

Curriculum Structure & Syllabi

(As per National Education Policy 2020)

of

B. Tech.

in

(INFORMATION TECHNOLOGY)

(w.e.f. 2024-25)

Vision

Mission

Program Educational Objectives

Program Outcomes

Program Specific Outcomes

Overall Credit Structure

Curriculum

Syllabus



Offered By

**DEPARTMENT OF INFORMATION TECHNOLOGY AND COMPUTER APPLICATION
MADAN MOHAN MALAVIYA UNIVERSITY OF TECHNOLOGY (MMMUT)**

GORAKHPUR-273 010, UP, INDIA

March 2024

SYLLABUS AND CREDIT STRUCTURE FOR B. TECH. (INFORMATION TECHNOLOGY)
(SESSION 2024-2025 AND ONWARDS)
OVERALL CREDIT STRUCTURE FOR B.TECH. (INFORMATION TECHNOLOGY)

Credit Courses			
Core Courses (CC)		Electives Courses (EC)	
Category	Min. Credits	Category	Min. Credits
Basic Sciences & Maths (BSM)	20	Professional Electives (PE)/ Open Electives (OE)	36
Engineering Fundamentals (EF)	24		
Professional Skill (PS)			
Professional Core (PC)	48	Humanities & Social Science Elective (HSSE)	04
Management (M)	04		
Humanities & Social Science (HSS)	08		
Minor Project (P)	06		
Industrial Practice (IP) (In Industry)/ Major Project (MP) (In University)	10		
Sub-total	120	Sub-total	40
Grand Total		160	
Non-Credit Courses			
One Expert Lecture per semester for students (Mandatory). (BSM-1st year), (PC-2 nd Year), (T&P-3 rd Year)			Non-Credit
Social work/Training of at least 60 hours during break after first/ second semester (Mandatory) (Dean of Extension, Field Outreach and Alumni Relations).			Non-Credit
Industrial Training during the summer break after fourth semester (Mandatory).			Non-Credit
One -week workshop during the winter break after fifth semester on professional/ industry/ Social/ entrepreneurial orientation (Mandatory) (Dean of Extension, Field Outreach and Alumni Relations).			Non-Credit
Value Added Courses (VAC) / Audit Courses (AC) Two of the Value-Added Courses / Audit Courses are compulsory.			Non-Credit
Extracurricular Activities Courses (ECA) Two compulsory courses from the following S. No (ii) to (v) non-credit courses: (i) Induction Program (compulsory) (ii) Skill development (iii) Unity and Discipline (NCC or NSS) (iv) Sports, Cultural and Games (v) Personality Development			Non-Credit
Minor Degree (MD) from any Department and Micro Specializations (MS) within the Department			
<ul style="list-style-type: none"> • The total number of credits for graduation will be kept to minimum 160. The additional 18-20 credits required for Minor Degree Courses. • Micro specializations (MS) will be run by the department in order to aligned to industry careers or higher studies 			Offered as a Professional Electives (PE)

**DEPARTMENT OF INFORMATION TECHNOLOGY AND COMPUTER
APPLICATION**

**MADAN MOHAN MALAVIYA UNIVERSITY OF TECHNOLOGY (MMMUT)
GORAKHPUR-273010, UP, INDIA**

SEMESTER WISE CREDIT STRUCTURE FOR B. TECH. (INFORMATION TECHNOLOGY)

Category/Semesters	I	II	III	IV	V	VI	VII	VIII	Total
Basic Sciences & Maths (BSM)	8	8	0/4	4/0					20*
Humanities & Social Science (HSS)	4	4							08*
Humanities & Social Science Elective (HSSE)					4				04*
Management (M)						4			04*
Engineering Fundamentals (EF)	4	4	8/4	0/4					16*
Professional Skill (PS)	4	4							08*
Professional Core (PC)			12	12	12	12			48*
Professional Electives (PE)/ Open Electives (OE)				4-8	28-32				36*
Minor Project (P)						0	6		06*
Industrial Practice (IP) (in Industry)/ Major Project (MP) (In University)								10	10*
Total Credit	20*	20*	20*	20- 24*	16*- 32*	16*- 32*	6- 30*	10- 30*	160*
	80-84*				76-80*				
Total Courses Offered	05*	05*	05*	05*- 06*	04*- 08*	04*- 08*	00- 06*	00- 05*	36*

**Minor variation is allowed as per need of the respective disciplines.*

First Year, Semester I

S. N.	Category	Paper Code	Subject	L	T	P	Credit
1.	BSM	BSM-110	Engineering Mathematics I	3	1	0	4
2.	BSM	BSM-131/181	Engineering Physics	3	0	2	4
3.	EF	BIT-103/156	Programming in C	3	0/1	2/0	4
4.	PS	BIT-104	Internet and Web Designing	2	0	4	4
5.	HSS	BHS-101/151	UHV(Group-1) /TW&PC(Group-2) #	3/2	1/0	0/2	4
			Total	13- 14	1-3	6- 10	20
6.	ECA-I		Induction Program	-	-	-	0

Group-1: CSE, IT, CH, CE; Group-2: ECE, ECE(IOT), ME, EE.

First Year, Semester II

S. N.	Category	Paper Code	Subject	L	T	P	Credit
1.	BSM	BSM-160	Engineering Mathematics II	3	1	0	4
2.	BSM	BSM-140/190	Environmental Science and Green Chemistry	3	0	2	4
3.	EF	BEE- 110 / BEE-160	Basic Electrical Engineering	3	1/0	0/2	4
4.	PS	BIT-154	Object Oriented Programming with C++	2	0	4	4
5.	HSS	BHS-102/152	TW&PC (Group-1)	3/2	0/1	2/0	4
			Total	13-14	1-3	6-10	20
6.	VAC/AC	BIT-155	AC-1 (Design Thinking) Design Thinking for Software Development	0	0	2	0
7.	ECA-II			-	-	-	0

List of Extra Curricular Activity (ECA) Courses

ECA-II						
S. No.	Branch	Category	Subject Name	Subject Code	Hours/Week	Credit
1.	Open to all Branches	ECA	Skill Development-I	ECA-151	20	20
2.	Open to all Branches	ECA	Unity and Discipline (NCC)-I	ECA-171	20	20
3.	Open to all Branches	ECA	Unity and Discipline (NSS)-I	ECA-172	20	20
4.	Open to all Branches	ECA	Games & Sports-I	ECA-181	20	20
5.	Open to all Branches	ECA	Cultural, Art & Literary-I	ECA-182	20	20

List of Value-Added Courses (VAC)/Audit Courses (AC)

S. No.	Subjects	Codes
1.	Constitution of India	AUC01
2.	Indian Culture and Heritage	AUC02
3.	Indian Architecture	AUC03
4.	Indian Festivals	AUC04
5.	Vaidic Mathematics	AUC05
6.	Astronomy	AUC06

7.	Arts of India	AUC07
8.	Intellectual Property Right	AUC08
9.	Human Rights	AUC09
10.	Logical Research	AUC10
11.	Professional Ethics	AUC11
12.	Environmental Law	AUC12
13.	Health Law	AUC13
14.	National Cadet Corps	AUC14
15.	Basics of Human Health and preventive medicines	AUC15

Syllabus

BSM-110	Engineering Mathematics I
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. Understand the concepts of limit theory and nth order differential equations and their applications to our daily life
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**
Differential Calculus: Limit, Continuity and Differentiability, Mean value theorems. Leibnitz theorem, Partial derivatives, Euler's theorem for homogenous function, Total derivative, Change of variable. Taylor's and Maclaurin's theorem. Expansion of function of two variables, Jacobian, Extrema of function of several variables.

