M.C.A. (COMPUTER APPLICATIONS)

HINDUSTHAN
EDUCATIONAL AND CHARITABLE TRUST

HICET

REGULATION 2016

CHOICE BASED CREDIT SYSTEM

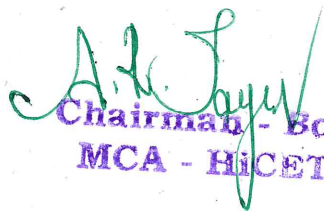# Curriculum & Syllabus

2017-2018
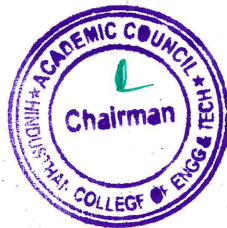
VISION AND MISSION OF THE INSTITUTION

VISION

To become a premier institution by producing professionals with strong technical knowledge, innovative research skills and high ethical values.

MISSION

- To provide academic excellence in technical education through novel teaching methods.
- To empower students with creative skills and leadership qualities.
- To produce dedicated professionals with social responsibility.

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ACADEMIC COUNCIL
HINDUSTHAN COLLEGE OF ENGG & TECH

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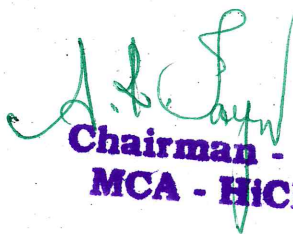
VISION AND MISSION OF THE DEPARTMENT

VISION
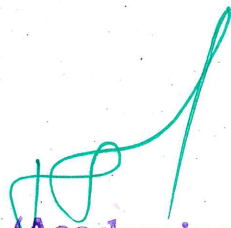
Our Vision is to equip and enrich the young minds professionally through experience, understanding, learning & implementation and to raise the level of Employability, by enhancing the individual skill sets.

MISSION

- To enhance Technical Knowledge through practical implementation.
- Inculcate culture, ethics and morality.
- To induce technical and analytical skills for societal benefits.

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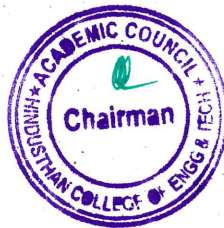
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PROGRAM OUTCOMES (POs)

a. Ability to apply knowledge of mathematics, computer science and domain knowledge to solve problems in the computational world.
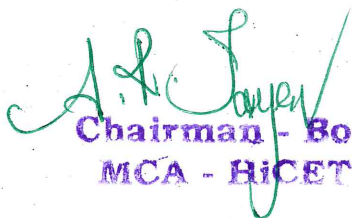
b. Ability to evaluate, analyze and use available technological solutions to design and implement the same.

c. Ability to work with complex computing problem environment, use knowledge both technical and research to provide valid conclusions of experiments based on analysis and interpretation of data.

d. Ability to use/evaluate the various software tools and networking requirements for solutions.

e. Ability to adhere to the professional ethics, follow cyber rules and regulations and be a responsible citizen.

f. Ability to be a lifelong learner in the field of computer science.

g. Ability to demonstrate the knowledge and understanding of hardware, software, networking and Finance requirements for the Society.

h. Ability to communicate effectively with the fellow members and also with other uses of the computing community and society.

i. Ability to experience the industrial environment for understanding the impact of computational solutions in a global and societal context.

j. Ability to become leaders, entrepreneurs, and provide solutions to complex problems in life.

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GRADUATE ATTRIBUTES (PSOs)

- Knowledge of solving complex computing problems
- Independent learning for continual development.
- Societal and environmental concern.
- Individualism and Team work.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

To produce graduates with the ability to

- Work productively as IT professional both at supportive and leadership roles.
- Advance successfully in their chosen career path utilizing technical abilities, leadership qualities, communication and interpersonal skills with high regard to legal and ethical responsibilities.
- Build their profession adapting to the changes in the technology with lifelong learning.

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CURRICULUM

Hindusthan College of Engineering and Technology

(An Autonomous Institution, Affiliated to Anna University, Chennai
Approved by AICTE, New Delhi& Accredited by NAAC with 'A' Grade)
Coimbatore, Tamil Nadu.

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DETAILS OF CHANGES CARRIED OUT IN CURRICULUM & SYLLABUS
CBCS PATTERN
POST GRADUATE PROGRAMMES
M.C.A. (MASTER OF COMPUTER APPLICATIONS)

REGULATION-2016

For the students admitted during the academic year 2017-2018 and onwards

SEMESTER I

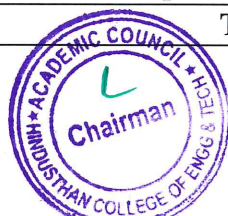| S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
		THEORY							
1	16MA1124	Mathematical Foundation for Computer Applications	3	1	0	4	40	60	100
2	16CA1201	Computer Organization and Architecture	3	0	0	3	40	60	100
3	16CA1202	Fundamentals of Web Design	3	0	0	3	40	60	100
4	16CA1203	Programming in C	3	0	0	3	40	60	100
5	16CA1204	Database Management Systems	3	0	0	3	40	60	100
		PRACTICAL							
6	16CA1001	Web Design Laboratory	0	0	4	2	50	50	100
7	16CA1002	Programming in C Laboratory	0	0	4	2	50	50	100
8	16CA1003	DBMS Laboratory	0	0	4	2	50	50	100
9	16HE1031	Communication Skill Development I	0	0	2	1	50	50	100
		Total	15	1	14	23	400	500	900

SEMESTER II

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
		THEORY							
1	16CA2201	Software Engineering	3	0	0	3	40	60	100
2	16CA2202	Operating Systems	3	0	0	3	40	60	100
3	16CA2203	Object Oriented Programming	3	0	0	3	40	60	100
4	16CA2204	Design and Analysis of Algorithms	3	0	0	3	40	60	100
5	16CA2205	Data Structures using C	3	0	0	3	40	60	100
		PRACTICAL							
6	16CA2001	OOPS Laboratory	0	0	4	2	50	50	100
7	16CA2002	Algorithms Laboratory	0	0	4	2	50	50	100
8	16CA2003	Data Structures Laboratory	0	0	4	2	50	50	100
9	16HE2032	Communication Skill Development II	0	0	2	1	50	50	100
		Total	15	0	14	22	400	500	900

SEMESTER III

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
		THEORY							
1	16BA3251	Organizational Behaviour	3	0	0	3	40	60	100
2	16CA3201	Computer Networks	3	0	0	3	40	60	100
3	16CA3202	Compiler Design and Analysis	3	0	0	3	40	60	100
4	16CA3203	Java Programming	3	0	0	3	40	60	100
5	16CA3204	Computer Graphics and Multimedia	3	0	0	3	40	60	100
		PRACTICAL							
6	16CA3001	Software Engineering Tools Laboratory	0	0	4	2	50	50	100
7	16CA3002	Java Programming Laboratory	0	0	4	2	50	50	100
8	16CA3003	Computer Graphics and Multimedia Laboratory	0	0	4	2	50	50	100
9	16CA3004	Career & Soft Skill Development - I	0	0	2	1	50	50	100
		Total	15	0	14	22	400	500	900

