R.T.M. NAGPUR UNIVERSITY, NAGPUR

(Revised Curriculum as per AICTE Model Curriculum)
SCHEME OF EXAMINATION FOR
FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE
SEMESTER: THIRD   BRANCH: INFORMATION TECHNOLOGY

Sr. No.	Subject Code	Subject	WorkLoad				Credit				Marks				Total Marks	Category
			Lecture	Practical	Tutorial/ Activity	Total	L	P	T/A	Total	Theory		Practical			
											Internal	University	Internal	University		
1	BEIT301T	Applied Mathematics-III	3		1	4	3		1	4	30	70			100	BSC
2	BEIT302T	Programming Logic & Design using 'C'	3			3	3			3	30	70			100	PCC
3	BEIT302P	Programming Logic & Design using 'C'		2		2		1		1			25	25	50	PCC
4	BEIT303T	Digital Electronics and Fundamental of Microprocessor	3		1	4	3		1	4	30	70			100	ESC
5	BEIT303P	Digital Electronics and Fundamental of Microprocessor		2		2		1		1			25	25	50	ESC
6	BEIT304T	Emerging Trends in Information Technology	3			3	3			3	30	70			100	PCC
5	BEIT305T	System Programming	3			3	3			3	30	70			100	PCC
7	BEIT306P	Software Lab -1		2		2		1		1			25	25	50	LC
8	BEIT307T	Universal Human Values	2			2	2			2	15	35			50	HSMC
9	BEIT308T	Environmental Science (Audit)	2			2	-	-	-	-						MC
		Total	19	6	2	27	17	3	2	22	165	385	75	75	700	

Dr. S. V. Sonekar
Chairman.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: 3rd Sem IT (C.B.C.S.)
BRANCH: INFORMATION TECHNOLOGY

Subject : **A P P L I E D MATHEMATICS - III**   Subject Code : **BEIT301T**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
4 Hrs (Theory)	04	30	70	100

Aim: To enhance the logical and analytical abilities through mathematics

Course Objectives:
1. A primary objective is to provide a bridge for the student from lower-division mathematics courses to upper-division mathematics.
2. Explain the importance of mathematics and its techniques to solve real life problems and provide the limitations of such techniques and the validity of the results.
3. Propose new mathematical and statistical questions and suggest possible software packages and/or computer programming to find solutions to these questions.

Course Outcomes:
After completing the course, students will be able to

1. Understand the basics of Laplace, Fourier and Z transforms and apply them for solving differential equations, integral equations and difference equations.
2. Analyze real world scenarios to recognize when matrices and probability are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches.
3. Organize, manage and present data in a clear and concise manner.
4. Develop an ability to identify, formulate, and/or solve real world problems.
5. Understand the impact of scientific and engineering solutions in a global and societal context.
6. Create the groundwork for post-graduate courses, specialized study, and research in computational mathematics.

Unit 1: Integral Transforms   **(10 Hrs)**
Laplace Transform: Definition, Properties of Laplace transform (Statement only), Evaluation of integrals by Laplace transform, Inverse Laplace transform by partial fraction method, Convolution theorem (Statement only), Simple applications of Laplace transform to solve ordinary differential equations.
Fourier Transform: Definition and Properties (excluding FFT), Applications of Fourier transform to solve integral equations.

Unit 2: Z-Transform   **(10 Hrs)**
Definition and convergence of Z-transform, Properties (Statement only) and examples, Inverse Z-transform by partial fraction method, Convolution of two sequences, Power series method, Solution of difference equations with constant coefficients by Z-transform method.

Unit 3: Matrices   **(08 Hrs)**

Linear dependence of vectors, Eigen values and Eigen vectors, Reduction to diagonal form, Singular value decomposition, Sylvester's theorem (Statement only), Largest Eigen value and its corresponding Eigen vector by iteration method.

Unit 4: Mathematical Expectation and Probability Distributions   (10 Hrs)

Review of discrete and continuous random variables, Mathematical expectation, Variance, Standard deviation, Moments, Moment generating function, Binomial distribution, Poisson's distribution, Normal distribution, Exponential distribution.

Unit 5: Statistical Techniques   (10 Hrs)

Statistics: Introduction to correlation and regression, Multiple correlation and its properties, Multiple regression analysis, Regression equation of three variables.

Measures of central tendency: Mean, Median, Quartile, Decile, Percentile, Mode, Mean deviation, Standard deviation.

Skewness: Test and uses of skewness and types of distributions, Measure of skewness, Karl Pearson's coefficient of skewness, Measure of skewness based on moments.

Text/ Reference Books:

(1) Advanced Engineering Mathematics (Wiley), Erwin Kreyzig.
(2) Higher Engineering Mathematics (Khanna Publishers), B. S. Grewal.
(3) Advanced Engineering Mathematics (S. Chand), H. K. Dass.
(4) Probability and Statistics (Schaum's Outline Series), Murray Spiegel, John Schiller, R. A. Srinivasan.
(5) Advanced Mathematics for Engineers, Chandrika Prasad.
(6) A text book of Engineering Mathematics (Laxmi Publication), N. P. Bali & M. Goyal.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE SEMESTER: 3rd Sem IT (C.B.C.S.) BRANCH: INFORMATION TECHNOLOGY

Subject : **PROGRAMMING LOGIC AND DESIGN USING 'C'**

Subject Code : **BEIT302T**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
3 Hrs (Theory)	**03**	30	70	100

Aim: To develop programming & logic development skills. Prerequisite(s):

Student should have a basic understanding of Computer Programming terminologies. A basic understanding of any of the programming languages will help you in understanding the **C programming** concepts and move fast on the learning track.

Prerequisites are followings.

1.   Enthusiasm 2. Logic Building Skills 3.Mathematics (Basics like prime number, factorial)

Course Objectives:

1	1) This course is emphasized to develop programming and problem solving skills in structured programming using 'C' environment.
2	This course is designed to provide a comprehensive study of the C programming language which provide students with the means of writing efficient, maintainable, and portable code.
3	To learn and acquire art of computer programming. To know about some popular programming languages and how to choose

Course Outcomes:

At the end of this course Student are able to:

CO1	Acquire fundamental knowledge of c programming language.
CO2	Apply Array , functions and pointer techniques in program development.
CO3	Able to implement programs on sub routines / functions , structure , uniuon
CO4	Apply knowledge of console programming for file handling and real time applications.
CO5	Apply knowledge of memory management related research and graphics for business applications and area.

SYLLABUS

UNIT I: **7Hr**
Introduction and Structure of 'C' Programming: Algorithms and Flowchart, Characteristics of algorithm, Basic Techniques, Decision Making, Looping Technique, Multiway Decision Making, Storage Classes in C. Preprocessor Directives in 'C'. Examples through 'C'.

UNIT II: **7Hr**
Array: one dimensional array, pointer and array, Searching (Linear and Binary) and Sorting (Selection, Bubble, Insertion). Array of pointers, multidimensional array (2-D array)
String : Introduction to string, pointers and strings, standard library function and user defined function, two dimensional array of character, array of pointer to string, limitation.