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, Eigen-vectors, Cayley-Hamilton theorem, Diagonalization of matrices.

UNIT-III

9

Multiple Integrals: Double and triple integrals, change of order of integration, change of variables. Application of multiple integrals to surface area and volume. Beta and Gamma functions, Dirichlet integral.

UNIT-IV

9

Vector Calculus: Gradient, Divergence and Curl. Directional derivatives, line, surface and volume integrals. Applications of Green's, Stoke's and Gauss divergence theorems (without Proofs).

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.,

BSM-131/181

ENGINEERING PHYSICS

Course Category : Basic Sciences and Maths (BSM)

Pre-requisite Subject : Physics at 12th Standard

Contact hours/week : Lecture: 3, Tutorial: 0, Practical: 2

No. of Credits : 4

Course Assessment Methods : Continuous assessment through, Home assignments, quizzes and two minor test, attendance, one major theory.

Course Objective: Understanding of the principles and concept of Optics, Quantum Mechanics, Fiber Optics, Electrodynamics and Physics of Advanced Materials.

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

1. Understand the basics principles of Optics and its applications in Engineering and Technology.
2. Compare and understand the uses of various lasers in different fields of Engineering.
3. Know the knowledge of Optical Fibre and their applications in Photonics.
4. Understand the principles of Quantum Mechanics and their applications in Engineering and Technology.
5. Know the principles of Electrodynamics and their applications in Engineering and Technology.
6. Understand the basic properties of advanced materials and their engineering applications.

Topics Covered

UNIT-I: Optics:

9

Interference: Interference of light, Interference in thin films, Newton's rings. Refractive index and wavelength determination.

Diffraction: Fresnel and Fraunhofer class of diffraction. Resultant of n-harmonic waves, single, double and N- slit diffraction, Diffraction grating, Grating spectra, Dispersive power.

Polarization: Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, Retardation Plate, Polarimeter.

Laser: Spontaneous and stimulated emission of radiation, Population inversion, Concept of 3 and 4 level Laser, Construction and working of Ruby, He-Ne lasers, and laser applications.

UNIT-II : Quantum Mechanics and Fiber Optics: 9

Quantum Mechanics: de Broglie waves, Davisson-Germer experiment, Concept of Phase and Group velocities, Uncertainty principle and its applications, Derivation of time independent and time dependent Schrodinger wave equations. Postulates of quantum mechanics, Significance of wave function, Application of Schrodinger wave equation for a particle in one dimensional infinite potential well.

Fiber Optics: Fundamentals of optical fiber, Acceptance angle and cone, Numerical aperture, Single and Multi-Mode Fibers, Step index and graded index fiber, Propagation Mechanism in optical fibers.

UNIT-III: Electrodynamics: 9

Scalar and Vector fields, Gradient, Divergence and curl, Concept of displacement current, Maxwell's equation in differential and integral forms, Physical significance of each equation.

Maxwell's equation in free space, Velocity of electromagnetic wave, Transverse nature of the electromagnetic wave, Poynting vector, Maxwell's equations in dielectric and conducting medium, and skin depth.

UNIT-IV: Physics of Advanced Materials: 9

Concept of energy bands in solids, Semiconducting materials, Concept of direct and indirect band gap in semiconductors, Carrier concentration and conductivity in semiconductors, Optoelectronic Materials, Superconducting Materials, Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Type I and Type II superconductors, London Equations, BCS theory (Qualitative), Introduction of nanoscience, Nanotechnology and its applications.

EXPERIMENTS

1. To determine the specific resistance of a given wire using Carrey Foster's Bridge.
2. To determine the wavelength of sodium light using Newton's Ring experiment.
3. To determine the wavelength of spectral lines of white light using plane diffraction grating.
4. To determine the specific rotation of cane sugar solution using polarimeter.
5. To study the variation of magnetic field along the axis of current carrying circular coil.
6. To study the Hall's effect and to determine Hall coefficient in n type Germanium.
7. To study the energy band gap of Germanium using four probe method.
8. To determine the height of Tower by Sextant.

Books & References

1. Optics- Ajoy Ghatak, Tata McGraw-Hill
2. Optics- N. Subrahmanyam, Brij Lal, M.N. Avadhanulu, S. Chand
3. Quantum Mechanics: Theory and Applications- Ajoy Ghatak, Tata McGraw-Hill

4. Fiber optics and laser Principles and Applications-Anuradha De, New Age International
5. Optical Fibers and its application as sensors by R. K. Shukla, New Age International.
6. Introduction to Electrodynamics by David J. Griffiths, Pearson
7. Physics of Semiconductor Devices, by S. M. Sze, Wiley
8. Concepts of Modern Physics by Arthur Beiser, Tata McGraw Hill.
9. Introduction to Solid State Physics by C. Kittel, Wiley.
10. Engineering Physics by B. K. Pandey and S. Chaturvedi, 3e Cengage Learning Pvt. Limited, India.
11. Engineering Physics by H. K. Malik and A. Singh Tata McGraw Hill.
12. Advanced Practical Physics Vol. I and Vol. II by D. K. Dwivedi, Victorius Publishers, New Delhi.

BIT-103

PROGRAMMING IN C

Course category : Engineering Fundamentals (EF)

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, Minor test and Major Theory Examination

Course Objective: Students will gain an understanding of the fundamentals of computers and programming. The objective is to prepare them for various dimensions of C Programming language.

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

1. Describing the basics of terminologies used in computer programming.
2. Practicing C language programming by writing, compiling and debugging the code.
3. Designing programs involving simple statements, conditional statements, iterative statements, array, strings, functions, recursion and structure.
4. Discussing the dynamic memory allocations and use of the pointers.
5. Applying basic operations on files through programs.
6. Studying and implementing the codes using macros, pre-processor directives and command line arguments

Topics Covered

UNIT-I

9

Basics of Computers and Programming: Functional diagram of computer; Language Processors; Approaches to problem solving, Concept of algorithm and flow charts. **Simple Statements:** Data types; Tokens and its types; Variable declaration and initialization; User defined type declaration: type def, enum; Comments; Format specifiers; Standard I/O: taking input and displaying output; **Operators:** types, precedence and associativity; Expressions; Type conversion, Cshort-hands.

