Definition, Computer Hardware & Computer Software **Components:** Hardware – Introduction, Input devices, Output devices, Central Processing Unit, Memory- Primary and Secondary. Software - Introduction, Types – System and Application. **Computer Languages:** Introduction, Concept of Compiler, Interpreter & Assembler **Data Representation:** Number system and Coding Schemes.		
UNIT-II	**Operating system & Computer Network**	**8 hours**
Operating system: Definition, Functions, Types, Classification, Elements of command based and GUI based operating system. **Computer Network:** Overview, Types (LAN, WAN and MAN), Data communication, topologies		
UNIT-III	**Internet, Internet of Things (IoT):**	**8 hours**
Internet: Overview, Architecture, Functioning, Basic services like WWW, FTP, Telnet, Gopher etc., Search engines, E-mail, Web Browsers. **Internet of Things (IoT):** Definition, Sensors, their types and features, Smart Cities, Industrial Internet of Things.		
UNIT-IV	**Block chain, Crypto Currencies & Cloud Computing**	**8 hours**
Block chain: Introduction, overview, features, limitations and application areas fundamentals of Block Chain. **Crypto Currencies:** Introduction, Applications and use cases **Cloud Computing:** Introduction and features, AWS, Google, Microsoft & IBM Services		
UNIT-V	**Emerging Technologies:**	**8 hours**
Emerging Technologies: Introduction, overview, features, limitations and application areas of Augmented Reality, Virtual Reality, Grid computing, Green computing, Big data analytics, Quantum Computing and Brain Computer Interface		

Course Outcome (CO)		Knowledge Level
At the end of course, the student will be able to:		
CO 1	Demonstrate the knowledge of the basic structure, components, features and data representation methods.	K1,K3
CO 2	Compare and contrast features, functioning & types of operating system and computer networks.	K4
CO 3	Explain the Internet's architecture and services, and describe IoT concepts	K2
CO 4	Describe the fundamentals of blockchain, cryptocurrencies, and	K1,K_2

	cloud computing, including their features and applications.	
CO 5	Illustrate the emerging trends and technologies in the field of Information Technology.	K1,K2

TEXTBOOKS:
1. Introduction to Information Technology by ITL Education Solutions Limited, 2. ' O' Level made simple "introduction to ICT resources" by Satish Jain, Shashank Jain, Shashi Singh & M. Geetha Iyer, BPB publication.
3. Information Technology The breaking wave by Dennis Curtin Tata McGraw-hill edition
4. Computer Fundamentals by A. Goel, Pearson Education, 2010.
5. Fundamentals of Internet and Emerging Technologies Paperback – 1 August 2021 by C. Xavier (Author)
REFERENCEBOOKS:
1. Introduction to Information Technology by P. Aksoy and L. DeNardis, Cengage Learning...
2. Norton P. "Introduction to Computers", McGraw Hill Education.
3. Balagurusamy E., " Fundamentals of Computers", McGraw Hill
4. Bindra J., "The Tech Whisperer- on Digital Transformation and the Technologies that Enable it ", Penguin
SUGGESTED VIDEO LINKS:
1. https://www.youtube.com/watch?v=qfUZBKDh9BY 2. https://www.simplilearn.com/tutorials/networking-tutorial/importance-of-types-of-networks-lan-man-wan 3. https://ashishmodi.weebly.com/uploads/1/8/9/7/18970467/computer_fundamental.pdf 4. https://www.slideshare.net/slideshow/computer-network-telnet-and-gopher/43861422 5. https://zerocap.com/insights/research-lab/fundamentals-of-blockchain/ 6. https://www.oswego.edu/cts/basics-about-cryptocurrency 7. https://www.spiceworks.com/tech/cloud/articles/what-is-cloud-computing/ 8. https://www.slideshare.net/VijayJoshi123/an-introduction-to-emerging-technology-243504709 9. https://www.slideshare.net/slideshow/big-data-analytics-250646534/250646534 10. https://www.youtube.com/watch?v=SzMiJFOa6w8 11. https://link.springer.com/book/10.1007/978-3-031-07127-0 12. https://en.wikipedia.org/wiki/Emerging_technologies