UNIT III: **8Hr**
Function and Pointers: Introduction to functions, why use function, Scope rule of function, call by value, call by reference, recursion, Iterative versus recursive style
Structure: Declarations, nested structures, array of structures, structure to functions, unions, difference between structure and union

UNIT IV: **7Hr**
Console and File I/O: Types of I/O, console I/O functions, File I/O: data organization, file operation, file opening modes, file copy programming, String I/O files, Text file and binary file, low level disk I/O, Command line argument, detecting errors in reading / writing. Bitwise operators, Enumerated data types, typedef, typecasting, bit - field operator, volatile qualifier

UNIT V: **7Hr**
Dynamic memory allocation and Malloc(), Calloc(), free(), realloc(), Sizeof() operator.
Graphics in 'C': Setting Text mode, Setting Graphics Mode, Drawing – lines, rectangle, circles, arcs, polygon , ellipse. Functions to fill colors. Display Text in Graphics mode, Text Formatting. Computer animation: getimage (), putimage (), imagesize().

Text Books:

1. Programming Techniques Through 'C' : M. G. Venkateshmurthy (Pearson)
2. LET US 'C : Yashwant P. Kanetkar. (BPB).
3. Programming in 'C': Ashok N. Kamthane (2nd Edition[Pearson])
4. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.

Reference Books :
1. The Complete Reference C (4th Edition): Herbert Schildt [TMH]
2. The C Programming Language: Dennis Ritchie & Brain Kernighan [Pearson]
3. Programming with C : K.R.Venugopal & S.R.Prasad [TMH]

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: 3rd Sem IT (C.B.C.S.)
BRANCH: INFORMATION TECHNOLOGY

Subject : **PROGRAMMING LOGIC AND DESIGN USING 'C'**   Subject Code : **BEIT302P**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
02 Hrs (Practical)	**01**	25	25	50

Aim: To develop programming & logic development skills.

Prerequisite(s):

Student should have a basic understanding of Computer Programming terminologies. A basic understanding of any of the programming languages will help you in understanding the **C programming** concepts and move fast on the learning track.

Prerequisites are followings.

1. Enthusiasm
2. Logic Building Skills
3. Mathematics(Basics like prime number, factorial)

Course Objectives:

1	1) This course is emphasized to develop programming and problem solving skills in structured programming using 'C' environment.
2	This course is designed to provide a comprehensive study of the C programming language which provide students with the means of writing efficient, maintainable, and portable code.
3	To learn and acquire art of computer programming. To know about some popular programming languages and how to choose

Course Outcomes:

At the end of this course Student are able to:

CO1	Acquire fundamental knowledge of c programming language.
CO2	Apply Array , functions and pointer techniques in program development.
CO3	Able to implement structured programs for complex data.
CO4	Apply knowledge of console programming for file handling and real time applications.
CO5	Apply knowledge of memory management and graphics for business applications and related research area.
CO6	Acquire knowledge of advanced concept in c like BIOS, TSR etc

NOTE:

1. Practical's are based on PROGRAMMING LOGIC AND DESIGN USING 'C' syllabus

2. Practical's have to be performed using 'C' language

3. There should be at the most two practical's per unit

4. Minimum ten practical's have to be performed

5. Do not include study experiments

PRACTICALS ARE BASED ON FOLLOWING TOPICS:

Topic 1: Based on Looping & Decision Making

Topic 2: Based on Array

Topic 3: Based on String

Topic 4: Based on Function

Topic 5: Based on Pointer

Topic 6: Based on Structure

Topic 7: Based on Files

Open Ended Experiments

Topic 8: Based on Graphics

Topic 9: Based on Animations

Mini Project

Topic 10: Mini Project based on PROGRAMMING LOGIC AND DESIGN USING 'C' syllabus

Text Books:

1. Programming Techniques Through 'C' : M. G. Venkateshmurthy (Pearson)

2. LET US 'C : Yashwant P. Kanetkar. (BPB).

3. Graphics Under C: Yashwant Kanetkar (BPB).

4. Writing TSR'S through 'C': Yashwant Kanetkar (BPB).

5. Programming in 'C': Ashok N. Kamthane (2nd Edition[Pearson])

6. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India) Pvt. Ltd., Pearson Education in South Asia, 2011.

7. Alexis Leon; Mathews Leon, Fundamentals of Information Technology, 2/e, Vikas publishing

Reference Books :

1. The Complete Reference C (4th Edition): Herbert Schildt [TMH]

2. The C Programming Language: Dennis Ritchie & Brain Kernighan [Pearson]

3. Programming with C : K.R.Venugopal & S.R.Prasad [TMH]

4. Programming in C: B. L. June ja and Anita Seth (cengage learning)

5. A First Course in Programming with 'C': T. Jeyapoovan (Vikas)

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: III (C.B.C.S.)

BRANCH: INFORMATION TECHNOLOGY

Subject :Digital Electronics &Fundamental of Microprocessor

Subject Code : BEIT303T

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
4 Hrs (Theory)	4	30	70	100

Aim: To prepare a syllabus of subject Digital Electronics & Fundamental of Microprocessor for the students of Information Technology branch.

Prerequisite(s): Nil

Course Objectives: (02-04)

1	To prepare students to apply basic fundamental knowledge of Digital Electronics in Information Technology practice involving Number System, Logic Gate and Boolean algebra
2	To prepare students to analyze, plan, design and solve various types of K-map Up to Five variables.
3	To provide the students the knowledge regarding the various types of devices in combinational Circuits
4	To provide the students the knowledge regarding the various types of Flip-Flop and their conversion, types of counter in sequential circuits .The course will provide students with fundamentals of microprocessor 8085.

Course Outcomes:

At the end of this course Student are able to:

CO1	The students would be able to understand the importance and necessity of logic gates also determine and solve the Boolean expression
CO2	The students would be able to solve various types of K-map in SOP & POS form.
CO3	The students would be equipped with the basic knowledge related to design of Combinational Circuits.
CO4	The students would be equipped with the basic knowledge related to design of Sequential Circuits,Flip-flop, counters
CO5	The students should be able to understand of necessity of Instructions, types ofaddressing modes and instruction sets, programming for microprocessor.

Unit I: [7 Hours]

Analog Vs. Digital Systems, Boolean Algebra, D'Morgan's Laws. **Types of Number System and conversion:** Decimal, Binary, Octal, Hex, **Type of Codes:** Reflected (Gray), Self-Complementary (Excess- 3), BCD, Gates and their truth tables.

Unit II: [7 Hours]

Forms of Expression: Sum of products and Product of Sums, Standard Sum of products and Product of Sums, Minterms and Maxterms, Canonical Sum of products and Product of Sums. Karnaugh map: simplification of functions using K- map (up to 5 variables) and their implementation using logic gates.

Unit III: [7 Hours]

Combinational Circuits: Decoders, Encoders, Priority Encoder, Multiplexers, De Multiplexers, Code converters. Implementation of Functions using Decoder.
Arithmetic Circuits: Adder (Half and Full), Subtractor (Half and Full).
BCD adder/ Subtractor.

Unit IV: [7 Hours]

Types Flip Flops: SR, JK, Master Slave JK, D and T. Race around Condition (Racing) and Toggling. Characteristics Table and Excitation Table, Conversion of Flip-Flop.
Sequential Circuits: Counters, Modulus of Counter, Types-Synchronous Counter and Asynchronous (Ripple) counter

Unit V: [8 Hours]

8085 microprocessor architecture, addressing modes, instruction sets, Interrupts, Programming in 8085.