UNIT-II

9

Conditional Statements: Simple if, if-else, nested if-else, else-if ladder, switch statements, nested switch, advantages of switch over nested if, restrictions on switch values. **Iterative Statements:** Concepts of entry and exit controlled loops; Uses of for, while and do while loops; Nested Loops; Printing various patterns using nested loops; Using break, continue and goto statements.

9

UNIT-III

Arrays: Single-dimensional, multi-dimensional array and their applications; declaration and manipulation of arrays; strings and string handling functions. **Pointers:** Pointer and address arithmetic; dereferencing; pointers and arrays; dynamic memory allocation and de-allocation. **Functions:** Function prototype; Arguments and its types: actual, formal and default arguments; Scope of a variable; Argument passing methods; Passing pointer as the function argument; Recursion: types, advantages and disadvantages; Storage class specifies; Character test functions.

9

UNIT-IV

Structure: Declaring and defining structures; Array within structure; Array of structure; Defining and using some data structures: Stack, Queue, and Linked lists. **File Handling:** Types of files; Text files and different operations on text files, opening a file, closing a file; Data structure of a file; EOF; I/O operations on files; Random access to the files. **Standard C Pre-processors & C Library:** Pre-processor, Directives, Macro, Macro substitution; Conditional Compilation; Command Line Arguments; Standard C Library.

EXPERIMENTS

Implementing programs in following categories using programming language ‘C’:

1. Programs of simple statements, conditional statements, and iterative statements with the applications.
2. Programs of single and multi-dimensional arrays and their applications.
3. Programs of strings and the applications
4. Programs of pointer and the applications
5. Programs of function and the applications
6. Programs of structure and the applications
7. Codes of file handling and management
8. Codes with Pre-processor, Macro, Conditional Compilation and Command Line Arguments

Textbooks

1. Brian W. Kernighan and Dennis M. Ritchie, “The C programming language”, Pearson
2. E. Balagurusamy, “Programming in ANSI C”, McGraw Hill Education
3. Yashavant Kanetkar, “Let Us C”, bpb publication
4. Jeri R. Hanly, Elliot B. Koffman, “Problem Solving and Program Design in C”, Pearson
5. Herbert Schildt, “C: The Complete Reference”, McGraw Hill Education

BIT-104

Internet & Web Technology

Course Category : Professional Skill (PS)

Pre-requisite Subject : NIL

Contact Hours/Week : Lecture : 2, Tutorial : 0 , Practical: 4

Number of Credits : 4

Course Assessment Methods : Continuous assessment through two Viva-voce, Practical work/record, attendance, two tests and Major Examination (T & P)

Course Objective : Internet & Web Technologies 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 internet & 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, Angular JS and its application.
5. Learning about the tools and techniques of web design covers using software Applications
6. Demonstrate an understanding of basic CSS, XML, JAVA Script, JSP, ASP.NET and PHP

Topics Covered

UNIT-I **9**

Introduction to internet, History of Internet, Advantages and disadvantages of Internet, Application of internet for Business Development, Network its types and typologies, Modem, gateways, routers, Bridge, hub, switch, Internet connections, Dial Up connection, Direct Connection & Broad Band Connection, Internet Address, URL, ISP, Intranet, Extranet, VPN. 1G, 2G, 3G, 4G, 5G and 6G Technologies, Wi-Fi, Wi-Max, Nano Technology, Web Site, Web Portal, Internet security.

UNIT-II **9**

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. Creating Style Sheet (CSS): Creating Style Sheet, CSS Properties, CSS Styling, CSS 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 **9**

Client-Side Scripting using JAVA Script JAVA script Overview; Constants, Variables, Operators, Expressions & Statements; User Defined & Built-in Functions; Client-Side Form Validation; Using Properties and Methods of Built-in Objects Server-Side Scripting Using JSP, ASP.NET And PHP JSP :Introduction to JSP, JSP Architecture, JSP Directives, JSP Scripting Elements, Default Objects in JSP, JSP Actions, JSP with Beans and JSP with Database, Error Handling in JSP, Session Tracking Techniques in JSP

UNIT-IV **9**

Introduction to Custom Tags.ASP.NET: ASP. Net Coding Modules, ASP.NET Page Directives, Page Events and Page Life Cycle, Post back and Cross page Posting ASP.NET Server Controls, HTML Controls, Validation Controls, Building Databases. PHP (Hypertext Preprocessor)-Introduction, Syntax, Variables, Strings, Operators, If- Else, Loop, Switch, Array, Function, Form, Mail, File Upload, Session, Error, Exception, Filter, PHP ODBC.

EXPERIMENTS

1. Describe the use and function of the following (a) telnet (b) TCP/IP (c) HTTP.
2. Describe the chatting components on the internet.
3. To create a simple html file to demonstrate the use of different tags.
4. To create an html file to link to different html page which contains images, tables, and also link within a page.
5. To create an html page with different types of frames such as floating frame, navigation frame & mixed frame.
6. To create a registration form as mentioned below.
 Procedure: Create an html page named as “registration.html”
 - i. set background colors
 - ii. use table for alignment
 - iii. provide font colors & size
7. Use tables to provide layout to your HTML page describing your university infrastructure Use frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in center to show body of page, remaining on right to show remarks.
8. Create a single page application using concepts of Angular JS.
9. 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.
10. To create a html page to display a new image & text when the mouse comes over the existing content in the page.
11. To create an html page to explain the use of various predefined functions in an array & Date object in Javascript.
12. To create an html page to explain the use of various predefined functions in a string and math object in java script.

Textbooks

1. Uttam K. Roy, Web Technologies, 1/e, Oxford University Press, USA
2. M. Srinivasan, Web Technology: Theory and Practice, Pearson Education India
3. Deitel, Deitel and Nieto, Internet and Worldwide Web - How to Program, 5th Edition, PHI, 2011.
4. Ralph Moseley & M. T. Savaliya, Developing Web Application- Second Edition, Wiley
5. Miller/Kirst, Web Programming Step by Step, Stepp, 2nd edition, 2009
6. Ullman, PHP for the Web: Visual Quick Start Guide, Pearson Education, 4th edition
7. www.w3c.org
8. www.w3schools.com

Reference books

1. Ivan Bayross, Web Enabled Commercial Application Development Using HTML, DHTML, JAVA Script, Perl & CGI, BPB Publication, 2005
2. Hans Bergsten, JAVA Server Pages, O'Reilly

BHS- 101/151 Universal Human Values: Understanding Harmony

Course Category	: HSS
Prerequisite subject	: None
Number of Credits	: 4
Contact Hours/Week	: Lectures: 3, Tutorial: 1, Practical: 0
Course Assessment Methods	: Continuous assessment through One test, teacher's assessment (quiz, tutorial, assignment, attendance), and One Major Theory Examination.
Course Objectives	: The objectives of this course are to: -

1. Develop a holistic perspective in students based on self-exploration about themselves (human being), family, society and nature/existence.
2. Develop understanding (or developing clarity) in students about harmony in the human being, family, society and nature/existence.
3. Strengthen self-reflection in students.
4. Develop commitment and courage in students to act.