B.TECH. FIRST YEAR (SEMESTER-I)					
Course Code	**CS11030**	**L**	**T**	**P**	**Credit**
Course Title	**PROGRAMMING FOR PROBLEM SOLVING**	**3**	**1**	**0**	**4**

Course Objectives:
The "Problem Solving Using C Programming" course aims to teach C programming basics, develop problem-solving skills, enhance logical thinking, train in debugging, introduce basic data structures, cover input/output operations, emphasize modular programming, and prepare for advanced studies.

Pre-requisites:
Knowledge of algebra, basic number theory, set theory, and logic. Familiarity with proof techniques (direct, indirect, induction), basic combinatorics, and counting principles is essential. Additionally, strong problem-solving skills and logical thinking are important.

UNIT-I	**Introduction**	**8 hours**

Introduction: Features of C Programming Language, C Programming Language Standard, Setting Up C Development Environment, C Hello World Program, Compiling a C Program: Behind the Scenes, C Comments, Tokens , Identifiers, Keywords, Variables and Constants: C Variables, Constants , Const Qualifier , Different Ways to Declare Variable as Constant , Scope Rules, Internal Linkage and External Linkage, Global Variables .Data Types: Data Types , Data Type Modifiers , Literals , Escape Sequence in C, bool , Integer Promotions , Character Arithmetic , Type Conversion ,Input/Output: Basic Input and Output , Format Specifiers, Printf , Scanf, Scansets , Formatted and Unformatted Input and Output Functions

UNIT-II	**Decision-Making Statements and Control Statements**	**8 hours**

Decision-Making statements: if Statement, if...else Statement, if-else-if Ladder, Switch Statement Using Range in switch case , Control Statements , for loop, while loop, do...while Loop , continue Statement , break Statement , goto Statement Functions : User-Defined Function , Parameter Passing Techniques , Importance of Function Prototype , Return Multiple Values From a Function, main Function , Implicit Return Type int , Callbacks , Nested Functions , Predefined Identifier Function , Maths Functions

UNIT-III	**Arrays And Strings**	**8 hours**

Arrays: C Arrays, Properties of Array , Multidimensional Arrays, Initialization of Multidimensional Arrays , Pass Array to Functions , Pass a 2D Array as a Parameter , Data Types for Which Array is Not Possible, Pass an Array by Value Strings in C: An Array of Strings in C, Difference Between Single Quoted and Double Quoted Initialization, String Functions.

UNIT-IV	**User Define Data Types and Storage Classes**	**10 hours**

User-Defined Data Types: Structures, dot (.) Operator , C typedef, Structure Member Alignment, Padding and Data Packing, Flexible Array Members in a Structure , Unions, Bit Fields , Difference Between Structure and Union, Anonymous Union and Structure , Enumeration (or Enum) Storage Classes: extern Keyword , Static Variables , Initialization of Static Variables, Static Functions, Understanding "volatile" Qualifier, Understanding the "register" Keyword .

UNIT-V	**Memory Managements, Pointer and Error Handling**	**8 hours**

Memory Management: Memory Layout of C Programs, Dynamic Memory Allocation , Difference Between malloc() and calloc(), Memory Leak, Dynamic Array in C, Dynamically Allocate a 2D Array , Dynamically Growing Array. Pointers : Pointer Arithmetics , Pointer to Pointer (Double Pointer), Function Pointer , Declare Function Pointer , Pointer to an Array, Constant Pointer , Pointer vs Array , Restrict Keyword File Handling: Basics of File Handling , fopen() Function, EOF, getc() and feof(), fgets() and gets() , fseek() vs rewind() , Return Type of getchar(), fgetc() and getc(), Read/Write Structure From/to a File , Difference, Between

printf, sprintf and fprintf, Difference Between getc(), getchar(), getch() and getche() Error Handling: Error Handling in C, Using goto for Exception Handling in C, Error Handling During File Operations in C.