Text books:

1. Modern digital Electronics- R. P. Jain, Mc Graw Hill.
2. Digital Integrated Electronics- Herbert Taub, Mc Graw Hill.
3. Digital Logic and Computer Design- Morris Mano (PHI).
4. Digital Integrated Electronics- Herbert Taub, Mc Graw Hill.
5. Digital Electronics Logic and System – James Bingnell and Robert Donovan, Cengage Learning
6. Digital Circuits & Systems by K. R. Venugopal & K. Shaila
7. 8 Bit Microprocessor by Ramesh Gaonkar.
8. 8 bit microprocessor & controller by V. J. Vibhute, Techmak Publication.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: III (C.B.C.S.)

BRANCH: INFORMATION TECHNOLOGY

Subject : **Digital Electronics &Fundamental of Microprocessor**   Subject Code : **BEIT303P**

Load	Credits	Practical (Internal) Marks	Practical (External) Marks	Total Marks
2 Hrs (Practical)	1	25	25	50

Aim: To prepare a syllabus of subject Digital Electronics & Fundamental of Microprocessor Practical for the students of Information Technology branch.

Prerequisite(s): Nil

Course Objectives: (02-04)

1	To provide the students the knowledge regarding the various types of devices used in combinational and Sequential Circuits.
2	To provide the students the knowledge regarding the various types of Flip-Flop and Counter in sequential circuits.
3	The course will provide students with fundamentals concepts of microprocessor 8085.

Course Outcomes:

At the end of this course Student are able to:

CO1	Apply the basic concept of logic gates and their use in combinational and sequential circuits.
CO2	Use and implements Universal logic gates.
CO3	Design and Implement basic circuits required in computer system.
CO4	Develop and execute assembly language programs.

Note:

1.   Practicals are based on Digital Electronics And Fundamentals of Microprocessor syllabus (subject code: BEIT303T)

2.   There should be at the most two practicals per unit
3.   Minimum ten practicals have to be performed
4.   Do not include study experiments

Practical List

1. To verify the basic logic gates using diodes and transistors.

2. To study and verify demorgan's theorem.

3. To verify boolean expression using logic gates.

4. Implementation of ex-or and ex-nor gate using nand gate only.

5. Implementation of ex-or and ex-nor gate using nor gate only

6. To construct half adder, half subtractor, full adder, full subtractor using and, or, not and ex-or gates and verify the truth table.

7. To study& perform r-s & clocked r-s flip-flop, d & clocked d flip flop.

8. To study & perform j-k flip flop

9. To verify the principle of mod-n counter.

10. To study architecture of 8085.

11. Write an assembly language program to multiply two 8 bit data.

12. Write an assembly language program to multiply two 8 bit numbers stored and store the result in memory.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: THIRD (C.B.C.S.)
BRANCH: INFORMATION TECHNOLOGY

Subject : **Emerging Trends in Information Technology**			Subject Code : BEIT304T	
Load	Cred its	College Assessment Marks	University Evaluatio n	Total Marks
03 Hrs (Theory)	03	30	70	100

Aim: Technology is an ever-changing playing field and those wanting to remain at the helm of innovation have to adapt. The consumer journey is charting a new course and customers and companies alike are embracing emerging technologies. As the IT industry trends such as cloud computing and SaaS become more pervasive, the world will look to brands who can deliver with accuracy and real-time efficiency.

Prerequisite(s):
Students must have knowledge of internet.

Course Objectives: (02-04)

1	An understanding of professional, ethical and social responsibilities.
2	An ability to analyze the impact of computing on individuals, organizations, and society, including ethical, legal, security and global policy issues.
3	Recognition of the need for, and an ability to engage in, continuing professional development.
4	An ability to apply knowledge of computing and mathematics appropriate to the discipline.

Course Outcomes:

At the end of this course Student are able to:

CO1	Create a business case for an emerging information technology.

CO2	Identify factors affecting the successful adoption of new information technologies.

CO3	Identify the key attributes, business benefits, risks, and cost factors of a new technology.
CO4	Know how to effectively use advanced search and selection metrics for identifying and selecting new technology.
CO5	Describe technology trends that presently drive or are expected to drive the selection of new technologies over the next decade.
CO6	To hone analytical and logical skills for problem solving.

Unit-1 Information Technology and Internet Basics [8 Hours]

Introduction , Need for Information Storage and Processing, Information Technology Components, Role of Information Technology,Information Technology and the Internet, Internet Evolution, Basic Internet Terminology, Data over Internet, Modes of Data Transmission Types of Networks, Types of Topologies, Protocols used in the Internet,Getting Connected to Internet Applications, Internet Applications,Computer Ethics.

Unit-2- E-Commerce [7 Hours]

Introduction: E-commerce as Business need-commerce,Types, Advantages, Disadvantages, e-Commerce Architecture, Internet Payment Systems, Characteristics, 4C Payment Methods, SET Protocol for Credit Card Payment, E-Cash, E- Check, Overview of Smart Card.

Unit-3- E-mail & Internet [7 Hours]

Introduction, E-mail Account & Its Functions, Search Engine, Surfing Web Pages, Basics of Social Networking Site, Internet service provider (ISP), the function of an ISP, Security issues in E-mail and Internet, Firewall, role of the firewall and its functionality, Internet virus, Antivirus, Securing Internet connection.

Unit-4- E-Banking[7 Hours]

Transactions: Inter Banking, Intra Banking, Electronic Payments, (Payment – Gateway Example) Securities in E-banking (SSL, Digital Signatures – Examples) Services Provided: ATM, Smart Card ECS (Electronic Clearing System) e.g. Telephone, Electricity Bills.

Unit-5-E – Governance & E – Agriculture[7 Hours]

E –Governance Models: (G2B,G2C,C2G,G2G), Challenges to E – Governance, Strategies and tactics for implementation of E – Governance, Types of Agriculture information (Soil, Water, Seeds, Market rate) & Technique dissemination, Future trade marketing, Corp Management, Query redresses System, (Information Kiosk, IVR etc), Case Study

References Books:

1) Fundamentals of Information Technology, Wiley India Editorial Team ISBN: 9788126543557

2) E – Commerce: C.V.S. Murty

3) Fire Wall and Internet Security: William Cheswick, Stevens, Aviel Rubin

4) The Essential Guide to Knowledge management:Amrit Tiwana

5) The GIS Book: George B. Karte.

6) Management Information System: Laudon & Laudon

Subject: **System Programming**   Subject Code: **BEIT305T**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
03 Hrs (Theory)	03	30	70	100

Aim: To understand System programming, Machine Structure, & Language processor programming ALP.

Prerequisite(s):

1. Basic & Fundamentals of Computer System

Course Objectives:

1	To understand Machine Structure
2	To understand Language processor programming
3	To understand Loader linker and compiler

Course Outcomes:

At the end of this course Student are able to:

CO1	To understand the basics of system programs like editors, compiler, assembler, linker, loader, interpreter and MACRO
CO2	To understand & Design of object code generation through translator(assembler)
CO3	To Understand the interlinking functions in program with MACRO & it's processing.
CO4	To understand how linker and loader create an executable program from an object module created byassembler and compiler.
CO5	To understand the various phases of compiler and various drivers in UNIX and difference between Unix and Windows operating system.