Course Outcomes : The students will be able to demonstrate the following knowledge, skills, and attitudes upon completion of the course: -

1. Ability to understand the interconnectedness of humanity and nature as well as the importance of values in interpersonal relationships.
2. Ability to recognize their role as global citizens and understand the importance of actively contributing to the betterment of society through responsible actions.
3. Ability to engage in critical reflection on their own values and beliefs, challenging assumptions and biases to foster personal growth and development.
4. Ability to appreciate and respect diversity thereby promoting communication and conflict resolution skills, promoting dialogue and understanding in resolving interpersonal and intergroup conflicts.

UNIT 1

9

Introduction to Values: origin, definition, meaning, and types of values; Values in Education System; difference between Values, Morals, and Ethics; Self-Exploration—what is it? - Its content and process; 'Natural Acceptance' and 'Experiential Validation' as the process for self-exploration; Continuous Happiness and Prosperity- A look at basic human aspirations; Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority; Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario; Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT 2

9

Understanding human being as a co-existence of the sentient 'I' and the material 'Body'; Understanding the needs of Self ('I') and 'Body' - happiness and physical facility; Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer); Understanding the characteristics and activities of 'I' and harmony in 'I'; Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail; Programs to ensure Sanyam and Health.

UNIT 3**9**

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship; Understanding the meaning of Trust; Difference between intention and competence; Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship; Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals; Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

UNIT 4**9**

Understanding the harmony in the Nature; Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature; Understanding Existence as Co-existence of mutually interacting units in all-pervasive space; Holistic perception of harmony at all levels of existence; Natural acceptance of human values; Definitiveness of Ethical Human Conduct; Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order; Competence in professional ethics.

Text & Reference Books:

1. Andrews, C. (2006). *Slow is beautiful*. New Society Publishers.
2. Gandhi, M. K. (1909). *Hind Swaraj or Indian Home Rule*. Navjeevan Trust.
3. Gandhi, M. K. (2009). *An Autobiography or The Story of My Experiments with Truth* (Mahadev Desai, Trans.). Navjeevan Mudranalay. (Original work published 1925).
4. Gaur, R. R., Sangal, R., & Bagaria, G. P. (2010). *A Foundation Course in Human Values and Professional Ethics*. Excel Books.
5. Govindrajan, M., Senthilkumar, S., & Natarajan, M. S. (2013). *Professional Ethics and Human Values*. Prentice Hall India.
6. Kumarappa, J. C. (2017). *Economy of Permanence*. Sarva Seva Sangh Prakashan.
7. Naagarazan, R. S. (2022). *A Textbook on Professional Ethics and Human Values*. New Age International.
8. Rolland, R. (2010). *Life of Vivekanad* (4th Ed.). Advait Ashram.
9. Schumacher, E. F. (1973). *Small is beautiful. A study of Economics as if people mattered*. Blond & Briggs.
10. Suresh, J., & Raghavan, B. S. (2003). *Human Values and Professional Ethics*. S Chand.

BSM-160**Engineering Mathematics II**

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 solve the ordinary differential equations.
2. To solve the partial differential equations using Lagrange and Charpit's method.
3. To solve and understand the properties of Bessel's and Legendre's differential equation.
4. Application of partial differential equation in real life problems
5. To solve ODE and PDE with the help of Laplace transform
6. To inculcate the habit of mathematical thinking and lifelong learning.

Topics Covered

UNIT-I

9

Ordinary Differential Equations I: 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, Applications of differential equations to engineering problems

UNIT-II

9

Ordinary Differential Equations II: Series solution of second order differential equations with variable coefficient (Frobenius method). Bessel and Legendre equations and their series solutions, Properties of Bessel function and Legendre polynomials.

UNIT-III

9

Partial Differential equations: Partial differential equations of the first order, Lagrange's solution, Charpit's general method of solution, Partial differential equations of the second order: Constant coefficient and reducible to constant coefficient, Classification of linear partial differential equations of second order.

UNIT-IV

9

Laplace Transform: Laplace Transform, Laplace transform of derivatives and integrals. Unit step function, Laplace transform of Periodic function. Inverse Laplace transform, Convolution theorem, Applications to solve simple linear and simultaneous differential equations and Partial Differential Equations.

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.
5. M.D. Raisinghania, Ordinary and Partial Differential Equations. S Chand Publications.

BSM-140/BSM-190

Environmental Science and Green Chemistry

Course category:

Basic Sciences & Maths (BSM)

Pre-requisite Subject:

NIL

Contact hours/week

Lecture : 3, Tutorial : 0 , Practical: 2

Number of Credits:

4

Course Assessment methods:

Continuous assessment through home assignments, quizzes, minor tests, practical work, viva-voce, practical exam and major theory Examination

Course Objectives

Understanding the principles and concepts of Chemistry viz. Chemical Bonding, acidity and basicity, Atmospheric Chemistry & Water Chemistry, Spectroscopic analytical methods and Green Chemistry and solving industrial problems using solid foundation in Chemistry.

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

1. To develop the concepts of basic chemistry.
2. To make the students aware of global environmental issues e.g. global warming & Green house effect, Ozone depletion, pollution and its prevention and understand various aspects of atmospheric chemistry.
3. To understand the analytical and conceptual skills required for environmental chemistry research.
4. To understand water treatment for all types of uses and need to protect environment.
5. To understand the specifications of pure water and its purification techniques.
6. To develop the knowledge about Green Chemistry and Green Technology.

Unit 1: 9

Basic Chemical Concepts

Periodic properties of elements, Ionization potential, electron affinity and electronegativity; mole concept, molarity and normality, Chemical Bonding – MO Theory, MO diagram of diatomic molecules, hydrogen bonding, electrophiles, nucleophiles, inductive effect and mesomeric effect. Reaction Mechanism. Acidity and basicity - Concept of pH.

Unit 2: 9

Atmospheric chemistry & Water Chemistry

The atmosphere of Earth, layers of atmosphere and temperature inversion, Air pollution, Global warming and Greenhouse effect. Acid rain and Ozone layer depletion. Chemical and photochemical Smog.

Sources of water, conservation of water, impurities in water and their effects. WHO guideline and BIS guideline for drinking water. Hardness of water, Softening of water by Zeolite process, Lime Soda process, Ion exchange process and Reverse osmosis.

Unit 3: 9

Spectroscopic analytical methods

Absorbance, Transmittance and Beer-lamberts Law. Basic principles of UV-Visible spectroscopy, Fluorescence spectroscopy, Infrared spectroscopy, NMR Spectroscopy. Use of these instrumental techniques for monitoring of environmental pollution.