Course Outcome (CO)		Knowledge Level
At the end of course, the student will be able to:		
CO 1	To Write Simple Algorithms for Arithmetic and Logical Problems	K2, K3
CO 2	To Translate the Algorithms to Programs & Execution (in C Language).	K3
CO 3	To Implement Conditional Branching, Iteration and Recursion	K3
CO 4	To Decompose a Problem into Functions and Synthesize a Complete Program Using Divide and Conquer Approach	K4
CO 5	To Use Arrays, Pointers and Structures to Develop Algorithms and Programs.	K2, K3

TEXT BOOKS:

1. Ashok N. Kamthane, Programming in C, Pearson Publishing House.
2. Yashwant Kanetkar, Let Us C, BPB Publication

REFERENCE BOOKS:

1. Schaum's Outline of Programming with C by Byron Gottfried, McGraw-Hill
2. The C programming by Kernighan Brain W. and Ritchie Dennis M., Pearson Education.
3. Computer Basics and C Programming by V.Rajaraman , PHI Learning Pvt. Limited, 2015.
4. Computer Concepts and Programming in C, E Balaguruswami, McGraw Hill
5. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition, Cengage Learning - 2007. 6. Let Us C By Yashwant P. Kanetka

SUGGESTED VIDEO LINKS:

1. https://archive.nptel.ac.in/courses/106/104/106104128/
2. https://onlinecourses.nptel.ac.in/noc22_cs40/preview
3. https://archive.nptel.ac.in/courses/106/105/106105171/
4. https://www.youtube.com/watch?v=vqtyDXFlS98
5. https://www.youtube.com/watch?v=zJzpCorv1JQ&list=PLfqABt5AS4FkIiyvV8mnZmf3p6PxbAtc8

B.TECH. FIRST YEAR (SEMESTER-I)					
Course Code	**AH11020**	**L**	**T**	**P**	**Credit**
Course Title	**DESIGN THINKING AND INNOVATION**	**2**	**0**	**0**	**2**

Course Objectives: The objective of this Course **to explain the fundamental concept of innovation and design thinking.** It aims to equip students with the fundamental concepts and techniques of design thinking, enabling them to apply design thinking principles to their daily work and develop innovative solutions for real-world problems.

Pre-requisites: Pre-requisites aims to ensure that students have a basic understanding of engineering concepts and are ready to apply design thinking principles to their work.

Course Contents / Syllabus

UNIT-I	**Foundations Of Learning and Emotional Intelligence**	**8 hours**

An Insight to Learning: Understanding the learning process, role of comprehension, insight and information processing. Kolb's Learning Styles, Techniques for assessing and interpreting the learning process, Understanding the Memory process, Problems in retention, Memory enhancement techniques.

Understanding Emotions: Exploring the role of emotions in the learning experience, Assessing Empathy, Application with Peers.

UNIT-II	**Fundamentals of Design Thinking**	**8 hours**

Definition: Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concepts & Brainstorming.

Stages of Design Thinking Process: **Empathize, Define, Ideate, Prototype, Test.**

Creative Problem-Solving: Understanding Creative thinking process, Understanding Problem Solving, Testing Creative Problem Solving.

UNIT-III	**Product Design and Prototyping**	**8 hours**

Process of Engineering Product Design: Understanding the steps involved in designing a product, including identifying the problem, defining the requirements, and creating a design concept.

Stages of Product Design: Concept development, design refinement, and prototyping, **Examples of Best Product Designs and Functions, Assignment – Engineering Product Design**

Prototyping & Testing: What is Prototype? Why Prototype? Rapid Prototype Development process, Testing, Sample Example, Test Group Marketing.

UNIT-IV	**Embracing Diversity in Design Thinking**	**8 hours**

Understanding Individual Differences and Uniqueness: Recognizing the value of diverse perspectives in design thinking, Techniques for fostering an inclusive and collaborative design environment.

Group Discussion and Activities: To encourage understanding, acceptance, and appreciation of individual differences, including role-playing, case studies, and group projects.