SEMESTER IV

S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
		THEORY							
1	16CA4201	Operation Research	3	1	0	4	40	60	100
2	16CM4321	Embedded Systems	3	0	0	3	40	60	100
3	16CA4202	Network Programming	3	0	0	3	40	60	100
4	**16CA43XX**	**Professional Elective I**	3	0	0	3	40	60	100
5	**16CA43XX**	**Professional Elective II**	3	0	0	3	40	60	100
		PRACTICAL							
6	16CM4001	Embedded Systems Laboratory	0	0	4	2	50	50	100
7	16CA4002	Network Programming Laboratory	0	0	4	2	50	50	100
8	16CA4003	Career & Soft Skill Development - II	0	0	2	1	50	50	100
9	16CA4701	Technical Seminar/ Technical Publications	0	0	4	2	50	50	100
		Total	15	1	14	23	400	500	900

LIST OF PROFESSIONAL ELECTIVES

ELECTIVE – I &II COMMON									
S.No.	Course Code	Course Title	L	T	P	C	CIA	ESE	TOTAL
		THEORY							
1	16CA4301	TCP/IP	3	0	0	3	40	60	100
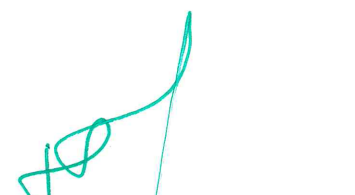
2	16CA4302	Software Project Management	3	0	0	3	40	60	100
3	16CA4303	Software Testing	3	0	0	3	40	60	100
4	16CA4304	Software Quality Management	3	0	0	3	40	60	100
5	16CA4305	Cyber Security	3	0	0	3	40	60	100
6	16BA4352	Accounting and Financial Management	3	0	0	3	40	60	100

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Semester	I	II	III	IV	V	VI	TOTAL
Credits	23	22	22	23	23	12	**125**

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PRINCIPAL
Hindusthan College Of Engineering & Technology
COIMBATORE - 641 032.

SYLLABUS

Programme	Course Code	Name of the Course	L	T	P	C
MCA	16MA1124	MATHEMATICAL FOUNDATION FOR COMPUTER APPLICATIONS	3	1	0	4

|		
Course Objective	1. To understand the concepts and operations of matrix algebra needed for computing graphics modeling.	
	2. To understand and apply the class of functions which transform a finite set into another finite set which relates to input output functions in computer science.	
	3. To impart discrete knowledge in computer engineering through finite automata and Context free grammars	

Unit	Description	Instructional hours
I	**MATRIX ALGEBRA** Matrices, Rank of Matrix - Eigen Values and Eigen Vectors - Inverse of a Matrix - Cayley Hamilton Theorem.	12
II	**BASIC SET THEORY AND RELATIONS** Basic Definitions - Venn Diagrams and set operations - Laws of set theory - Principle of inclusion and exclusion - Permutation and Combination - Relations - Properties of relations - Matrices of relations - Closure operations on relations.	12
III	**FUNCTIONS AND MATHEMATICAL LOGIC** Functions - injective, subjective and objective functions - Propositions and logical operators - Truth table - Propositions generated by a set, Equivalence and implication - Basic laws- Some more connectives - Functionally complete set of connectives- Normal forms - Proofs in Propositional calculus.	12
IV	**FORMAL LANGUAGES** Languages and Grammars - Classification of Grammars - Context Free Grammars and Languages – Derivations.	12
V	**FINITE STATE AUTOMATA** Concepts of Automata Theory – Finite Automata – Types of finite Automata - Deterministic Finite State Automata(DFA), Non Deterministic Finite State Automata (NFA) – Transition Diagrams - Equivalence of DFA and NFA.	12
	Total Instructional hours	**60**

Course Outcome	CO1: Acquire the basic knowledge of matrix, set theory, functions and relations concepts needed for designing and solving problems. CO2: Acquire the knowledge of logical operations and predicate calculus needed for computing skill Able to design and solve Boolean functions for defined problems. CO3: Apply the acquired knowledge of formal languages to the engineering areas like Compiler. Design CO4: Apply the acquired knowledge of finite automata theory and design discrete problems to solve by computers.

REFERENCE BOOKS:

R1. Kenneth H.Rosen, "Discrete Mathematics and Its Applications", Tata McGraw Hill, Fourth Edition, 2002 (Unit 1,2 & 3).

R2. Hopcroft and Ullman, "Introduction to Automata Theory, Languages and Computation", Narosa Publishing House, Delhi, 2002. (Unit 4,5)

R3. A.Tamilarasi&A.M.Natarajan, "Discrete Mathematics and its Application", Khanna Publishers, 2nd Edition 2005.

R4. JurajHromkovic, "Theoretical Computer Science", Springer Indian Reprint, 2010.

R5. A Text Book of Matrix Algebra, Third Edition, Suddhedu Biswas, PHI learning Private Limited – 2012

R6. David Makinson, "Sets, Logic and Maths for Computing", Springer Indian Reprint, 2011.

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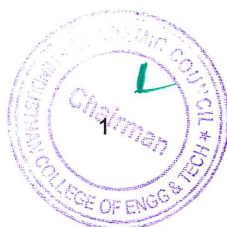
Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA1201	COMPUTER ORGANIZATION AND ARCHITECTURE	3	0	0	3

| Unit	Description	Instructional hours
I	**DIGITAL FUNDAMENTALS** Number Systems and Conversions – Boolean Algebra and Simplification – Minimization of Boolean Functions – Karnaugh Map, Logic Gates – NAND – NOR Implementation.	8
II	**COMBINATIONAL AND SEQUENTIAL CIRCUITS** Design of Combinational Circuits – Adder / Subtractor – Encoder – Decoder – MUX / DEMUX – Comparators, Flip Flop – Triggering – Master – Slave Flip Flop – State Diagram and Minimization – Counters – Registers.	10
III	**BASIC STRUCTURE OF COMPUTERS & PARALLEL PROCESSING** Functional Units – Basic Operational Concepts – Bus Structures – Performance and Metrics – Instruction and Instruction Sequencing – Addressing Mode – ALU design – Fixed point and Floating point operation.	9
IV	**PROCESSOR DESIGN** Processor basics – CPU Organization – Data path design – Control design – Basic concepts – Hard wired control – Micro programmed control – Pipeline control – Hazards – super scalar operation	9
V	**MEMORY, I/O SYSTEM AND PARALLEL PROCESSING** Memory technology – Memory systems – Virtual memory – Caches – Design methods – Associative memories – Input / Output system – Programmed I/O – DMA and Interrupts – I/O Devices and Interfaces – Multiprocessor Organization – Symmetric multiprocessor – Cache Coherence – Clusters: Non Uniform Memory Access - Vector Computation.	9
	Total Instructional hours	45

COURSE OUTCOME	CO1 : Able to design digital circuits by simplifying the Boolean functions. CO2 : Able to understand the organization and working principle of computer hardware components. CO3 : Able to understand mapping between virtual and physical memory. CO4 : Acquire knowledge about multiprocessor organization and parallel processing CO5 : Able to trace the execution of an instruction through the processor.

REFERENCE BOOKS:

R1. Morris Mano, "Digital Design", Prentice Hall of India, Fourth Edition 2007.