Environmental problems posed by the use of non-biodegradable polymers widely used in day-to-day life. Incineration as the key method for disposal of polymeric waste. Bio-degradable polymers.

Unit 4: 9

Green Chemistry

Green Chemistry and Green Technology: New trends in Green chemistry; Green Chemistry Methodologies-Microwave heating, ultrasound technique. Green Chemical Synthesis Pathways; Green reagents, Green solvents.

Experiments:

1. Determination of temporary and permanent hardness in water sample using EDTA as standard solution.
2. Determination of alkalinity in the given water sample.
3. Determination of chloride content in the given water sample by Mohr's method.
4. Determination of percentage of available chlorine in bleaching powder sample.
5. Determination of iron content in the given sample using $K_3[Fe(CN)_6]$ as an external indicator.
6. Determination of Electrical conductivity/TDS of a given water sample using conductivity meter.
7. Determination of dissolved Carbon Dioxide of given water sample.
8. Determination of the biochemical oxygen demand of sewage influent.
9. To calculate the lambda max of the given compound by using UV-Visible spectrophotometer.
10. Determination of nickel / cobalt / copper solutions by UV-visible spectrometry.
11. Examples of Green Synthesis /Reactions.
12. Determination of Turbidity of Water
13. Iodoform test
14. Synthesis of a polymer Bakelite or Polyacrylic acid.

Books & References

1. A Textbook of Environment and Ecology, Shashi Chawla, Tata McGraw Hill
2. Environmental Studies, Raj Kumar Singh, Tata McGraw Hill
3. Engineering Chemistry, Wiley India
4. Engineering Chemistry, Tata McGraw Hill
5. Organic Chemistry, Morrison & Boyd, 6th edition, Pearson Education
6. Fundamentals of Environmental Chemistry, Manahan, Stanley E., Boca Raton: CRC Press LLC.
7. Environment and Ecology, R K Khandal, Wiley India
8. An Introductory Text on Green Chemistry: For Undergraduate Students, Indu Tucker Sidhwani, Rakesh K. Sharma, Wiley
9. A text book of Green Chemistry, Shankar Prasad Deo and Nayim Sepay, Techno World Publication.
10. Introduction to Green Chemistry, John Andraos, Albert S. Matlack, CRC Press

BEE-110/160

Basic Electrical Engineering

Course category	: Engineering Fundamentals (EF)
<i>Pre-requisite Subject</i>	: NIL
Contact hours/week	: Lecture: 3, Tutorial: 0, Practical: 2
<i>Number of Credits</i>	: 4
Course Assessment methods	: Continuous assessment through attendance, home assignments, quizzes, practical work, record, viva voce, Minor tests and One Major Theory & Practical Examination.
Course Objectives	: <ol style="list-style-type: none"> 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 used in electrical engineering and apply the basic concepts in Electrical engineering for multi-disciplinary tasks.

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. Classify different electrical measuring equipment's and understanding their principles.
5. Understand the basic concepts of magnetic circuits.
6. Explain construction and working principle of transformer.

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

9

Introduction to AC Circuits:

AC fundamentals, Analysis of single phase 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

9

Measuring Instruments:

Fundamentals of measurement & instrumentation, Units, Dimensions and Standards. Error Analysis, types of errors & its analysis. Measuring instruments, construction and working principles of PMMC, Moving Iron and Electro-dynamometer type voltmeters & ammeters, Use of shunts and multipliers.

UNIT IV

9

Magnetic Circuits and Transformers:

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.

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.

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.

BIT-154

OBJECT ORIENTED PROGRAMMING

Course category	: Program Skill (PS)
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, Minor test and Major Theory Examination

Course Objective: Students will gain an understanding of the fundamentals of C++ Programming, object oriented concepts in C++, inheritance, polymorphism, exception handling and file handling.

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

1. Write code for Conditional statements, Loops, Array, Function, and Pointer
2. Write object-oriented programming using classes and objects.
3. Write code for Constructors and Destructors
4. Write code for Inheritance.
5. Write code for Function Overloading and Operator Overloading
6. Write code for Dynamic or Run-time Polymorphism (Overriding)
7. Write code for Exception handling and Templates.
8. Write code for file handling and various file operations.

Topics Covered

UNIT I

9

Tokens, Keywords, Identifiers and Constants, Basic Data Types, User-Defined and Derived Data Types, Type Casting, Implicit Conversion, Operators and Expressions, Operator Precedence, Simple statements, Conditional statements, Iterative statements, Array, Function, Pointer, Structure.

UNIT II

9

Basic Concepts of Object Oriented Programming, Object Oriented Programming Paradigm, Benefits of OOP, Object Oriented Languages, Class and Objects, Scope Resolution Operator, Access specifiers, Data members, Accessing class members, Data hiding, Member function, Inline function, Friend function, Passing objects as arguments, Returning objects from functions.

UNIT III

9

Constructors and its types, Destructor, Constructor overloading, Order of construction and destruction, Inheritance, Single, Multilevel, Multiple, Hierarchical, Hybrid Inheritance, Base class, Derived class,

Virtual function, Polymorphism: Function Overloading, Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Overriding

UNIT IV

9

Exception Handling, Throwing and Catching Mechanism, Templates, File handling, Types of files, End of File, Basic file operations: creating, opening, closing, reading, writing and appending a file, copying a file to another, Object oriented system development.

EXPERIMENTS:

Write programs to illustrate the following concepts:

1. Operators and expressions
2. Simple statements, Conditional statements and Iterative statements
3. Arrays
4. Functions
5. Pointers
6. Structures
7. Objects and Classes
8. Inline Function, Friend function and Virtual Functions
9. Scope Resolution Operator
10. Constructors and Destructors
11. Inheritance
12. Function Overloading
13. Operator Overloading
14. Dynamic or Run-time Polymorphism (Overriding)
15. Exception Handling
16. File operations.

Books & References:

1. P. Deitel and H. Deitel, "C++ How to Program", Pearson.
2. E. Balagurusamy, "Object Oriented Programming with C++", TMH Publication.
3. Yashavant Kanetkar, "Let us C++", BPB Publications
4. Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publication.
5. B. Trivedi, "Programming with ANSI C++", Oxford University Press.
6. Ira Pohl, "Object Oriented Programming using C++", Pearson Education, Second Edition Reprint
7. B. Stroustrup, "The C++ Programming language", Pearson Education.
8. Timothy Budd, "An Introduction to Object Oriented Programming with C++," Addison-Wesley.
9. Kip R. Irvine, "C++ and Object-Oriented Programming," Prentice Hall.