UNIT-V	**Iterative Design and User-Centric Refinement**	**8 hours**

Design Thinking & Customer Centricity: Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with Product Design.

Feedback, Re-Design & Re-Create: Feedback loop, Focus on User Experience, Address "ergonomic challenges, User focused design, rapid prototyping & testing, final product'

Final Presentation – "Solving Practical Engineering Problem through Innovative Product

Design & Creative Solution".

Course Outcome (CO)		Knowledge Level
At the end of course, the student will be able to:		
CO 1	A strong foundational understanding of how individuals learn, process information, and leverage emotional intelligence - all critical elements for the successful application of design thinking principles.	K2
CO 2	Identify a foundational understanding of design thinking and its application in creative problem-solving.	K3
CO 3	Comprehensive understanding of the product design process, including the steps involved, stages of design, and the importance of prototyping and testing.	K3
CO 4	Understanding the importance of embracing diversity in design thinking and the techniques to foster an inclusive and collaborative design environment.	K_2
CO 5	Understanding of iterative design and its application in enhancing customer experience, addressing ergonomic challenges, and creating innovative solutions.	K3

TEXT BOOKS:
1. "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation" by Tim Brown.
2. E Balaguruswamy (2022), Developing Thinking Skills (The way to Success), Khanna Book Publishing Company.
REFERENCE BOOKS:
1. "The Design Thinking Playbook" by Michael Lewrick
2. "The Design of Everyday Things" by Donald A. Norman
3. "Universal Principles of Design" by Jill Butler, Kritina Holden, and William Lidwell
4. "Designing for Growth: A Design Thinking Toolkit for Managers" by Jeanne Liedtka, Tim Ogilvie, and Rachel Bronzenske
SUGGESTED VIDEO LINKS:
1.https://youtu.be/xqnT703jngk 2.https://youtube.com/playlist?list=PLrpK1inhO61UWoyhl8Od3JdkunC1Pnb_I&feature=shared 3.https://youtu.be/WFgZlAb90Yg 4.https://youtu.be/WFgZlAb90Yg?feature=shared 5.https://youtu.be/FIVA6dBRv4I?feature=shared 6.https://youtube.com/playlist?list=PLdinyWzDfipOyGraQ94cQkMLYG0OuqeZR&feature=shared 7. https://youtu.be/szu0god6MoM

B.TECH. FIRST YEAR (SEMESTER-I)					
Lab Code	**CS11040**	**L**	**T**	**P**	**Credit**
Lab Title	**PROGRAMMING FOR PROBLEM SOLVING USING C LAB**	**0**	**0**	**4**	**2**

Course Outcome (CO)		
At the end of course, the student will be able to:		
CO 1	To Write and Understand Simple Algorithms for Arithmetic and Logical Problems	K2, K3
CO 2	To Translate and Write the Algorithms to Programs & Execution (in C Language).	K3
CO 3	To Implement Conditional Branching, Iteration and Recursion	K3
CO 4	To Decompose a Problem into Functions and Synthesize a Complete Program Using Divide and Conquer Approach	K4
CO 5	To Use Arrays, Pointers and Structures to Develop Algorithms and Programs.	K2, K3

List of Programs/ Experiment:

S.N.	Program/Experiment Title	CO
1	WAP that accepts the marks of 5 subjects from key board and finds the sum and percentage marks obtained by the student and print them.	CO1
2	WAP that calculates the Simple Interest and Compound Interest. The Principal, Amount, Rate of Interest and Time are entered through the keyboard	CO1
3	WAP to calculate the area and circumference of a circle.	CO1
4	WAP that accepts the temperature in Centigrade and converts into Fahrenheit using the formula C/5=(F-32)/9.	CO1
5	WAP that swaps values of two variables using /not using a third variable.	CO1
6	WAP that checks whether the two numbers entered by the user are equal or not.	CO2
7	WAP to find the greatest of three numbers.	CO2
8	WAP that finds whether a given number is even or odd.	CO2
9	WAP that tells whether a given year is a leap year or not.	CO2
10	WAP that accepts marks of five subjects and finds percentage and prints grades according to the following criteria: Between 90-100%---- Print 'A' 80-90%----------Print 'B' 60-80%----------Print 'C' Below 60%---------- Print 'D'	CO2
11	WAP that simply takes elements of the array from the user and finds the sum of these elements.	CO3
12	WAP that inputs two arrays and saves sum of corresponding elements of these arrays in a third array and prints them	CO3
13	WAP to find the minimum and maximum element of the array.	CO3
14	WAP to add and multiply two matrices of order nxn and also print identity matrix.	CO3
15	WAP to implement strlen (), strcat (),strcpy () using the concept of Functions.	CO3
16	WAP to create a structure, define and initialized with example.	CO4
17	WAP to print student record. Fields are Student name, father's name, Add, Roll etc.	CO4
18	Define a structure data type TRAIN_INFO. The type contain Train No.: integer type Train name: string Departure Time: aggregate type TIME	CO4

	Arrival Time: aggregate type TIME Start station: string End station: string The structure type Time contains two integer members: hour and minute. Maintain a train timetable and implement the following operations: a. List all the trains (sorted according to train number) that depart from a particular section. b. List all the trains that depart from a particular station at a particular time. c. List all he trains that depart from a particular station within the next one hour of a given time. d. List all the trains between a pair of start station and end station.	
19	Write a program to create a structure and define it with example.	CO4
20	Write a program for storage class uses auto keyword.	CO4
21	WAP to assign memory using malloc Function.	CO5
22	WAP to swap two elements using the concept of pointers.	CO5
23	WAP to compare the contents of two files and determine whether they are same or not.	CO5
24	WAP to check whether a given word exists in a file or not. If yes then find the number of times it occurs.	CO5
25	WAP for file handling.	CO5

SUGGESTED VIDEO LINKS:
1. https://archive.nptel.ac.in/courses/106/104/106104128/
2. https://onlinecourses.nptel.ac.in/noc22_cs40/preview
3. https://archive.nptel.ac.in/courses/106/105/106105171/

**Note: Faculty may delete/add practical according to needs.*

B.TECH. FIRST YEAR (SEMESTER-I)					
Lab Code	**CS11050**	**L**	**T**	**P**	**Credit**
Lab Title	**PROFESSIONAL COMPUTING LAB**	**0**	**0**	**4**	**2**

Course Objectives:

- To be proficient in important Microsoft Office tools: MS WORD, EXCEL, POWERPOINT.
- To be proficient in using MS WORD to create quality technical documents, by using standard templates, widely acceptable styles and formats, variety of features to enhance the presentability and overall utility value of content.
- To be proficient in using MS EXCEL for all data manipulation tasks including the common statistical, logical, mathematical etc., operations, conversion, analytics, search and explore, visualize, interlink, and utilizing many more critical features offered.
- To be able to create and share quality presentations by using the features of MS PowerPoint, including: organization of content, presentability, aesthetics, using media elements and enhance the overall quality of presentations.

Pre-requisites: Basic knowledge of Computer

Module 1	**Introduction to Microsoft Office**	**8 hours**

Introduction: Overview of Microsoft Office Suite, Understanding the Ribbon Interface, Navigating through applications, File management and basic settings

Microsoft Word Basics: Creating, saving, and opening documents, Formatting text (font, size, color, style), Paragraph formatting (alignment, spacing), Lists and bullets, Page layout and margins, Inserting and formatting images, Headers and footers, Practice sessions

Module 2	**Microsoft Excel Basics**	**8 hours**

Introduction to Excel interface, Creating, saving, and opening workbooks, Basic formulas and functions, Formatting cells (font, borders, fill color), Managing rows and columns, Creating simple charts, Data sorting and filtering, Practice sessions

Module 3	**Microsoft PowerPoint Basics**	**8 hours**

Creating, saving, and opening presentations, Slide layout and design. Inserting text and images, Transitions and animations, Slide show settings, Adding notes and comments, Practice sessions

Module 4	**Microsoft Outlook Basics**	**8 hours**

Overview of Outlook interface, Email basics (compose, reply, forward), Organizing emails (folders, categories), Calendar management, Contacts and address book, Tasks and reminders, Practice sessions.