System Programming

UNIT I: [8 Hours]

Overview of System Software Introduction, Software, Software Hierarchy, Systems Programming, Machine Structure, Interfaces, Address Space, , System Software Development, Recent Trends in Software Development, Levels of System Software. Overview of Language Processors Programming Languages and Language Processors, Language Processing Activities, Program Execution, Fundamental of Language Processing, Symbol Tables Data Structures for Language Processing: Search Data structures, Allocation Data Structures

UNIT II: [7 Hours]

Elements of Assembly Language Programming, Design of the Assembler, Assembler Design Criteria, Types of Assemblers, Two-Pass Assemblers, One-Pass Assemblers, Single pass Assembler for Intel x86 , Algorithm of Single Pass Assembler, Multi-Pass Assemblers, Advanced Assembly Process, Variants of Assemblers Design of two pass assembler,

UNIT III: [7 Hours]

Introduction, Macro Definition and Call, Macro Expansion, Nested Macro Calls, Advanced Macro Facilities, Design Of a Macro Pre-processor, Design of a Macro Assembler, Functions of a Macro Processor, Basic Tasks of a Macro Processor, Design Issues of Macro Processors, Features, Macro Processor Design Options, Two-Pass Macro Processors, One- Pass Macro Processors

UNITI V: [7 Hours]

Introduction, Relocation of Linking Concept, Design of a Linker, Self-Relocating Programs, Linking of Overlay Structured Programs, Dynamic Linking, Loaders, Different Loading Schemes, Sequential and Direct Loaders, Compile-and-Go Loaders, General Loader Schemes, Absolute Loaders, Relocating Loaders, Practical Relocating Loaders, Linking Loaders, Relocating Linking Loaders, Linkers v/s Loaders

UNIT V: [7Hours]

Compilers, Causes of Large Semantic Gap, Binding and Binding Times, Data Structure used in Compiling, Scope Rules, Memory Allocation, Compilation of Expression, Compilation of Control Structure, Code Optimization. Interpreters & Debuggers Benefits of Interpretation, Overview of Interpretation, The Java Language Environment, Java Virtual Machine, Types of Errors, Debugging Procedures, Classification of Debuggers, Dynamic/Interactive Debugger

Text Books:

1. System Programming- J. J. Donovan, Tata McGraw-Hill Education.

2. UNIX Device Drivers- George Pajari, Pearson Education.

3. UNIX system Utilities manual.

4. UNIX programming Tools LEX and YACC –Levine, Mason and Brown, O'Reilly.

Reference Books:

1. System Programming and Operating systems- D. M. Dhamdhere, Tata McGraw-Hill Education.

2. UNIX programming Environment- Keringham and Pike, PHI.

3. System Software: An introduction to systems programming- Leland L. Beck, Pearson Education.

4. Principles of Compiler Design-Aho and Ullman, Pearson Education.

Subject: **Software Lab -1(Basics of Hardware and Microprocessor)**   Subject Code : BEIT306P

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
02 Hrs (Practical)	1	25	25	50

Aim: To develop Basics of Hardware and Microprocessor skills.

Prerequisites

Student should have a basic understanding of hardware and microprocessor. Student should have a basic understanding of Computer terminologies

Course Objectives:

1	To basic understanding of Computer terminologies.
2	To understand computer system and its integrity.
3	To study the concept of networking and its functionalities.

Course Outcomes:

At the end of this course Student is able to:

CO1	Understand the basic organization, working and applications of personal computers.
CO2	Apply the different tools and utilities of the operating system.
CO3	Student can demonstrate the working of computer system and its peripheral.

CO4	Student can design the networking.
CO5	Student should be able to assembled computer system
CO6	To understand the different types Viruses ,Spyware and Malware

PRACTICALS:

1. Practical's are based on Computer Lab -1(Basics of Hardware and Microprocessor) syllabus (subject code: BEIT303T)

2. Practical's are based on following topics:

a) Study of computer peripherals .Processor, Motherboard, Hard disk, CD/DVD ROM, Monitor, SMPS, Safety Precautions.

b) Study and Configuration of BIOS.

c) Assembling of Personal Computer.

d) Partitioning Hard disk

e) Installation of Operating System.

f) Study Networking Basics

g) File and Printer Sharing in Network.

h) Structured Cabling.

i) Building Small Home Network.

j) WI-FI Basics.

3. Open ended experiment:

a) Assembled process.

b) Protecting PC From Virus , Spyware and Malware.

4. Mini Project

5. List of open source tools:

MATLAB, Scilab

List of Major Equipment/ Instrument with Broad Specifications

1.   Desk top computer system, laptops, servers with latest configuration.

2. All peripheral maintenance kits (motherboard, keyboard, DVD, mouse, HDD etc)

3. Preventive maintenance kit

4. Disk cleaning kit

5. diagnostic software/tools, preferably open source based

6. Internet Access

7. Library resources

8. Anshuman Kit 8085

Books Recommended:

Text Books:

1. Computer Installation and Servicing ,D Bala subramanian ,Tata McGraw Hill Education Private Limited

2. The complete PC Upgrade & Maintenance Guide ,Mark Minasi ,BPB Publications .

Reference Books:

1.IBM PC and clones,Govind Rajalu ,Tata McGraw Hill Education Private Limited]

Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur
Faculty of Engineering and Technology
B.E 3rd sem (IT)
Subject: Universal Human Values (Theory)

CREDITS: 02

Teaching Scheme: 2 Hours/Week:

Examination Scheme: University Assessment: 35 Marks
College Assessment: 15 Marks

Aim: To inculcate sensitivity among students towards themselves and their surrounding including family, society and nature

Objective: The objective of the course is four fold:
1. Development of a holistic perspective based on self-exploration, about themselves (human being), family, society and nature/existence.
2. Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course outcomes: By the end of the course,
1. Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
2. Students would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
3. They would have better critical ability.
4. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).

Unit 1
Value education, definition, need for value education. The content and the process of value education, basic guidelines for value education, self-exploration as a means of value education, happiness and prosperity as part of value education.   (6 hours)
Unit 2
Harmony of self with body, coexistence of self and body, understanding the needs of self and the needs of body, understanding the activities in the self and the activities in the body.   (6 hours)
Unit 3
Values in relationship, the five dimensions of human endeavour, the holistic perception of harmony in existence.   (6 hours)

Unit 4
Basics for ethical human conduct, defects in ethical human conduct, human rights violations and social disparities, value based life.   (6 hours)

Text Book: Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. Indian Ethos and Modern Management: Amalgam of the best of the ideas from the East and the West, B.L. Bajpai, New Royal Book Bo., Lucknow, 2004
4. Human society in ethics and politics, Bertrand Russel, Routledge Publications, 2009

Course Code					
Category	Mandatory Courses				
Course Title	Environmental Science				
Scheme & credits	L	T	P	Credits	Semester
	2	0	0	0	III

Course Outcomes

On successful completion of the course, the students:

1. Identify different types of air pollutions as well as explain their causes, detrimental effects on environment and effective control measures.
2. Recognize various sources of water pollutants and interpret their causes and design its effective control measure
3. Illustrate various types of pollutants and waste management.
4. Analyze various social issues related to environment and challenges in implementation of environmental laws.

Syllabus

Unit-I Air pollution and its control techniques: (6 lectures)

Contaminant behaviour in the environment, Air pollution due to SOx, NOx, photochemical smog, Indoor air pollution

Natural pathways for degradation: Carbon cycle, Sulphur cycle, Nitrogen cycle, Oxygen cycle.

Factors responsible for altering the composition of atmosphere (deforestation, burning of fossil fuels, industrial and vehicular emissions, CFCs).

Techniques to control Air pollution, ambient air quality and continuous air quality monitoring, Control measures at source, Kyoto Protocol, Carbon Credits.