BHS- 102/152 TECHNICAL WRITING AND PROFESSIONAL COMMUNICATION (TW&PC)

Course Category	: HSS
Prerequisite subject	: None
Number of Credits	: 4
Contact Hours/Week	: Lectures: 2, Tutorial: 1, Practical: 2
Course Assessment Methods	: Continuous assessment through One test, teacher's assessment (quiz, tutorial, assignment, attendance), and One Major Theory Examination.

Course Objectives : The objectives of this course are to: -

The course aims-

1. To sensitize the students to understand the role and importance of communication for personal and professional success.
2. To enable the learners to enhance their writing skills in techno-cultural and professional echo-system.
3. To equip learners to differentiate technical writing from general writing.
4. To equip them with technical writing skills.
5. To enable learners to exhibit knowledge, skills, attitude and judgment in and around human communication that facilitate their ability to work collaboratively with others in an interpersonal environment.

Course Outcomes : The students will be able to demonstrate the following knowledge, skills, and attitudes upon completion of the course: -

1. Overcome the problems she/he shall faces in oral and written communication.
2. Acquire knowledge of and methods for using technical communication, such as reports, proposals, technical letters, etc.
3. Use and Practice compositions correctly.
4. Give presentations in different sessions and make self-appraisal.
5. Learn and understand the various facets of Communication Skills, such as (LSRW) Listening, Speaking, Reading, and writing, and identify, formulate, and solve real-life problems with a positive attitude; also inculcate, the habit of learning and developing communication and soft skills.

Unit 1: Language and Communication

6

Language Vs communication: Communication as coding and decoding – signs, symbols & pictograph – verbal and non-verbal symbols – Language & communication; Types of Communication- functional, situational, verbal, and non-verbal, interpersonal, group, interactive, public, Mass Communication. Thinking and Articulation, critical, creative aspects of articulation.

Skills of Language Acquisition: Natural Language Acquisition Skills: Listening, Speaking, Reading & Writing {LSRW}; Language Acquisition Through Training: Listening, Speaking, Reading, Writing, Grammar & Vocabulary {LSRWGV}

Phrase, Clause & Sentence in Professional Drafting-Simplicity, Clarity and Conciseness of a Presentation, Differentiating between Professional and Creative Writing, Blending of Artistic/Professional Writing, Avoiding gender, racial, and other forms of bias in Professional Writing. Pre-writing, Drafting, and Re-writing.

Unit 2: Towards Technical Writing

6

Technical Paper Writing: Professional Paper Elements-Front Matter of a Paper, Main Text of a Paper, End Matter of a Paper: Organizing References and Bibliography, Order of a thesis and Paper Elements, Concluding Remarks. **Methods of Research Paper Writing:** Identification of Author and His Writing- Author's name and Affiliation, Joint Authorship of a Paper, Identification of Writing- Title, Keywords, Synopsis, Preface and Abstract. Drafting Research Article & Methodology.

Thesis/Dissertation Writing: Thesis Elements-Front Matter of a Thesis, Main Text of a Thesis, End Matter of a Thesis, Specimen—Thesis and Research Paper, Chapters and Sections-Introductory Chapters and Sections, Statement of the Problems, Plan and Scope, Core Chapters and Sections- Theoretical

Analysis and Synthesis, Basic Assumption and Hypothesis.

Professional Presentation & Seminar Delivery Tools: Designing the Presentation; Establishing the Objectives. Making Professional PowerPoint Presentations, Signaling Structure of Presentation through Sentences and Crisp Phrases, Preparing Notes for Professional/Technical Presentation, Text Animation, White Board, Flip Charts, Diagrams, Preparing Cards. Seminar Presentations: Purpose modes and methods. Nascent Emerging Platforms for On-line Presentations viz. Zoom, Webex, Team& Meet etc.

Unit 3: Drafting Skills & Career Correspondence

6

Professional Drafting: Letters vs. e-mails, Formal and Informal emails, Parts of e-mails, Types of e-mails, Managing tone of E-mails and business Letters, Examples of Letters and E-mail, Professional Correspondence through E-mail, Job Applications and cover Letters. Introduction to DOs (Demi- Official Letters)

Career & Correspondence: Developing a Professional C.V, Bio Data & Resume. Report Writing, Kinds of Reports, Length of Report, Parts of a Report, Terms of Reference, Collection of Facts, Outlines of Report, Examples of Report, Technical Proposal, Elements of Proposal, Examples of Proposal, drafting of proposal.

Unit 4: Professional Practices with ICT Interface

6

Conducting Professional Meeting: Pre-meeting Preparation, During Meeting: Action Taken Report (ATR) & New Agenda Points, Post Meeting Follow ups. Notice, Circular, Agenda & Meeting Minutes.

Introduction to Generation-Z, Cyber Identity & Professional Netiquettes for Netizens: Drafting E-mails, Blogs on social media, Videoconferencing. Managing Profiles on social media. What to Write and Share on social media. Telephone Etiquettes & Phubbing.

List of Practical:

1. Introduction to Vowel and Consonant Sounds
2. Monophthongs and Diphthongs
3. Syllable, Word Stress & Intonation
4. Harnessing Non-verbal Communication Skills in Cross-Cultural Environment for the establishment of an ideal Ecosystem to ensure Professional Success
5. Developing Speech, and Proofreading the Same
6. Argumentative Skills & Group Dynamics
7. Preparing CV, Biodata & Resume
8. Types of Interview and Interview Skills
9. GD, PI & Telephonic Interview
10. Presentation Skills, Extempore, Debate and Video Conferencing
11. Netiquettes while Writing Blogs on social media.
12. Ethical Usages of Generative AI

Text / Reference Books

1. Acharya Anita. (2012) Interview Skills- Tips & Techniques. Yking Books, Jaipur.
2. Basu, B. N., (2008) Technical Writing. PHI Learning Pvt. Ltd., New Delhi.
3. Chauhan, N. K & Singh, S. N. (2013) Formal Letters, Pankaj Publication International, New Delhi.
4. Chhabra T.N. (2018) Business Communication. Sun India Publication New Delhi.
5. Dubey Arjun et.al. (2016) Communication for Professionals. Alfa Publications, Delhi.
6. Gibaldi, Joseph (2021). The MLA Handbook for Writers of Research Papers. Ed. IXth, Modern Language Association of America, NY, US.
7. Gurumani, N. (2010) Scientific Thesis Writing and Paper Presentation, MJP Publishers, Chennai.

8. Hamilton Richard. (2009) Managing Writers. Penguin, India.
9. Mc Graw S. J. (2008) Basic Managerial Skills for All. Ed. 08th, Prentice Hall of India, New Delhi.
10. Murphy & Hildebrandt. (2008) Effective Business Communication. Tata McGraw Hill NewDelhi.
11. Pandey, S.P., Singh, S. N. & Kumar, Raman, (2023) Exploring Digital Humanities: Challenges & Opportunities, MacBrain Publishing House, New Delhi.