Module 5	**Professional Social Networking**	**8 hours**

Introduction to professional networking, Creating and optimizing LinkedIn profiles, Networking etiquettes, Building and maintaining professional relationships, Leveraging other social platforms for professional growth, Voice and Webcam Communication, Understanding Blogging, Practice Sessions

Course Outcome (CO)		**Knowledge Level**
At the end of course, the student will be able to:		
CO1	Students will proficiently navigate Microsoft Office, manage files, and create well-formatted documents in MS Word.	K1,K2

CO2	Students will perform essential data manipulation and analysis using basic Excel functions, formulas, and data visualization tools	K2
CO3	Students will design and deliver engaging presentations with effective slide layouts, transitions, and media elements in PowerPoint.	K2
CO4	Students will enhance their email communication and organizational skills by effectively using Outlook's email, calendar, and task management features.	K3
CO5	Students will optimize their LinkedIn profiles, build professional relationships, and leverage social media for career growth and professional networking.	K2, K3

REFERENCE BOOKS:

1. "Microsoft Office 365 & Office 2019 Introductory" by Steven M. Freund, Corinne Hoisington, and Mary Z. Last
2. "LinkedIn For Dummies" by Joel Elad

SUGGESTED VIDEO LINKS:

1. https://youtu.be/ZXAPCy2c33o?si=T4kR1ZJpylQs04vx
2. https://youtu.be/WsA3SPKI6GY?si=JV2TNgG3UD6962sT
3. https://youtu.be/yiCTA7sopYs?si=YS5ZnSBFTlur1iFH
4. https://youtu.be/Nqw-5rnrNaQ?si=b35iaQoaqstQUPpH
5. https://youtu.be/SlkuUaXGhW0?si=NIlDSl--mKzHz6fI
6. https://youtu.be/_w_IeEempwQ?si=ZU47a1h7wDhfRejz
7. https://youtu.be/5gKSd6_pTVE?si=GV6c_0vF20p3Fs25
8. https://youtu.be/t-d3eNO8bgw?si=XJ8HayV-dCbPei_k
9. https://youtu.be/SlkuUaXGhW0?si=NIlDSl--mKzHz6fI
10. https://youtu.be/vC9da7xfJ-s?si=5_lYOUyTA4IgK5r6
11. https://youtu.be/n24lhnPEvMQ?si=7JBwAlbgP-VBJmLl
12. https://youtu.be/N8jRM738m6M?si=cNaT8PCobG6qk7NY
13. https://youtu.be/u5je3qTaMjY?si=QLL8c9Vmtf2Mu6mw
14. https://youtu.be/T07QUnn0X6s?si=u7oQp7uf9xH0_Lvc
15. https://youtu.be/68rewyjTXe0?si=2Em17-sRkcUNHhFh
16. https://youtu.be/qAC9Vjkcm9Y?si=D5bU2Trr1aJpZXr4
17. https://youtu.be/7-Iw4688tpU?si=UZXZmLssrwcqw-yV
18. https://youtu.be/veGE-x0H3mM?si=miWizXMkflgfiF68
19. https://youtu.be/hQFeQ1ZdFbM?si=SaToMCEBqEiw8Dkw
20. https://youtu.be/hvzQNgJV0H0?si=AJltxrT9wkmhcjP2
21. https://youtu.be/1W1_wLJTYAg?si=8ZhatUokF1DtiUHb
22. https://youtu.be/Apdn5y1tazY?si=DRuH9xFxxAKK-qkg
23. https://youtu.be/HIYDS5NI8XM?si=sQCbeWJiHXyRMdp1
24. https://youtu.be/DP8ylJyspf8?si=ekVBtwir2hV-ukG_
25. https://youtu.be/JNZqRYkgZ4c?si=U5N1FKoTn8fm3Nso
26. https://youtu.be/sECmKVoFtOY?si=Ud-yRus1Cfbr2IcL
27. https://youtu.be/B--RUXNsqPI?si=afpvIsVdAnXTuxSF
28. https://youtu.be/zpHfC9z317E?si=ASttLRbfpw77-R2Y
29. https://youtu.be/VRIpybMBmYU?si=PcDGJ0nnpFATNDIl
30. https://youtu.be/fACEzzmXelY?si=0rvG1yUS1B1ip-om
31. https://youtu.be/qxvIUhFOdrs?si=Jj-GSGbIXQVXiViL
32. https://youtu.be/Ey1atEavZ-M?si=nDHx2bO3Pq_EJg8h
33. https://youtu.be/4KHe8R9WPSs?si=XU4Py_Y6Vf5us2Kt
34. https://youtu.be/3iwvIk9Zmqo?si=aP57ppmRXbLHHtVV
35. https://youtu.be/eq5oRguqp50?si=TE5s33saJnCm97QU