R2. Carl Hamacher, ZyonkoVranesic, SafwatZaky and NaraigManjikian, " Computer Organization and Embedded Systems", Sixth Edition, Tata Mc Graw Hill, 2012.

R3. William Stangling, "Computer Organization & Architecture – Designing for Performance" 9th Edition 2012.

R4. David A. Patterson and John L. Hennessy, " Computer Organization and Design: The Hardware / Software Interface", Fourth Edition, Morgan Kaufmann/Elsevier, 2009.

R5. John P. Hayes, " Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 2014.

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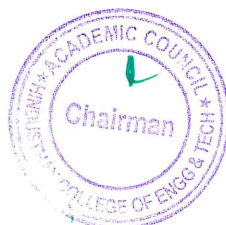
Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA1202	FUNDAMENTALS OF WEB DESIGN	3	0	0	3

COURSE OBJECTIVE

1. To understand the concepts and architecture of the World Wide Web.
2. To understand and practice mark up languages.
3. To understand and practice embedded dynamic scripting on client side Internet Programming.
4. To understand and practice web development techniques on client-side.
5. To design a creative and dynamic website.

Unit	Description	Instructional hours
I	**INTRODUCTION TO WWW** Internet Standards – Introduction to WWW – WWW Architecture – SMTP – POP3 – File Transfer Protocol - Overview of HTTP, HTTP request – response — Generation of dynamic web pages.	9
II	**UI DESIGN** Markup Language (HTML): Introduction to HTML and HTML5 - Formatting and Fonts - Commenting Code – Anchors – Backgrounds – Images – Hyperlinks – Lists – Tables – Frames - HTML Forms.	9
III	**CASCADING STYLE SHEET (CSS)** The need for CSS, Introduction to CSS – Basic syntax and structure - Inline Styles – Embedding Style Sheets - Linking External Style Sheets – Backgrounds - Manipulating text - Margins and Padding - Positioning using CSS.	9
IV	**SCRIPTING LANGUAGES** HTML – forms – frames – tables – web page design - JavaScript introduction – control structures – functions – arrays – objects – simple web applications.	9
V	**DYNAMIC HTML** Dynamic HTML – introduction – cascading style sheets – object model and collections – event model – filters and transition – data binding – data control – ActiveX control – handling of multimedia data.	9
	Total Instructional Hours	45

COURSE OUTCOME

CO1: Explain the history of the internet and related internet concepts that are vital in understanding web development.

CO2: Discuss the insights of internet programming and implement complete application over the web.

CO3: Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.

CO4: Utilize the concepts of JavaScript

CO5: Create and maintain responsive websites and employ strategies with user-centered design methodologies.

REFERENCE BOOKS:

R1. Harvey & Paul Deitel& Associates, Harvey Deitel and Abbey Deitel, "Internet and World Wide Web - How To Program", Fifth Edition, Pearson Education, 2011.

R2. Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition Tata McGraw-Hill 2010.

R3. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013.

R4. Margaret Levine Young, "Internet and WWW", 2nd Edition, Tata McGraw Hill, 2002.

R5. Jeff Rule, Dynamic HTML: The HTML Developer's Guide, Addison-Wesley, 1999.

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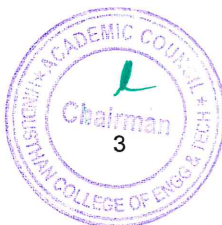
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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA1203	PROGRAMMING IN C	3	0	0	3

COURSE OBJECTIVE

1. To understand the basic concepts of problem solving approaches using C
2. To develop optimal program structure using conditional and iterative control structures and functions.
3. To design, implement, test, and apply the basic C programming concepts.
4. Apply the techniques of structured (functional) decomposition to break a program into smaller pieces and describe the mechanics of parameter passing.

UNIT	DESCRIPTION	TOTAL INSTRUCTIONAL
I	**INTRODUCTION TO C LANGUAGE** Overview of 'C' language - Constants, Variables and Data Types - Operators, Expressions and Assignment statements - Managing Input/Output Operations - Formatted I/O - Decision Making - Branching - IF, Nested IF - Switch - goto - Looping- While, do, for statements	9
II	**ARRAYS AND FUNCTIONS** Arrays - dynamic and multi-dimensional arrays - Character arrays and Strings - Two dimensional character arrays - String handling Functions - User defined Functions - Categories of Functions – Recursion - Functions using Arrays, Storage Classes	9
III	**STRUCTURES AND UNIONS** Basics of Structures-Declaring a Structure - Array of Structures –Nested Structures- Passing Structures elements to Functions- Passing entire Structure to Function - Structures within Structures-Union-typedef and enumeration types-bit fields.	9
IV	**POINTERS** Pointers - Declaration, Accessing a variable, dynamic memory allocation, Pointers versus Arrays, Array of pointers, Pointers & Strings, Pointers to functions and structure Pointers, Pointer to Pointer	9
V	**FILE MANAGEMENT** File Management in C - Data hierarchy- Files and Streams - Sequential access file- Random access file – Preprocessors, Command Line Arguments	9
	Total Instructional hours	45

COURSE OUTCOME

CO1: Able to design a computational solution for a given problem.
CO2:Able to break a problem into logical modules that can be solved (programmed).
CO3:Able to transform a problem solution into programs involving programming constructs
CO4:Able to write programs using structures, strings, arrays, pointers and files for solving complex computational problem.
CO5:Able to introduce modularity using functions and pointers which permit ad hoc run-time polymorphism

REFERENCE BOOKS :

R1. E.Balagurusamy " Programming in ANSI C " , 6th Edition, Tata McGraw Hill, 2012
R2. Yashavant P. Kanetkar "Understanding Pointers In C", BPB Publications, NewDelhi, 2010
R3. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Oxford University Press, 2013
R4. Kamthane, A.N., "Programming with ANSI and Turbo C", Pearson Education, Delhi,2009.
R5. Byron C Gottfried, Programming with C, Schuams' outline series, 2nd edition, Tata McGraw Hill, 2006.

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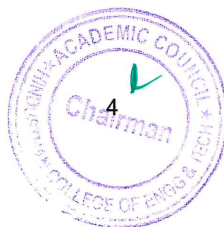
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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA1204	DATABASE MANAGEMENT SYSTEMS	3	0	0	3

COURSE OBJECTIVE

1. To understand the fundamentals of data models and conceptualize and depict a database system using ER diagram
2. To make a study of SQL and relational database design
3. Understand and successfully apply logical database design principles, including E-R diagram and database normalization
4. To know about the data storage techniques an query processing
5. To impart knowledge in transaction processing, concurrency control techniques and recovery procedures