Unit-II Water pollution and its control techniques: (6 lectures)

Major sources of water pollution: Eutrophication, acid mine drains, pesticides and fertilizers, dyeing and tanning, marine pollution, microplastics

Techniques to control water pollution: Conventional waste water treatment-types of sewage, sewerage system, alternative systems, primary, secondary and tertiary processes including aerobic and anaerobic techniques, safe disposal and its utility.

Treatment schemes for waste water from dairy, textile, power plants, pharmaceutical industries, and agro based industries such as rice mills

Unit-III   Other Environmental Pollution& Waste Management: (6 lectures)

Soil pollution: Soil around us, Soil water characteristics, soil pollution.

Causes, effects & control : noise pollution, nuclear & radiation hazards, marine pollution (Oil spills & Ocean Acidification)

Solid waste management: Composting, vermiculture, landfills, hazardous waste treatment, bioremediation technologies, conventional techniques (land farming, constructed wetlands), and phytoremediation.

Degradation of xenobiotics in environment: Petroleum hydrocarbons, pesticides, heavy metals

Introduction, types of e-wastes, environmental impact, e-waste recycling, e-waste management rules.

Unit-IV   Social Issues and the Environmental Laws (6 lectures)

Concept of Sustainable development

Water conservation, rain water harvesting, watershed management

Resettlement and rehabilitation of people; its problems and concerns.

Environmental Laws (brief idea only)

Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of

Pollution) Act, Wildlife Protection Act, Forest Conservation Act

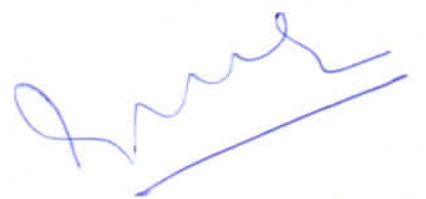Issues involved in enforcement of environmental legislation.

Different government initiatives (brief idea only)- National ambient air quality standard 2009, Swachh Bharat Abhiyan, National afforestation program and Act- 2016, National River conservation plan and National Ganga River basin authority, Formation of National Green Tribunal

Activity
1. Field Trip & Report Writing
2. Case-study & Report Writing

Books suggested:

1) Benny Joseph, Environmental Studies, Mc Graw Hill Education (India) Private Limited
2) B. K. Sharma, Environmental Chemistry, Goel Publishing House, Meerut
3) P Aarne Vesilind, J. Jeffrey Peirce and Ruth F. Weiner, Environmental Pollution and Control, Butterworth-Heinemann
4) D. D. Mishra, S. S. Dara, A Textbook of Environmental Chemistry and Pollution Control, S. Chand & Company Ltd.
5) Shree Nath Singh, Microbial Degradation of Xenobiotics, Springer-Verlag Berlin Heidelberg
6) Indian Environmental Law: Key Concepts and Principles edited by Shibani Ghosh, Publisher, Orient BlackSwan, 2019. ISBN, 9352875796.
7) P. Thangavel & Sridevi, Environemental Sustainability: Role of Green technologies, Springer publications

Dr. S. V. Sonelcuf
cheirman.

R.T.M. NAGPUR UNIVERSITY, NAGPUR (Revised Curriculum as per AICTE Model Curriculum)

SCHEME OF EXAMINATION FOR

FOUR YEAR BACHELOR OF ENGINEERING (B. E.) DEGREE COURSE

SEMESTER: FOURTH   **BRANCH: INFORMATION TECHNOLOGY**

Sr. No.	Subject Code	Subject	WorkLoad				Credit				Marks				Total Marks	Category
											Theory		Practical			
			Lecture	Practical	Tutorial/ Activity	Total	L	P	T/A	Total	Internal	University	Internal	Univ.		
1	BEIT401T	Discrete Mathematics and Graph Theory	3		1	4	3		1	4	30	70			100	BSC
2	BEIT402T	Data Structure and Program Design	3			3	3			3	30	70			100	PCC
3	BEIT402P	Data Structure and Program Design +		2		2		1		1			25	25	50	PCC
4	BEIT403T	Object Oriented Programing System	3			3	3			3	30	70			100	PCC
5	BEIT403P	Object Oriented Programing System		2		2		1		1			25	25	50	PCC
6	BEIT404T	Computer Architecture Organization	3			3	3			3	30	70			100	PCC
7	BEIT405T	Introduction to Computer Network	3			3	3			3	30	70			100	PCC
8	BEIT406T	Operating Systems	3			3	3			3	30	70			100	PCC
9	BEIT407P	Software Lab -2		2		2		1		1			25	25	50	LC
10	BEIT408T	Cosumer Affairs (Audit)	2			2										HSMC
11	BEIT409P	Intership		2		2		1		1			50		50	PROJ-CS
		Total	**20**	**8**	**1**	**29**	**18**	**4**	**1**	**23**	**180**	**420**	**125**	**75**	**800**	

Dr. S. V. Sonekar
Chairman

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: FOURTH (C.B.C.S.)
BRANCH: INFORMATION TECHNOLOGY

Subject : Discrete Mathematics and Graph Theory   Subject Code : BEIT401T

Load	Tutorial	Credits	College Assessment Marks	University Evaluation	Total Marks
03 Hrs (Theory)	01	04	30	70	100

Course Objectives:

1	A primary objective is to provide a bridge for the student from lower-division mathematics courses to upper-division mathematics.
2	Obtain skills and logical perspectives in introductory (core) courses that prepare them for subsequent courses.
3	Develop proficiency with the techniques of mathematics and/or computer science, the ability to evaluate logical arguments, and the ability to apply mathematical methodologies to solving real world problems.

Course Outcomes:

At the end of this course Student are able to:

CO1	Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction.
CO2	Gain an introduction into how mathematical models for engineering are designed, analyzed and implemented in industry and organizations.
CO3	Reason mathematically about basic data types and structures (such as numbers, sets, graphs, and trees) used in computer algorithms and systems; distinguish rigorous definitions and conclusions from merely plausible ones.
CO4	Analyze real world scenarios to recognize when Logic, sets, functions are appropriate, formulate problems about the scenarios, creatively model these scenarios (using technology, if appropriate) in order to solve the problems using multiple approaches.
CO5	Apply knowledge of mathematics, physics and modern computing tools to scientific and engineering problems.

Unit 1: Set Theory, Relations and Functions (10 Hrs)

Sets: Review of propositions and logical operations, Principle of mathematical induction, Review of sets, Types and operations on sets.

Relations: Ordered pairs and n-tuples, Types of relations, Composite relation, Transitive closure of a relation, Partially ordered set, Hasse diagrams.

Functions: Definition, Composition of functions, Types of functions, Characteristics function and its properties.

Unit 2: Fuzzy Set and Fuzzy Logic (10 Hrs)

Fuzzy sets and systems, Crisp set, Operations and combinations on Fuzzy sets, Relation between Crisp set and Fuzzy set, Fuzzy relations, Overview of Fuzzy logic and classical logic.

Unit 3: Group Theory and Ring Theory

Binary operation, Algebraic structure, Groupoid, Semigroup, Monoid, Group, Subgroup, Normal subgroup (Only definitions and examples), Ring, Commutative ring, Ring with unity, Zero divisor, Integral domain, Field (Only definitions and simple examples).

Unit 4: Graph Theory

Basic concepts of graph theory, Digraphs, Basic definitions, Matrix representation of graphs, Subgraphs and quotient graphs, Isomorphic graphs, Paths and circuits, Reachability and connectedness, Node base, Euler's path & Hamilton's path, Tree, Binary tree, Undirected tree, Spanning tree, Weighted graphs (Only definitions and examples), Minimal spanning tree by Prim's algorithm & Kruskal's algorithm, Representation of algebraic expressions by Venn diagram and binary tree.