36. https://youtu.be/zwsOzdqmvqo?si=oAGKKcRpzp8ahDtn
37. https://youtu.be/jh_dlIye2Ug?si=RXOOmTktwyovJMzn
38. https://youtu.be/oB6O3D6DkMo?si=V2xSGWawM_U0r7Aa
39. https://youtu.be/x5KFZAB74_w?si=h83JZejrMZgMCrmR
40. https://youtu.be/AYcqLymo6M4?si=zyK9t_PD4KtfF3Ku
41. https://youtu.be/Q8rN3JKqUc8?si=Skew23tYzK7m8wPL

Note: Faculty may delete/add practical according to needs.

B.TECH. FIRST YEAR (SEMESTER-I)			
Lab Code	**CS11060**	**L T P**	**Credit**
Lab Title	**FUNDAMENTAL OF WEB DESIGNING LAB**	**0 0 2**	**1**

Course Outcome (CO)		Knowledge Level
At the end of course, the student will be able to:		
CO1	Understand and implement the various tags in HTML.	K2, K3
CO2	Understand and implement the concept of lists and tables in HTML.	K3
CO3	Understand and Apply the CSS (Creating Style Sheet) elements to add interactivity to a web page.	K3
CO4	Understanding and implementing the concept of Java Script and its methods.	K4
CO5	Implementing the concept of iterators, validations and error handling in advance JavaScript.	K2, K3

S.N.	Program/Experiment Title	CO
1	Design a page having suitable background color and text color with title "My First Web Page" using all the attributes of the Font tag.	CO1
2	Create a HTML document giving details of your [Name, Age], [Address, Phone] and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag.	CO1
3	Write HTML code to design a page containing some text in a paragraph by giving suitable heading style	CO1
4	Write HTML code to create a Web Page that contains an Image at its center.	CO2
5	Create a web page, showing an unordered list of names of all the B.Tech Programmes (Branches) in your institution.	CO2
6	Create a HTML document containing a nested list showing a content page of any book.	CO2
7	Create the time table of your class using the concept of table tag.	CO2
8	Apply various colors to suitably distinguish key words, also apply font styling like italics, underline and two other fonts to words you find appropriate, also use header tags.	CO3
9	Write an HTML page that contains a selection box with a list of 5 countries, when the user selects a country, its capital should be printed next to the list; Add CSS to customize the properties of the font of the capital (color, bold and font size).	CO3
10	Write a JavaScript program to swap the value of two variables without using a third variable. Take the value of both variables from the user.	CO4
11	Using the JavaScript alert() and prompt() method	CO4
12	Creating a user-defined function in JavaScript	CO4
13	Write a code to implement iterators in JS	CO5
14	Write a code to implement validations in javascript	CO5
15	Write a program to implement Error Handling in JS	CO5

SUGGESTED VIDEO LINKS:
Same as links available in theory subject

Note: Faculty may delete/add practical according to needs.