Unit	Description	Instructional hours
I	**INTRODUCTION** Purpose of Database Systems – view of Data – Database languages – Database Architecture – Database users and Administrators – Database Schema – Keys – Relational Algebra – Tuple Relational Calculus	9
II	**SQL, PROGRAMMING AND TRIGGERS** SQL Data Definition – Basic Structure of SQL QUERIES – Basic Operations – Aggregate Functions – Nested Sub queries – Join Expressions – Views – Transactions – Functions and Procedures – Triggers.	9
III	**NORMAL FORMS** Entity-Relationship – Basic Concepts – Constraints – Removing attributes in Entity sets – ER Diagram – First Normal Forms – Second Normal Form – Third normal Form – Boyce Codd Normal Forms.	9
IV	**DATA STORAGE AND INDEXING** Storage and File Structure: Physical Storage media – Magnetic Disk an Flash Storage – RAID – File organization – Organization of records in File – Indexing and Hashing: Basic Concepts – Ordered Indices – B+Tree Index Files – Multiple Key Access – Static Hashing – Dynamic Hashing	9
V	**TRANSACTION MANAGEMENT** Transaction Concept and Model – Transaction Atomicity and Durability – Transaction isolation – Serializability – Transaction Isolation and Atomicity – Concurrency control : Lock-based Protocols – Deadlock Handling.	9

Total Instructional hours   45

Course outcome

CO1: Understand the basic concepts of the database and data models.
CO2: Design a Database using ER diagrams and map ER into Relations and normalize the relations
CO3: Acquire the knowledge of query evaluation to monitor the performance of the DBMS.
CO4: Develop a simple database supplications using normalization.
CO5: Acquire the knowledge about different special purpose database and to critique how they differ from traditional database systems

REFERENCE BOOKS:

R1. Abraham Silberschatz, Henry F.Korth and S.Sundarshan "Database System Concepts", Sixth Edition, McGraw Hill, 2010.
R2. Raghu RamaKrishnan, Johannes Gehrke, "Database Management Systems", 3rd Edition, McGraw Hill Publishers, 2003.
R3. RamezElmasri and ShamkantB.Navathe, "Fundamental Database Systems", Third Edition, Pearson education, 2003.
R4. C. J. Date, "An Introduction to Database Systems", 8th Edition, Addison Wesley Publishers, 2004.
R5. Peter Rob, Carlos coronel , "Data base system concepts" , Ceange Learning 2008

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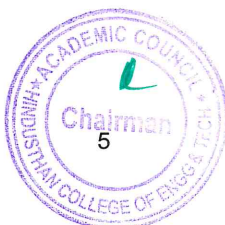
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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA1001	WEB DESIGN LABORATORY	0	0	4	2

COURSE OBJECTIVE

1. To be familiar with elements, Tags and Basic structure of HTML files.
2. To develop the concept of basic and advanced text formatting.
3. To designing of webpage-Document Layout, Working with List, Working with Tables.
4. To work with List, HTML elements box, Positioning and Block properties in CSS.
5. To know the usage of JavaScript for validation.

S.no	Description of the experiments	Practical hours
1	Create a web page with the following using HTML (i). To embed an image map in a web page. (ii). To fix the hot spots. (iii). Show all the related information when the hot spots are clicked.	6
2	Create a web page with all types of Cascading style sheets.	3
3	Implement Client Side Scripts for Validating Web Form Controls using JavaScript.	3
4	Designing Quiz Application Personal Information System/ Using JavaScript	3
5	Develop and demonstrate a HTML file that includes JavaScript that uses functions for the following problems: (i). Parameter: A string Output: The position in the string of the left-most vowel. (ii). Parameter: A number Output: The number with its digits in the reverse order.	3
6	Write an HTML code to display your CV on a web page.	3
7	Write an HTML code to create a Home page having three links: About Us, Our Services and Contact Us. Create separate web pages for the three links.	6
8	Write an HTML code to create a Registration Form. On submitting the form, the user should be asked to login with this new credentials.	6
9	Write an HTML code to create your Institute website, Department website and Tutorial website for specific object.	6
10	Write an HTML code to create a frameset having header, navigation and content sections.	6
	Total Instructional hours	**45**

COURSE OUTCOME

CO1: Design and develop basic web pages using HTML and CSS.
CO2: Use graphics in Web pages.
CO3: Use tables in Web pages.
CO4: Link pages to create a Web site.
CO5: Design and develop web pages using CSS for layout

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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA1002	PROGRAMMING IN C LABORATORY	0	0	4	2

	COURSE OBJECTIVE	1. Understand the basic concepts of C programming, its data types 2. Practice the use of conditional and looping statements 3. Implement programs based on structures, unions, enumerations 4. Implement arrays, functions and pointers 5. Gain skills to handle strings and files

S.no	Description of the experiments	Practical hours
1	Programs to understand the concept of data types and expressions	3
2	Conditional and control statements	6
3	Arrays-Single and Multi dimensional arrays	6
4	Defining and Handling of Strings	6
5	Implementation of functions and recursive functions	6
6	Structures, array of structures and Union	6
7	Implementation of pointers, operation on pointers and dynamic storage allocations	6
8	Creating and processing data files	6
	Total Instructional hours	**45**

|	Course Outcome	CO1: To know the concepts of Problem Solving CO2: To demonstrate the ability to analyze, use, and create user defined functions. CO3: To demonstrate the ability to understand and use Pointers CO4: To demonstrate the ability to understand and use Exception handling and I/O CO5: To design and write programs in C Language using Arrays, Structures and Unions and to create diversified applications in C.

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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA1003	DBMS LABORATORY	0	0	4	2

COURSE OBJECTIVE

1. To give a good formal foundation on the relational model of data
2. To develop conceptual understanding of database management system
3. To understand how a real world problem can be mapped to schemas
4. To develop understanding of different applications and constructs of SQL, PL/SQL.
5. To introduce the concepts of transactions and transaction processing

S.no	Description of the experiments	practical hours
1	Execute a DDL, DML, DCL and TCL commands for a Table	3
2	Execute SQL Functions	3
3	Execute various Joins an Sub Queries	3
4	Create and Manipulate various DB Objects for a Table	3
5	Write PL/SQL Procedure for an application using Exception Handling	3
6	Write PL/SQL Procedure for an application using Cursors.	6
7	Write a PL/SQL program to prepare reports for an application using Functions.	6
8	Write a PL/SQL block for transaction operations of a typical application using Triggers	6
9	Write a PL/SQL block for transaction operations of a typical application using Packages	6
10	Design and develop an application using any Front end and Back end tool.	6
	Total Instructional hours	**45**

COURSE OUTCOME

CO1: Ability to create database Tables
CO2: Ability to formulate SQL queries based on the problems given
CO3: Ability to apply PL/SQL
CO4: Ability to declare and enforce integrity constraints on a database
CO5: Ability to Normalize the database.