Unit 5: Combinatorics

Permutations and combinations, Pigeonhole principle with simple applications, Recurrence relations (Concept and definition only), Generating functions, Solution of recurrence relations using generating functions.

Text/ Reference Books

(1) Discrete Mathematical Structures (PHI), B. Kolman, R. Busby, S. Ross.
(2) Discrete Mathematical Structures with Applications to Computer Science (TMH), Tremblay and Manohar.
(3) Fuzzy Sets Uncertainty and Information, George, J. Klir, Tina A. Folger.
(4) Discrete Mathematics for Computer Scientists & Mathematicians, J. Mott, A. Kandel, T. Baker.
(5) Discrete Mathematics, S. Lipschutz.
(6) Neural network and Fuzzy systems (PHI), Bart Kosko.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: FOURTH (C.B.C.S.)
BRANCH: INFORMATION TECHNOLOGY

Subject : Data Structures and Program Design   Subject Code : BEIT402T

Load	Cred its	College Assessment Marks	University Evaluation	Total Marks
03 Hrs (Theory)	03	30	70	100

Aim:
(1) To study ADT, Linear & Non linear Data structure and its implementation using various algorithms.
(2) Examples on Abstract data structures, algorithm analysis, strings, lists, trees, binary search trees, priority queues, hashing, graphs, object oriented programming.

Prerequisite(s): Students are expected to be proficient in a C- programming language. Knowledge of Object Oriented Programming either using C++ is more preferred.

Course Objectives:

1	To understand the concepts of ADTs
2	To Learn linear data structures – lists, stacks, and queues
3	To understand sorting, searching and hashing algorithms
4	To apply Tree and Graph structure

Course Outcomes:

At the end of this course Student are able to:

CO1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation and various Sorting Algorithms
CO2	Understand basic data structures such linked lists, stacks and queues.
CO3	Implement stacks and Queues using Linked List
CO4	Solve problem involving graphs, trees and heaps
CO5	Describe the hash function and concepts of collision and its resolution methods

Unit I:

Introduction to algorithm, Time and space analysis of algorithms, Big oh and theta notations and omega notations, Average, best and worst case analysis, linear and binary search, selection sort, insertion sort, bubble sort, shell sort, Radix sort. Abstract data structure as an organization of data with specified properties and operations, General concepts of data structures. Representation of Arrays -Single and Multidimensional.

Unit II:

List: - representation of ordered list using array and operation on it, sparse matrix, polynomial, Linked Lists, Simply linked list, Implementation of linked list using static and dynamic memory allocation, operations on linked list, polynomial representations and manipulations are using linked list, circular linked list, doubly linked list, Generalized list

Unit III:

Stack & Queue: Representation of Stack & queue using array and linked list, , Application of stacks, Conversion from infix to post fix and pre-fix expressions, Evaluation of postfix expression using stacks, Multiple stacks, Circular queues, Priority Queues, Dequeue.

Unit IV:

Trees: General and binary trees, Representations and traversals, Threaded Binary Trees, Binary search trees, Applications, The concept of balancing and its advantages, B-Trees, B+ Trees, AVL Trees. Symbol Tables: static tree tables, dynamic tree tables, hash tables, hash functions, Collision resolution, overflow handling, Applications.

Unit V:

Graphs and digraphs: Representations, Breadth and depth first searches, connected component, spanning trees, shortest path–single source & all pairs, activity networks, topological sort, Hamiltonian path.

Text books:

1. Data Structures using C and C++ by Y. Langsam, Pearson Education
2. Algorithms in a Nutshell, George H & Garry, O'reilly Publication
3. Data Structures using C by Tanenbaum, Pearson Education
4. S. Sahani, Data Structures in C.

Reference books:

1. E. Horowitz & Sahni, Fundamental Data Structure, Galgotia Book Source, 1983.
2. Kruz, Data Structure and Programming Design, 1987.
3. N. Wirth, Algorithms +Data Structure = Program, Prentice Hall of India, 1979.

Subject : **Data Structures and Program Design**   Subject Code : BEIT402P

Load	Credits	College Assessments Marks	University Evaluation	Total Marks
2 Hrs (Practical)	1	25	25	50

Min. 08 practicals to be conducted based on the syllabus.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: FOURTH(C.B.C.S.)
BRANCH: INFORMATION TECHNOLOGY

Subject : **Object Oriented Programming System**　　　　Subject Code : BEIT403T

Load	Credits	College Assessments Marks	University Evaluation	Total Marks
3 Hrs (Theory)	3	30	70	100

Aim:
(1)To study object oriented programming C++
(2)Program implementation on various features of OOP language
Prerequisite(s): Students are expected to be proficient in a C-programming language. Knowledge
Course Objectives:

1	To understand basic concept of OOP
2	To learn the properties/features of OOP
3	Implement concept of Classes & objects, Inheritance, Polymophism,File handling using C++
4	To understand concept of Exception handling & STL

Course Outcome:
At the end of this course Student are able to

1	Understand the basic concept & properties/features of OOP
2	Understand and implement the concept of constructor & destructor in c++
3	Implement concept Inheritance using C++
4	Understand & Implement concept polymorphism using C++
5	Implement file handling & Exception Handling in C++

Unit I: Introduction to Object Oriented Programming
Basic concepts of object oriented programming-Benefits of OOP,,, Procedural vs OOP programming, Features of oops (class, object, Encapsulation, Data abstraction, Data-hiding, Polymorphism, message passing) , Basic Data type-Derived Data type-User defined data type, Operators in C++s, OOP Structure of C++ program-, Class Members, Access Control, Class Scope, Control Statements

Unit II: Constructor and Destructor, Type of constructor, parameter passing method, inline function, static class members, this pointer, friend function, Arrays of objects, C++ String class.

Unit III: Inheritance- Inheritance basics, base and derived classes, Public-Private and Protected inheritance Types of Inheritance:-single inheritance, multilevel inheritance, multiple inheritance, hierarchical inheritance, hybrid inheritance, and virtual base class, Run time polymorphism using virtual function, pure virtual function, abstract classes.

Unit IV: Function Overloading, Defining operator overloading, overloading unary operator, overloading of binary operator, rules for binary operator overloading, New& delete operators.

Unit V: Files & Exception Handling in C++
Stream classes, stream errors, disk file I/O with streams, File pointers, Error handling in file I/O. File I/O with members functions, overloading the extractions & insertion operators, Memory as a stream object, command-line arguments. Exception Handel ling Concept, Exception syntax, Multiple exceptions, exception with arguments.