BIT-155 DESIGN THINKING FOR SOFTWARE DEVELOPMENT

Course category : Audit Course (AC)

Pre-requisite Subject : NIL

Contact hours/week : Lecture:0, Tutorial:0, Practical:2

Number of Credits : 0

Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Two Minor test and Major Theory Examination

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

1. Understand the fundamental concepts of design thinking of Software Engineering and its applications.
2. Design and develop and analyse the various model of software development for a project by imparting creativity and problem-solving ability.
3. Design and develop the SRS for a project, ISO 9000 Models, SEI-CMM Model etc.
4. List and define the test cases, fundamental concepts of testing to be applied on various projects.
5. Design and define the cost estimations, size estimations using various techniques.
6. Understand the working concept of CASE tool, Reverse Engineering, Re-Engineering, Software Risk analysis and Management etc.

UNIT-I

Design process: Traditional design, Design thinking, Existing sample design projects, Study on designs around us, Compositions/structure of a design, Innovative design: Breaking of patterns, Reframe existing design problems, Principles of creativity Empathy: Customer Needs, Insight-leaving from the lives of others/standing on the shoes of others, Observation.

UNIT-II

Design team-Team formation, Conceptualization: Visual thinking, Drawing/sketching, new concept thinking, Patents and Intellectual Property, Concept Generation Methodologies, Concept Selection, Concept Testing, Opportunity identification Prototyping: Principles of prototyping, Prototyping technologies, Prototype using simple things, Wooden model, Clay model, 3D printing; Experimenting/testing.

UNIT-III

Software Process Introduction, S/W Engineering Paradigm, Life Cycle Models (Waterfall, Incremental, Spiral, Evolutionary, Prototyping), Software Requirements, Functional and Non-Functional–Software Document, Requirement Engineering Process, Feasibility Studies Software, Prototyping–Prototyping in Software, Process–Data–Functional and Behavioural Models–Structured Analysis and Data Dictionary.

UNIT-IV

Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up

Design. Software Measurement and Metrics: Various Size Oriented Measures: Halstead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graph.

EXPERIMENTS

1. Design and Develop Software Programmes based on different software models.
2. Estimation of Project Metrics
3. Modelling UML Use Case Diagrams and Capturing Use Case Scenarios
4. E-R Modelling from the Problem Statements
5. Identifying Domain Classes from the Problem Statements
6. State chart and Activity Modelling
7. Modelling UML Class Diagrams and Sequence diagrams
8. Modelling Data Flow Diagrams
9. Estimation of Test Coverage Metrics and Structural Complexity
10. Designing Test Suites.

Based on above: Student should practice and develop at least one project from given list as:

- a. Result Management System
- b. Library management system
- c. Inventory control system
- d. Accounting system
- e. Fast food billing system
- f. Bank loan system
- g. Blood bank system
- h. Railway reservation system
- i. Automatic teller machine
- j. Video library management system
- k. Hotel management system
- l. Hostel management system
- m. E-ticking
- n. Share online trading
- o. Hostel management system
- p. Resource management system
- q. Court case management system

Books & References

1. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HarperCollins Publishers Ltd.
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons Inc
3. Ulrich & Eppinger, Product Design and Development, 3rd Edition, McGraw Hill, 2004
4. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
5. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
6. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.

BIT-105

LINUX & SHELL PROGRAMMING

Course category : Engineering Fundamentals (EF)

Pre-requisite Subject : NIL

Contact hours/week : Lecture: 2, Tutorial: 0, Practical: 4

Number of Credits : 4

Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, Two Minor test and Major Theory Examination

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

1. Understanding the installation and Booting Process.
2. Understand the usage of Operating System commands
3. Understand Linux fundamentals, including file system structure, command-line navigation, and basic commands.
4. Understanding basics of the Shell programming language
5. Develop proficiency in shell scripting techniques for automating tasks and managing system resources.
6. Apply knowledge of Linux permissions, processes, and environment variables to solve real-world problems efficiently.

Topics Covered

UNIT-I

9

Introduction to Linux: Linux operating system, History and Evolution of Linux, Linux Distributions and Installation, Key features of Linux distributions (e.g., Ubuntu, CentOS), Command-line interface (CLI) vs. graphical user interface (GUI)

UNIT-II

9

Basics of File system: File System Structure and Purpose in Linux, Organization and Naming Conventions, Working with Files and Directories: pwd, cd, ls, cp, mv, rm, mkdir, rmdir, touch, etc.

Managing File Permissions and Ownership: Understanding and Setting Access Rights, Changing Owners and Groups, Modifying Permissions: Using Chmod, Chown, and Chgrp Commands, Viewing and Editing Files: cat, less, more, nano, vi

UNIT-III

9

Introduction to Shell Scripting: Using the Shell-Command Line Structure-Met characters-Creating New Commands-Command, Arguments and Parameters-Program Output as Arguments-Shell Variables- -More on I/O, Redirection-Looping in Shell Programs, Writing and Executing Shell Scripts, Variables and Data Types Control Structures: if-else, loops (for, while), Input and Output Redirection: stdin, stdout, stderr, pipes, Functions and Modular Programming, Debugging Shell Scripts.

UNIT-IV

9

Advanced Shell Scripting: Command-Line Arguments and Options, Conditional Expressions, String Manipulation, File Handling: Reading from and Writing to Files, Process Management: ps, pgrep, kill, etc., Environment Variables and Configuration Files, Introduction to Regular Expressions

EXPERIMENTS

1. Navigate through directories using cd, ls, pwd, mkdir, and rmdir.
2. Write a simple script to greet the user.
3. Create a script to calculate the factorial of a number.
4. Write a script to check if a file exists and display its contents if it does.
5. Write a script to automate user management tasks like adding, modifying, or deleting users.
6. Create a script to monitor system resource usage (CPU, memory, disk space) and send alerts if thresholds are exceeded.
7. Rewrite scripts using more efficient constructs or external tools where appropriate.
8. Experiment with different shell interpreters (e.g., bash, sh, dash) to compare performance.
9. Experiment with creating custom functions and libraries for reuse in multiple scripts.
10. Explore inter-process communication techniques using pipes, named pipes, or sockets.
11. Dive into advanced shell scripting features like arrays, associative arrays, and regular expressions.
12. Write a script to audit system configurations for security vulnerabilities.
13. Implement a script to enforce password policies or monitor user authentication attempts.
14. Experiment with cryptographic operations like encryption, decryption, and hashing in shell scripts.

Books & References

1. "Advanced Bash-Scripting Guide" by Mendel Cooper.
2. "Shell Programming in Unix, Linux and OS X: The Fourth Edition of Unix Shell Programming" by Stephen G. Kochan and Patrick Wood.
3. "The Linux Command Line: A Complete Introduction" by William E. Shotts, Jr.