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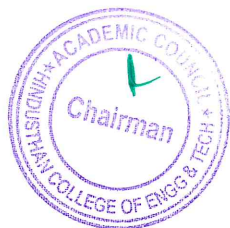
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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16HE1031	COMMUNICATION SKILL DEVELOPMENT I	0	0	2	1

COURSE OBJECTIVE

1. To help the learners to Improve their communicative skills
2. To help the learners to prepare resume, letter writing and report.
3. To help the learners to participate in GD's, increase confidence and to understand their own strengths.
4. Gaining active listening and responding skills,
5. Effective participation in Interview

S.no	Description of the experiments	Practical hours
1	**I. PC based session (Weightage 40%)**	15
	A. English Language Lab (15 Periods) **Listening Comprehension:** Listening and typing – Listening and sequencing of sentences – Filling in the blanks - Listening and answering questions.	5
	Reading Comprehension Filling in the blanks - Close exercises – Vocabulary building - Reading and answering questions.	5
	Speaking: Phonetics: Intonation – Ear training - Correct Pronunciation – Sound recognition exercises – Common Errors in English. Conversations: Face to Face Conversation – Telephone conversation – Role play activities (Students take on roles and engage in conversation	5
2	**B. Discussion of audio-visual materials (6 periods) (Samples to learn and practice**	6
	Resume / Report Preparation / Letter Writing Structuring the resume / report - Letter writing / Email Communication - Samples	1
	Presentation skills: Elements of effective presentation – Structure of presentation - Presentation tools – Voice Modulation – Audience analysis - Body language – Video samples	1
	Soft SkillS Time management – Articulateness – Assertiveness – Psychometrics – Innovation and Creativity - Stress Management & Poise - Video Samples	2
	Group Discussion: Why is GD part of selection process ? - Structure of GD – Moderator – led and other GDs - Strategies in GD – Team work - Body Language - Mock GD –Video samples	1
	Interview Skills Kinds of interviews – Required Key Skills – Corporate culture – Mock interviews- Video samples	1
3	**II. Practice Session (Weightage – 60%) 24 periods**	24
	Resume / Report Preparation / Letter writing: Students prepare their own resume and report	2
	Presentation Skills: Students make presentations on given topics	8
	Group Discussion: Students participate in group discussions.	6
	Interview Skills: Students participate in Mock Interviews	8
	Total Instructional hours	45

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REFERENCE BOOKS :

R1. Anderson, P.V, **Technical Communication**, Thomson Wadsworth , Sixth Edition, New Delhi, 2007.
R2. Prakash, P, **Verbal and Non-Verbal Reasoning**, Macmillan India Ltd. Second Edition, New Delhi,
    2004.
R3. John Seely, **The Oxford Guide to Writing and Speaking**, Oxford University Press, New Delhi,
    2004.
R4. Evans, D, **Decisionmaker**, Cambridge University Press, 1997.
R5. Thorpe, E, and Thorpe, S, **Objective English**, Pearson Education, Second Edition, New Delhi, 2007.
R6. Turton, N.D and Heaton, J.B, **Dictionary of Common Errors**, Addision Wesley Longman Ltd., Indian
reprint 1998.

Guidelines for the course

1. A batch of 60 students is divided into two groups – one group for the PC- based session and the other group for the Class room session.
2. The English Lab (2 Periods) and the Career Lab (2 Periods) may be handled by any competent teacher
3. **Record Notebook:** At the end of each session of English Lab, review exercises are given for the students to answer and the computer evaluated sheets are to be compiled as record notebook. Similar exercises for the career lab are to be compiled in the record notebook.
4. **Internal Assessment:** The 15 marks (the other 5 marks for attendance) allotted for the internalassessment will be based on the record notebook compiled by the candidate. 10 marks may be allotted for English Lab component and 5 marks for the Career Lab component.
5. **End semester Examination:** The end-semester examination carries 40% weightage for EnglishLab and 60% weightage for Career Lab.

Course Outcome	CO1: Display competence in oral, written, and visual communication.
	CO2: Show an understanding of opportunities in the field of communication.
	CO3: Communicate ethically.
	CO4: Demonstrate positive group communication exchanges.
	CO5: Apply appropriate communication skills across settings, purposes, and audiences.
	CO6: Build and maintain healthy and effective relationships.

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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA2201	SOFTWARE ENGINEERING	3	0	0	3

COURSE OBJECTIVE

1. To provide an insight into the processes of software development
2. To understand and practice the various fields such as analysis, design, development, testing of software Engineering.
3. To develop skills to construct software of high quality with high quality with high reliability.
4. To apply metrics and testing techniques to evaluate the software.

Unit	Description	Instructional hours
I	**INTRODUCTION** Software Engineering paradigms – Waterfall Life cycle - spiral Model - Agile Process Model – Prototype model – Planning – Software Project Scheduling – Risk analysis and Management – Requirement and Specification.	9
II	**SOFTWARE DESIGN** Abstraction – Modularity – Software Architecture – Cohesion – Coupling- Various Design Concepts and notations – Documentation – Dataflow Oriented design – Jackson System development.	9
III	**SOFTWARE TESTING AND MAINTENANCE** Software Testing Fundamentals – Software testing strategies – Black Box Testing – White Box Testing – System Testing – Testing Tools – Test Case Management – Software Maintenance Organization – Maintenance Report.	9
IV	**SOFTWARE METRICS** Scope – Classification of metrics – Measuring Process and Product attributes – Direct and Indirect measures – Cost Estimation – Reliability – Software Quality Assurance – Standards.	9
V	**SCM & WEB ENGINEERING** Need for SCM – Version Control – SCM Process – Software Configuration Items – Taxonomy – CASE Repository.	9
	Total Instructional hours	45

COURSE OUTCOME

CO1: Get an insight into the processes of software development
CO2: Able to understand the problem domain for developing SRS and various models of software engineering.
CO3: Able to Model software projects into high level design using DFD, UML Diagram.
CO4: Able to Measure the product and process performance using various metrics
CO5: Able to Evaluate the system with various testing techniques and strategies.

REFERENCE BOOKS :

R1. Roger S. Pressman, "Software Engineering: A Practitioner Approach", Eighth edition, McGrawHill, 2015.
R2. Richard Fairley, " Software Engineering Concepts", Tata McGraw Hill Edition, 2010
R3. Sommerville, "Software Engineering", Sixth Edition, Addison Wesley-Longman, 2016.
R4. Roger S. Pressman, David Lowe, "Web Engineering: A Practitioner's Approach", Special Indian edition, McGrawHill, 2009.
R5. Ali Behforroz, Frederick J.Hudson, "Software Engineering Fundamentals", Oxford Indian Reprint, 2012
R6. Kassem A. Saleh, "Software Engineering", First Edition, J.Ross Publishing, 2009.
R7. Jibitesh Mishra, Ashok Mohanty, "Software Engineering", Pearson Education, First Edition, 2012

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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA2202	OPERATING SYSTEMS	3	0	0	3

| COURSE OBJECTIVE	1. To be aware of the evolution and fundamental principles of operating system, processes and their communication 2. To understand the various operating system components like process management, memory management, process management and device management. 3. To know about file management and the distributed file system concepts in operating systems 4. To be aware of components of operating system with relevant case study.