Text Book:

1. C++: The Complete Reference, by <u>Herbert Schildt</u>4th edition Mc-Graw-Hill
2. Object-Oriented Programming in C++ by Robert Lafore 4th edition Pearson Education
3. The C++ Programming Language by BjarneStroustrupe 3rd edition Pearson Education

Reference books:

1. Object Oriented Programming in C++ by Subhash K U Pearson Education
2. Mastering C++ by K R Venugopal Tata Mc-Graw-Hill Education

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: FOURTH(C.B.C.S.)
BRANCH: INFORMATION TECHNOLOGY

Subject : **Object Oriented Programming System**   Subject Code : BEIT403P

Load	Credits	College Assessments Marks	University Evaluation	Total Marks
2 Hrs (Practical)	1	25	25	50

Aim:
(1)To study object oriented programming C++
(2)Program implementation on various features of OOP language
Prerequisite(s): Students are expected to be proficient in a C-programming language. Knowledge
Course Objectives:

1	To understand basic concept of OOP
2	To learn the properties/features of OOP
3	Implement concept of Classes & objects, Inheritance, Polymophism,File handling using C++
4	To understand concept of Exception handling & STL

Course Outcome:
At the end of this course Student are able to

1	Understand the basic concept & properties/features of OOP
2	Understand and implement the concept of constructor & destructor in c++
3	Implement concept Inheritance using C++
4	Understand & Implement concept polymorphism using C++
5	Implement file handling in C++
6	Understand concept of Exception handling & STL

List of Practicals:

1. Write a C++ program to implement the concept of class and object.

2. Write a C++ program, to implement the types of constructor.

3. Write a C++ program, to implement the string operation in C++.

4. Write a C++ program, to implement the types of Inheritance.

5. Write a C++ program to implement concept of function overloading.

6. Write a C++ program to implement operator overloading.

7. Write a C++ program, to implement the concept of Friend function

8. Write a C++ program to implement concept of pointers for object

9. Write a C++ program, to implement the concept file handling

10. Write a C++ program, to implement the Template function

11. Implement mini-project using C++

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: FOURTH (C.B.C.S.)
BRANCH: INFORMATION TECHNOLOGY

Subject: Computer Architecture Organization   Subject Code : BEIT404T

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
03 Hrs (Theory)	03	30	70	100

Prerequisite(s): Students are expected to be proficient in a basic knowledge of computer, number system and logic gates.

Course Objectives:

1	To make students learn and apply basic theoretical concepts of functional unit, processing unit, Hardwired and Micro programmed Control unit, Arithmetic algorithms, Memory Mapping Techniques.
2	To make students learn and understand the concept and Computer peripherals and types of Processors

Course Outcomes:

At the end of this course Student are able to:

CO1	Identify the basic functional units, various Buses and addressing modes.
CO2	Apply fundamental concept for executions and sequencing of control signals.
CO3	Compare Hardwired and Micro programmed Control unit and write the control steps/sequence of microprogramming.
CO4	Apply the Knowledge of computer arithmetic algorithm and solve the problems.
CO5	Design and implement various memory IC'S, evaluate the main memory address.

Unit I:
Basic Structure of Computers:

Functional Units, Basic Operational Concepts, Multiprocessors and Multicomputer.

Machine Instructions:

Memory Locations and Addresses, Memory Operations, Big endian and Little endian assignment, Machine program sequencing, addressing modes, Stacks, Subroutine.

Unit II:
Processing Unit:

Some fundamental concepts, Execution of a complete instruction, Single, two, three bus organization, Sequencing of control Signals.

Unit III:
Micro-programmed Control:

Microinstructions, grouping of control signals, Micro program sequencing, Micro Instructions with next Address field, Perfecting microinstruction, Emulation, Bit Slices, Introduction to Microprogramming, Macro Processor.

Unit IV:
Arithmetic:

Number Representation, Logic Design for fast adders, Addition and Subtraction, Multiplications of positive numbers, fast Multiplication, Booth's Algorithm, Integer Division, Floating point numbers and operations.

Unit V:
The Memory System:
Some Basic Concepts, Semiconductor RAM Memories, Memory system considerations, Semiconductor ROM Memories, Memory Interleaving, Cache Memory, Mapping techniques, Virtual memory.

Text books:
1. Computer Organization 5th Edition, 2001 V. Carl Hamacher Mc GrawHill.
2. Computer Organization and Design (The Hardware/Software Interfaces) 4th Edition David A. Patterson & John L. Hennessy Morgan Kaufmann.

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: FOURTH (C.B.C.S.)

BRANCH: INFORMATION TECHNOLOGY

Subject: Introduction of Computer Network   **Subject Code: BEIT405T**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
03 Hrs (Theory)	03	30	70	100

Aim: To study fundamental of computer network and functions of all seven layers in detail

Prerequisite(s): Students are expected to have in a Just basic idea of computers and operating comfort with modern computers is good enough.

Course Objectives:

1	To understand the fundamental of computer network
2	To develop an understanding of different components of computer networks, various protocols, modern technologies and their applications
3	To understand functions of all seven layers in detail
4	To understand overall concept of security

Course Outcomes:

At the end of this course Student are able to:

CO1	Understand the fundamental of computer network
CO2	Comparison of the OSI & the TCP/IP Reference Models
CO3	Student will be able to distinguish between the different types of bit errors and can explain the concept of bit redundancy and how it is generally achieved in the facilitation of error detection and the main methods of error correction.
CO4	Understand routing principles and algorithms, such as distance vector and link state. And inter networking principles and how the Internet protocols IP, IPv6 and ICMP operate.
CO5	Demonstrate an understanding of the significance and purpose of protocols and standards and their key elements and use in networking and Transport layer protocol

Unit I:

FUNDAMENTAL OF COMPUTER NETWORK: Introduction: Definition of a Computer Network; What is a Network?, Components of a computer network, Use of Computer networks, Classification of networks: Local area networks, Metropolitan area networks, Wide area networks, Wireless networks Network Topologies, Networking Devices(HUB, Switch ,Router etc.)

Security: Cryptography, user authentication, security protocols in internet, Firewalls

Unit II:

NETWORK SOFTWARE & ARCHITECTURE: Introduction: Networks Software; Protocol hierarchy, Design issues for the layers, Merits and De-merits of Layered Architecture, Service Primitives: Reference models; The OSI Reference Model, The TCP/IP Reference Model, Comparison of the OSI & the TCP/IP Reference Models, Network Standard.

Unit III:

PHYSICAL LAYER: Design Issues of Physical Layer, Transmission Media – Wired and Wireless, Switching – Circuit switching Network, Datagram Network, Virtual Circuit Network, Digital Transmission (Digital to Digital Conversion, Analog to Digital Conversion), Analog Transmission (Digital to Analog Conversion, Analog To Analog Conversion).

Unit IV:

DATA LINK LAYER and Network Layer : Error – Detection and correction method , Parity, LRC, CRC, Hamming code, Flow Control and error control , Stop and wait , Go back-N ,ARQ – Selective repeat ARQ –Sliding window , HDLC –, MEDIUM ACCESS SUBLAYER Channel allocation in LAN's and MAN's Network: Protocols-persistent and CSMA ,Network Layer: Need for Network Layer, Logical Addressing – Class full Addressing in IPv4, Routing – Routing Algorithm (Distance Vector Routing, Link State Routing

Unit V:

TRANSPORT LAYER and APPLICATION LAYER PROTOCOLS:

Transport Layer: Objectives of Transport Layer, Process to Process Delivery, Addressing – (IANA Ranges, Socket Addresses), Multiplexing, Quality of Service.

APPLICATION LAYER PROTOCOLS :ARP, RARP, ICMP, IPV6, DNS; SMTP, SNMP, FTP, HTTP & WWW.

Text books:
1. B. A. Forouzan – "Data Communications and Networking (3rd Ed.) " – TMH
2. A. S. Tanenbaum – "Computer Networks (4th Ed.)" – Pearson Education/PHI
3. W. Stallings – "Data and Computer Communications (8th Ed.) – PHI/ Pearson
Education Reference Books:
1. Kurose and Rose – "Computer Networking -A top down approach featuring the internet" – Pearson Education
2. Introduction to Data Communications and Networking by Wayne Tomasi-Pearson Edition
3. Comer – "Internetworking with TCP/IP, vol. 1, 2, 3(4th Ed.)" – Pearson Education/PHI

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: FOURTH (C.B.C.S.)