BIT-106 WEB PROGRAMMING WITH JAVA SCRIPT

Course category : Engineering Fundamentals (EF)

Pre-requisite Subject : NIL

Contact hours/week : Lecture: 2, Tutorial: 0, Practical: 4

Number of Credits : 4

Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Two Minor test and Major Theory Examination

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

1. Master the basics of web development with HTML, CSS, and JavaScript.
2. Develop proficiency in JavaScript programming for dynamic web interactions and event handling.
3. Familiarize with popular JavaScript frameworks and libraries for efficient web development.
4. Recognize and apply the elements of Creating Style Sheet (CSS).
5. Understanding the basic concept of Java Script, Angular JS. Express JS and Node JS, NoSQL and MongoDB and its application,.
6. Learning about the tools and techniques of web design covers using software Applications

Topics Covered

UNIT-I

6

Basics of Web Development and JavaScript: Basics of Web Development and JavaScript: Overview of Web Technologies, Web page Designing using HTML and CSS, Introduction to JavaScript: History, Features, and Applications, Scripting basics: Client-side and server-side scripting, JavaScript Syntax and Variables, Document Object Model (DOM)

UNIT-II

6

NodeJs: Basics of Node JS -Installation, Working with Node packages, Using Node package manager, Creating a simple Node.js application, Events Listeners, Timers, Callbacks Handling, Data I/O - Implementing HTTP services in Node.js.

Express and Angular: Implementing Express in Node.js, Configuring routes, Using Request and Response objects, Angular Typescript, Angular Components, Expressions, Data binding - Built-in directives

UNIT-III

6

Handling Events: Click, Mouseover, Submit, etc., Event Listeners and Event Propagation, Implementing Interactivity with JavaScript: Form Validation, Button Clicks, etc.

Functions in JavaScript: Declaration, Invocation, Parameters, and Return Values, Scope and Closure in JavaScript, Conditional Statements: if-else, switch-case, Looping Constructs: for, while, do-while, Error Handling: try-catch-finally.

UNIT-IV

6

MongoDB: Understanding NoSQL and MongoDB, Building MongoDB Environment, User accounts Access control, Administering databases, Managing collections, Connecting to MongoDB from Node.js-- simple applications.

React: Basic React applications, React Components, React State, Express REST APIs, Modularization and Webpack, routing with React Router, Server-side rendering.

EXPERIMENTS

Implementing programs in following categories using Javascript:

1. Set up development environment with Node.js, MongoDB, and text editor, and create basic webpages using HTML/CSS.
2. Write JavaScript code to handle events, variables, and functions, and implement simple Node.js applications with event listeners and timers.
3. Create Express.js servers with routing and request/response handling, and interact with MongoDB databases for CRUD operations.
4. Develop React components and integrate them with Express REST APIs for building full-stack applications.
5. Implement event listeners and form validation in JavaScript to enhance interactivity of web pages.
6. Write JavaScript functions to perform specific tasks, including parameter passing and return values.
7. Implement conditional statements (if-else, switch-case) and looping constructs (for, while, do-while) for decision-making and iteration.
8. Practice error handling techniques using try-catch-finally blocks in JavaScript programs.
9. Develop asynchronous JavaScript programs using timers, intervals, and AJAX for non-blocking operations and data retrieval.
10. Explore JavaScript frameworks like React, Angular, or Vue.js through basic projects demonstrating their setup and usage.
11. Experiment with JavaScript libraries such as jQuery or D3.js to add interactive features or data visualization to web pages.
12. Apply the concepts learned throughout the course to develop a small-scale web project, incorporating HTML, CSS, and JavaScript functionalities.

Books & References

1. John Pollock, Javascript – A Beginners Guide, 3rd Edition — Tata McGraw-Hill Edition.
2. Keyur Shah, Gateway to Java Programmer Sun Certification, Tata McGraw Hill, 2002.
3. Balagurusamy E, “Programming in JAVA”, TMH
4. Margaret Levine Young, “The Complete Reference Internet”, TMH
5. Naughton, Schildt, “The Complete Reference JAVA2”, TMH

BIT-107 WEB DEVELOPMENT WITH DJANGO

Course category : Engineering Fundamentals (EF)

Pre-requisite Subject : NIL

Contact hours/week : Lecture: 2, Tutorial: 0, Practical: 4

Number of Credits : 4

Course Assessment Methods: Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Two Minor test and Major Theory

Examination

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

1. Comprehend web development basics and Django fundamentals.
2. Apply Django concepts to build dynamic web applications.
3. Implement Django features including views, templates, forms, and database interaction.
4. Develop proficiency in creating and managing Django projects effectively.
5. Understand the Django administration site.
6. Creating superuser for accessing the backend admin app, registering custom Django models with the admin site.

Topics Covered

UNIT-I **6**
Web development basics: Client server architecture, webserver, web browser, basic of HTML

Web development basics: Client server architecture, webserver, web browser, basic of HTML concept, basics of CSS, basics of JavaScript, Bootstrap.

UNIT-II

6

Introduction to Django: Web Framework, The MVC and MTV Design Pattern, Difference between MVC and MTV design patterns, Django's History, Installation of Python, Installation of Django using PIP command, Understanding Django environment, Django Commands Overview.

UNIT-III

6

The Basics of Dynamic Web Pages: (Views and URLconfs): Creating View, Dynamic Content, Mapping URLs to Views, processing a Request, URL configurations and Loose Coupling, Creating View with Dynamic URLs, Django's Error Pages The Django Template System: Template System Basics, template language: variables, Boolean Operators, for loop, if, Basic Template Tags and Filters, Comments, Using Templates in Views, Template Loading, Template Inheritance Tags, Creating a Model Manipulating Data (CRUD) Linking Models.

UNIT-IV

6

Django Forms: Creating a form using Django Forms, Render HTML Forms (GET & POST), Form Fields. form field custom widgets. Simple Validation.

Interacting with a Database: Models: Using Database Queries in Views (hard-coding the connection parameters), Configuring the Database, Creating First App, Defining Models in Python. The Django Administration Site: Creating superuser for accessing the backend admin app, registering custom Django models with the admin site.

EXPERIMENTS

Implementing programs in following categories using programming language 'C':

1. Install Python including installation of pip, installation and setting
2. up virtual environment, installation of Django
3. Create a new django project using command line
4. Create a "Hello World" App in Django
5. Create a Django Form using forms.py
6. Create a Django app Using Django Templates features i.e.
7. Creating Template Objects , Rendering a Template , Multiple
8. Contexts, Context Variable Lookup, Playing with Context

9. Objects, Template Loading, include Template Tag,
10. App to connect templates with models to serve data dynamically
11. Creating and using CRUD class based view
12. Rendering a model in Django Admin Interface
13. Create a Dynamic Feedback form with validations

Books & References

1. <https://docs.djangoproject.com/>
2. Python Web Development with Django by Jeff Forcier Paul Bissex Wesley Chun
3. Django for Beginners: Build websites with Python and Django by William co' Vincent