Unit	Description	Instructional hours
I	**INTRODUCTION** Definition of OS-Mainframe System-Desktop Systems-Multi processor System-Distributed-Clustered-Real time Systems-Handheld Systems-Operating System Structure-System Components-Services-System Calls-System Programs-System Design and Implementation	8
II	**PROCESS MANAGEMENT** Concepts-Process Scheduling-Operations on Processes-Co-operating Processes-Inter Process Communication-CPU Scheduling-Scheduling Concepts-Criteria-Scheduling Algorithms-Multiprocessor Scheduling - Real time Scheduling.	10
III	**PROCESS SYNCHRONIZATION** Critical Section-Synchronization Hardware-Semaphores-Problems of Synchronization-Critical Regions - Monitors – Deadlocks –Characterization - Handling Deadlocks - Deadlock Prevention-Avoidance – Detection - Deadlock Recovery.	9
IV	**MEMORY MANAGEMENT** Storage Hierarchy-Storage Management Strategies – Contiguous - Non Contiguous Storage Allocation-Single User-Fixed Partition-Variable Partition-Swapping - Virtual Memory - Basic Concepts-Multilevel Organization-Block, Mapping - Paging - Segmentation – Page Replacement Methods – Locality - Working Sets.	9
V	**I/O AND FILE SYSTEMS** Disk Scheduling-File Concepts-File System Structure-Access Methods-Directory Structure-Protection-Directory Implementation-Allocation Methods-Free Space Management-Case Study: Linux System.	9
	Total Instructional hours	45

Course Outcome	CO1: Able to understand the operating system components and its services CO2: Implement the algorithms in process management and solving the issues of IPC CO3: Able to demonstrate the mapping between the physical memory and virtual memory CO4: Able to understand file handling concepts in OS perspective CO5: Able to understand the operating system components and services with the recent OS.

REFERENCE BOOKS :
1. Silberschatz and Galvin, Operating System Concepts, 9th Edition, John Wiley & Sons, Inc., 2012
2. Milankovic M., Operating System Concepts and Design, 2nd Edition, McGraw Hill, Reprint 2008
3. P.C.Bhatt, An Introduction to Operating Systems-Concepts and Practice, Prentice Hall Of India, 2010
4. H.M.Deitel, An Introduction to Operating Systems, 2nd Edition, Pearson Education, 2002
5. Andrew S. Tanenbaum, Herbert Bos - Modern Operating Systems, Prentice Hall 2014.

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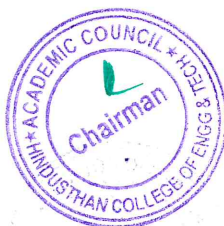
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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA2203	OBJECT ORIENTED PROGRAMMING	3	0	0	3

COURSE OBJECTIVE

1. To learn the fundamental concepts of Object oriented Programming
2. To learn how C++ supports Object Oriented principles such as abstraction, polymorphism etc
3. To understand and apply the principles hiding, localization and modularity in software development.
4. Use the generic programming features of C++ including the STL
5. Design and implement reliable and maintainable object-oriented applications of moderate complexity composed of several classes

Unit	Description	Instructional hours
I	**FUNDAMENTALS** Object Oriented Programming concepts - Encapsulation - Programming Elements - Program Structure - Enumeration Types - Functions and Pointers - Function Invocation - Overloading Functions - Scope and Storage Class - Pointer Types - Arrays and Pointers - Call by Reference - Assertions.	8
II	**IMPLEMENTING ADTS AND ENCAPSULATION** Structure Pointer Operators - Unions - Bit Fields - Data Members and Member Functions - Classes - Constructors and Destructors - Copy Constructors - Inline Functions - Static Members and Member Functions- Friend Function and Friend Class - this Pointer - Constness - implementation of simple ADTs - Namespace.	10
III	**POLYMORPHISM** Overloading - Overloading Operators - Unary Operator Overloading - Binary Operator Overloading - Overloading of Friend Functions - Function Selection - Pointer Operators.	9
IV	**TEMPLATE & STL** Template - Function Templates - Class Templates - Parameterizing - STL - Visitation - Iterators - containers - List - List Iterators – Algorithms - Function Adaptors.	9
V	**INHERITANCE & I/O STREAMS** Inheritance - Base Class - Derived Class - Visibility - Code Reuse - Inheritance and Constructors- Static and Dynamic Binding - Virtual Functions - Pure Virtual Functions and Abstract Base Class - Exceptions - Handlers - Standard Exceptions - I/O Streams - I/O Manipulators	9
	Total Instructional hours	45

COURSE OUTCOME

CO1: Able to understand and design the solution to a problem using object-oriented programming concepts.
CO2: Able to use proper class protection mechanism to provide security.
CO3: Able to demonstrate the use of virtual functions to implement polymorphism.
CO4: Understand and implement the features of C++ including templates, exceptions and file handling for providing programmed solutions to complex problems
CO5: Able to reuse the code with extensible Class types, User-defined operators and function overloading

REFERENCE BOOKS :
R1. Bhushan Trivedi, "Programming with ANSI C++", Oxford Press, Second Edition, 2012.
R2. HM Deitel and PJ Deitel "C++ How to Program", Seventh Edition, 2010, Prentice Hall
R3. Ira Pohl, "Object–Oriented Programming Using C++", Pearson Education, 2 Edition, 2003.
R4. E Balagurusamy, "Object oriented Programming with C++", 6th edition, 2013, Tata McGraw Hill
R5. Bhave , " Object Oriented Programming With C++", Pearson Education , 2009

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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA2204	DESIGN AND ANALYSIS OF ALGORITHMS	3	0	0	3

COURSE OBJECTIVE

1. To study about the fundamentals of problem solving and algorithm analysis.
2. To understand the problem using Divide and conquer methods and Greedy technique.
3. To learn about Dynamic programming techniques to solve Knapsack problem.
4. To study about N Queens problem, sum of subset problem using Backtracking method.
5. To learn about approximation algorithm for NP-hard and NP-complete problems

Unit	Description	Instructional hours
I	**INTRODUCTION** Fundamentals of algorithmic problem solving – Important problem types – Fundamentals of the analysis of algorithm efficiency – analysis frame work – Asymptotic notations – Mathematical analysis for recursive and non-recursive algorithms.	8
II	**DIVIDE AND CONQUER METHOD AND GREEDY METHOD** Divide and conquer methodology – Merge sort – Quick sort – Binary search – Binary tree traversal – Multiplication of large integers – Strassen's matrix multiplication – Greedy method – Prim's algorithm – Kruskal's algorithm – Dijkstra's algorithm.	10
III	**DYNAMIC PROGRAMMING** Computing a binomial coefficient – Warshall's and Floyd' algorithm – Optimal binary search tree – Knapsack problem – Memory functions.	9
IV	**BACKTRACKING AND BRANCH AND BOUND** Backtracking – N-Queens problem – Hamiltonian circuit problem – Subset sum problem – Branch and bound – Assignment problem – Knapsack problem – Travelling salesman problem.	9
V	**NP-HARD AND NP-COMPLETE PROBLEMS** P & NP problems – NP-complete problems – Approximation algorithms for NP-hard problems – Travelling salesman problem – Knapsack problem.	9

Total Instructional hours   45

COURSE OUTCOME

C01: Able to prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains.

C02: Able to apply the algorithms and design techniques to solve problems.

C03: Able to apply prior knowledge of standard algorithms to solve new problems, and mathematically evaluate the quality of the solutions.

C04: Able to produce concise technical writing for describing the solutions and arguing their correctness.

C05: Able to analyze the complexities of various problems in different domains.

REFERENCE BOOKS :

R1. Anany Levitin "Introduction to the Design and Analysis of Algorithms" Pearson Education 2003.

R2. Ellis Horowitz, Sartaj Sahni and SanguthevarRajasekaran, "Fundamentals of computer algorithms", 2nd Edition, Prentice Hall, 2008.