BRANCH: INFORMATION TECHNOLOGY

Subject: Operating Systems   **Subject Code: BEIT406T**

Load	Cred its	College Assessment Marks	University Evaluation	Total Marks
03 Hrs (Theory)	03	30	70	100

Aim: As a core subject of Information Technology, this course enables to understand importance of Operating System, its functionalities to manage resources of Computer and Peripherals, program development and its execution.

Prerequisite: Data structures(stack, queue, linked list, tree, graph), hashing, File structures, Any structured Programming Language (like C),

Course Objectives:

1	To learn and understand the Concepts of operating system
2	To Learn and understand operating system services
3	The core structure, functions and design principles of operating system
4	Interposes communications and basic concepts of virtualization

Course Outcomes:

At the end of this course Student are able to:

CO1	Describe the important computer system resources and the role of operating system in their management policies and algorithms.
CO2	Understand the process management policies and scheduling of processes by CPU
CO3	Evaluate the requirement for process synchronization and coordination handled by operating system
CO4	Describe and analyze the memory management and its allocation policies
CO5	Identify use and evaluate the storage management policies with respect to different storage management technologies.

Unit I:

Overview of Operating System: Operating system objectives and functions, Evolution 4 Operating System of OS, Characteristics of modern OS, Basic concepts: Processes, Files, System calls, Shell, Kernel architectures: Monolithic, Micro-kernel, Layered, Kernel mode of operations

Unit II:

Process Management: Process description: Process, Process States, ProcessControl Block (PCB), Threads, Thread management.

Process Scheduling: Types, Comparison of differentscheduling policies.

Unit III:

Process Co-ordination: Principles of Concurrency, Race condition and critical section, Mutual Exclusion-Hardware and Softwareapproaches, Semaphores, Monitors, Message Passing, Producer Consumer Problem.

Deadlock: Principles of Deadlock, Deadlock Detection,Deadlock Avoidance, Deadlock Prevention.

Unit IV:

Memory Management: Memory Management Requirements, Memory Partitioning, Virtual memory: Paging; Segmentation; Page replacement policies, page faults.

Unit V:

Input OutputManagement: I/O Devices, Organization of the I/O Function, Operating System Design Issues, I/O Buffering, Disk Scheduling and disk scheduling algorithms, Disk cache. Producer Consumer Problem

Reference Books:

(1) Operating System Concepts, 9th edition Peter B. Galvin, Greg Gagne, Abraham Silberschatz, John Wiley & Sons, Inc.
(2) Modern Operating Systems -By Andrew S. Tanenbaum (PHI)
(3) Operating Systems 5th Edition, William Stallings, Pearson Education India

Web References:

http://www.cs.pdx.edu/~walpole/class/cs533/papers/RPC.pdf
http://www.cs.pdx.edu/~walpole/class/cs533/papers/lrpc.pdf

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: FOURTH (C.B.C.S.)
BRANCH: INFORMATION TECHNOLOGY

Subject : Software Lab II   Subject Code: BEIT407P

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
02 Hrs (Practical)	01	25	25	50

Aim: To develop programming & logic development skills using Python

Prerequisite(s):

Student should have a basic understanding of Computer Programming terminologies. A basic understanding of any of the programming languages.

Course Objectives:

1	To understand why Python is a useful scripting language for developers.
2	To learn how to design and program Python applications.
3	To learn how to use lists, tuples, and dictionaries in Python programs.
4	To learn how to identify Python object types.
5	To learn how to use indexing and slicing to access data in Python programs.
6	To define the structure and components of a Python program.

Course Outcomes:
At the end of this course Student are able to:

CO1	Able to apply the principles python programming.
CO2	Write clear and effective python code.
CO3	Create applications using python programming.
CO4	Implementing database using SQLite.
CO5	Access database using python programming
CO6	Develop web applications using python programming.

NOTE:

1. Practical's are based on Python 3.4.3 (Preferably)
2. Practical's have to be performed using Python
3. There should be at the most two problems in practicals.
4. Minimum ten practical's have to be performed
5. Do not include study experiments

PRACTICALS ARE BASED ON FOLLOWING TOPICS:

1) Introduction to Python

2) Functions, Scoping and Abstraction

3) Structured Types, Mutability and Higher-Order Functions

4) Testing, Debugging, Exceptions and Assertions

5) Classes and Object-Oriented Programming using Python

6) Installation steps & Basic Input Output Programming using R Language

7) Implementation of Python programming in web programming

Open Ended Experiments

8) Introduction to R Programming Concepts

9) Conceptual Programming using R

Mini Project

Topic 10: Mini Project based on Python [Any small application using Python is preferred]

Text Books:

1. Head-First Python, 2nd edition, Paul Barry (O'Reilly, 2016)

2. Invent Your Own Computer Games with Python, 4th edition Al Sweigart

Reference Books :

1. Michael Urban and Joel Murach, Python Programming, Shroff/Murach, 2016

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR

FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE

SEMESTER: FOURTH (C.B.C.S.)

BRANCH: INFORMATION TECHNOLOGY

Course Code	BEIT408T				
Category	Audit Courses				
Course Title	Consumer Affairs				
Scheme & credits	L	T	P	Credits	Semester
	2	0	0	0	IV

Course outcomes: By the end of the course, the learner will be able to –
1. understand the basic concept and importance of Consumer Education
2. grasp the concepts related to Consumer Education and Protection
3. analyze the regulations and redressal mechanism system
4. aware of consumer movements

Unit 1
Concept of consumers and markets, concept of retail price, whole sale price, maximum retail price, local taxes, fair price and packaging.

Unit 2
Consumer protection act 1986, objectives and provisions, Grievances redress mechanism under consumer protection act 1986, procedure for filing and hearing a complaint, remedies, frivolous and vexatious complaints, offences and penalties.

Unit 3
Industry regulations and consumer complaint redressal mechanism, Banking – RBI and banking ombudsman, Insurance – IRDA and insurance ombudsman, Telecommunication – TRAI, Food products – FSSAI, Advertising – ASCI

Unit 4
Evolution of consumer movements in India, their role in consumer protection, national consumer citizen charter

Reference Books
1. Consumer Protection: Law and Practice, V. K. Agarwal, Bharat Law House Pvt. Ltd., 2021
2. Consumer Affairs, Sri Ram Khanna, Savita Hanspal, Sheetal Kapoor, H. K. Awasthi, Orient Blackswan, 2007
3. Textbook on Consumer Protection Law, Dr. H.K. Saharay, Universal Law, Publications, 2017
4. Consumer Protection and Redressal Mechanism, Atul Sharma and Arti Sharma, Global Vison Publication, 2019

RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY, NAGPUR
FOUR YEAR BACHELOR OF ENGINEERING (B.E.) DEGREE COURSE
SEMESTER: FOURTH (C.B.C.S.)
BRANCH: INFORMATION TECHNOLOGY

Subject : *Internships*   Subject Code : **BEIT409P**

Load	Credits	College Assessment Marks	University Evaluation	Total Marks
2 Hrs (Practical)	1	50	Nil	50

Activity: Field learning, Case study,

Students have to do internships to get exposure to latest technologies used by industries.

Minimum 04 weeks internship is desirable.

Dr. S . V . Sonelkar
Chairman,