R3. Horowitz, Sahni, Anderson-Freed, "Fundamentals of Data Structures in C", 2nd Edition, University Press, 2007.

R4. G. A.V.PAI, "Data structures and algorithms, concepts, Techniques and Applications", 1st Edition, Tata McGraw Hill, 2008.

R5. Parag Dave & Himanshu Dave, "Design and Analysis of Algorithms", 2nd Edition, Pearson Education, 2008.

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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA2205	DATA STRUCTURES USING 'C'	3	0	0	3

COURSE OBJECTIVE

1. To understand the linear and non linear data structure available in solving problems.
2. To know about the sorting and searching techniques and its efficiencies
3. Identify different solutions for a given problem; analyze advantages and disadvantages to different solutions.
4. To study the systematic way of solving problems, various methods of organizing large amounts of data
5. To employ the different data structures to fing the solutions for specific problem.

| Unit	Description	Instructional hours
I	**INTRODUCTION AND LIST** Introduction – Overview – How to create programs and analyze them – Abstract Data Types ((ADT) – Arrays and its representation – Structures – Ordered Lists - Representation of Arrays – Simple applications.	9
II	**STACKS AND QUEUES** Stacks: Operations on stacks - Applications of Stack – Polish Expression and their Compilation using Stacks – infix to postfix conversion – evaluation of Expression – Queues : Representation of Queues, Operation on Queues - Priority Queues – Applications on Queue.	9
III	**LINEAR DATA STRUCTURE** Linear Linked List: Operations on Linear List using singly Linked Storage structures - Circular linked lists. Doubly linked list - Polynomial manipulation using linked list – garbage collection and compaction using linked list	9
IV	**NON LINEAR DATA STRUCTURE** Trees: Need for non linear structures – Tress and its representation – Binary Tree – Operations on binary tree – Binary tree traversal – Huffman Algorithm – Binary search tree. Graphs s: Representation of graph – Matrix representation of graphs – list structures – Graph Traversals – Breadth first search – Depth first search – Shortest path Algorithm.	9
V	**SEARCHING AND SOTING** General Background – Exchange sorts – Selection and Tree Sorting – Insertion Sorts – Merge and Radix Sort – Heap Sort – Shell Sort – External Sort – Basic Search Techniques – Tree Searching – General Search Trees – Hashing.	9
	Total Instructional hours	45

COURSE OUTCOME

CO1: Able to understand the concepts of data structure, data type and array data structure
CO2: Able to analyze algorithms and determine their time complexity
CO3: Able to implement linked list data structure to solve various problems
CO4: Able to understand and apply various data structures such as stacks, queues, trees and graphs to solve various computing problems using C.
CO5: Able to design and apply appropriate data structure for solving computing problems

REFERENCE BOOKS:

R1. Jeen-Paul Tremblay and Paul; G Sorenson, "An Introduction to Data Structures with applications", Second edition, McGraw Hill Book Company, 2008
R2. Ellis Hoerowitz& Sartaj Sahni" Fundamentals of Dta Structures in C:, 2008, Computer Science
R3. Mark Allen Weiss "Data Structures and Algorithm Analysis in C", Addison Wesley Second Edition, 2007
R4. Tanenbaum A.S.Langram Y. Augestein M J " DAtaaStructures using C", Peasson Education, 2012.
R5. Reema Thareja, "DataStructures using C", Oxford Press 2014.

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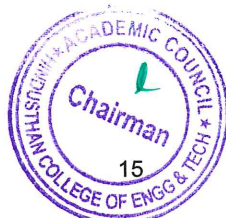
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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA2001	OOPS LABORATORY	0	0	4	2

COURSE OBJECTIVE	1. To make the student learn an object oriented method of solving problems. 2. To make the student to identify and practice the object-oriented programming concepts and techniques. 3. To practice the use of C++ classes and class libraries, modify existing C++ classes. 4. To develop C++ classes for simple applications and to apply the object oriented programming principles in software development.

S.no	Description of the experiments	Practical hours
1	Write a C++ program to perform String Concatenation • using Arrays • Using Functions • Using Arrays & functions • Using Pointers & Functions	3
2	Write a C++ Program to illustrate Enumeration and Function Overloading	3
3	Write a C++ Program to illustrate Scope and Storage class	3
4	Implementation of ADT such as Stack and Queues	3
5	Write a C++ Program to illustrate the use of Constructors and Destructors and Constructor Overloading	3
6	Write a program to Illustrate Friend Function and Friend Class	3
7	Write a Program to illustrate Static member and methods	
8	Write a Program to illustrate Bit fields	3
9	Write a Program to overload as binary operator, friend and member function	
10	Write a Program to overload unary operator in Postfix and Prefix form as member and friend function	3
11	Write a Program to illustrate Iterators and Containers	3
12	Write a C++ Program to illustrate function templates	3
13	Write a C++ Program to illustrate Class templates	3
14	Write C++ Programs and incorporating various forms of Inheritance	3
15	Write a C++ Program to illustrate Virtual functions	3
16	Write a C++ program to illustrate Exception Handling	3
17	Write a C++ program to demonstrate the concept of I/O Streams	3

Total Instructional hours   **45**

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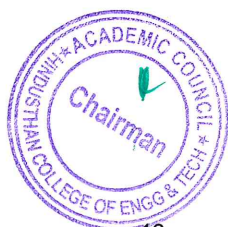
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Course Outcome	CO1: To apply object-oriented programming features to program design and implementation
	CO2: To demonstrate the ability to analyze, use, and create functions, classes, to overload operators.
	CO3: To demonstrate the ability to understand and use inheritance and Pointers when creating or using classes and create templates
	CO4: To demonstrate the ability to understand and use Exception handling and I/O Streams
	CO5: To design and write programs that make appropriate use of advanced object-oriented facilities common to many object-oriented languages such as classes, message passing, overloading and inheritance.

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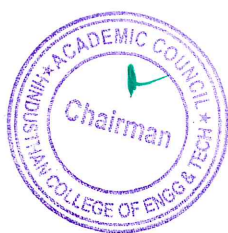MCA - HiCET
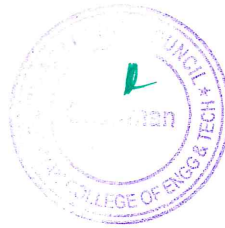
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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA2002	ALGORITHMS LABORATORY	0	0	4	2

COURSE OBJECTIVE

1. To implement various sorting techniques.
2. To implement searching algorithm using divide and conquer method
3. To implement shortest path algorithms using Floyd's algorithm and Warshall's algorithm.
4. To implement minimum spanning tree of graph using Prim's algorithm and Kruskals algorithm
5. To implement subset sum problem using backtracking method

S.no	Description of the Experiments	Practical hours
1	Quick Sort	3
2	Merge Sort	3
3	Binary Search	3
4	Warshall's Algorithm	3
5	Floyds Algorithm	3
6	Dijkstra's Algorithm	6
7	Prim's Algorithm	6
8	Knapsack Problem – Dynamic Programming	6
9	Knapsack Problem – Greedy Method	6
10	Subset Sum Problem – Backtracking	6
	Total Instructional hours	**45**

COURSE OUTCOME

CO1: Able to demonstrate a familiarity with major algorithms and data structures.
CO2: Able to apply important algorithmic design paradigms and methods of analysis.
CO3: Analyze worst-case running times of algorithms using asymptotic analysis.
CO4: Synthesize divide-and-conquer algorithms, Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
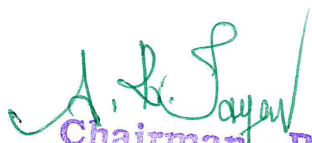CO5: Able to implement the dynamic-programming paradigm.

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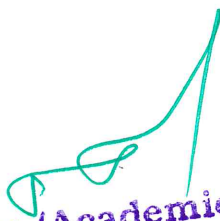| Programme	Course Code	Name of the Course	L	T	P	C
MCA	**16CA2003**	**DATA STRUCTURES LABORATORY**	**0**	**0**	**4**	**2**

COURSE OBJECTIVE	1. To develop skills to design and analyze simple linear and non linear data structures 2. To Strengthen the ability to identify and apply the suitable data structure for the given real world problem 3. To Gain knowledge in practical applications of data structures 4. To analyze performance of Algorithm 5. To use appropriate searching and sorting methods.

S.NO	DESCRIPTION OF THE EXPERIMENTS	TOTAL PRACTICAL HOURS
1	Program for adding two Polynomials.	3
2	Program for implementing Stack operations.	3
3	Program for implementing Queue operation.	3
4	Implementation of circular Queue.	3
5	Program for operations on Single Linked List.	3
6	Program for inserting and deleting elements in Double Linked List.	3
7	Program to implement Towers of Hanoi Problem.	3
8	Program to Convert an infix expression to postfix.	3
9	Program to sort elements in using sorting techniques.	3
10	Program to search an element using the search techniques.	6
11	Program to perform depth first search and breath first search using graph.	6
12	Program to perform tree traversal (In-order, pre-order, post-order) using binary search tree.	6
	Total Instructional hours	**45**

COURSE OUTCOME	CO1: To learn elementary data structures such as stacks, queues, linked lists, trees and graphs. CO2: To design and analyze the time and space efficiency of data structure. CO3: To identify the appropriate data structure for given problem. CO4: To have practical knowledge on the applications of data structures. CO5: To design algorithms to solve the problems.

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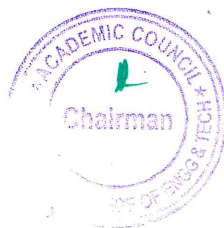
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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16HE2032	COMMUNICATION SKILL DEVELOPMENT II	0	0	2	1

COURSE OBJECTIVE	1. To help the learners to improve their communicative skill.
	2. To facilitate the learners to improve the pronunciation of words with proper stress.
	3. To help the learners acquire the soft skills and interpersonal skills which will help the student to excel in their workplace
	4. To inculcate the habit of reading and to improve the active vocabulary among the learners.
	5. To enhance the performance of students in placement, interviews and Group discussion

S.No.	Description of the experiments	Practical hours
1	Vocabulary Building	
	Splitting Syllables	
	Stress and Shift of words and sentences	
	Common errors in Speaking	15
	Letter writing	
	Writing Application, Bio-data, Resume, Curriculum Vitae.	
	Reading Comprehension and Answering Multiple Choice questions and Fill ups.	
	Listening to audio files and answering questions	
	Planning for an event	
2.	Extempore Speech - On the spot topics for speech Practice	10
	Identifying tonal variations expressing	
	E-Mail writing	
	Listening to Presentation Skills (GD & Debate)	
	Group Discussion	
3.	Reading Practice: Dr.Abdul Kalam's "Wings of Fire"	10
	Report Writing	
	Paper Presentation	
	Listening to Telephonic Conversation & Situational Conversation	
4.	Debate	10
	Note Taking	
	Interview Skills	
	Total Instructional hours	**45**

RECORD LAY OUT

1. Every student has to maintain a record in which he / she have to incorporate the following details.
2. Students have to collect materials related to topics for Group Discussion / Debate
3. 10 assignments of Lab observations related to Presentation Skills about 200 words each
4. Covering letter with Bio data / Resume / Curriculum Vitae
5. Paper Presentation Topics with source materials to be pasted in the record

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COURSE OUTCOME

CO1: Display competence in oral, written, and visual communication.
CO2: Show an understanding of opportunities in the field of communication.
CO3: Communicate ethically.
CO4: Demonstrate positive group communication exchanges.
CO5: Apply appropriate communication skills across settings, purposes, and audiences.
CO6: Build and maintain healthy and effective relationships

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SYLLABUS

Programme	Course Code	Name of the Course	L	T	P	C
MCA	16BA3251	ORGANIZATIONAL BEHAVIOUR	3	0	0	3

Course Objective

1. To understand the focus, purpose and importance of organizational behaviour.
2. To understand the various aspects related to individuals behaviour in an organization.
3. To comprehend the formation of organization structure and the influence and role of Groups in organisation
4. To expose the students to various leadership styles and the influence of Power and politics in organization.
5. To know the dynamics of organizational behaviour.

Unit	Description	Instructional Hours
I	**FOCUS AND PURPOSE** Definition, need and importance of organizational behaviour – Nature and scope – Frame work – Organizational behaviour models.	5
II	**INDIVIDUAL BEHAVIOUR** Personality – types – Factors influencing personality – Theories – Learning – Types of learners – The learning process – Learning theories – Organizational behaviour modification. Misbehaviour – Types – Management Intervention. Emotions - Emotional Labour – Emotional Intelligence – Theories. Attitudes – Characteristics – Components – Formation – Measurement- Values. Perceptions – Importance – Factors influencing perception – Interpersonal perception- Impression Management. Motivation – importance – Types – Effects on work behavior.	12
III	**GROUP BEHAVIOUR** Organization structure – Formation – Groups in organizations – Influence – Group dynamics – Emergence of informal leaders and working norms – Group decision making techniques – Team building - Interpersonal relations – Communication – Control.	10
IV	**LEADERSHIP AND POWER** Meaning – Importance – Leadership styles – Theories – Leaders Vs Managers – Sources of power – Power centers – Power and Politics.	8
V	**DYNAMICS OF ORGANIZATIONAL BEHAVIOUR** Organizational culture and climate – Factors affecting organizational climate – Importance. Job satisfaction – Determinants – Measurements – Influence on behavior. Organizational change – Importance – Stability Vs Change – Proactive Vs Reaction change – the change process – Resistance to change – Managing change. Stress – Work Stressors – Prevention and Management of stress – Balancing work and Life. Organizational development – Characteristics – objectives –. Organizational effectiveness	10

Total Instructional Hours   45

Course Outcome

CO1: Students will be familiar with the features and importance of organizational behaviour.
CO2: Can recognize aspects like personality, learning, emotions, attitudes, perceptions, motivation etc which will affect individual's behaviour in an organization.
CO3: Enables to understand and handle group behaviour effectively.
CO4: Gives an understanding on various leadership styles and the influence of Power and Politics in organization.
CO5: Ensures to have a better understanding on the dynamics of organizational behaviour.

REFERENCE BOOKS:

R1 - Stephen P. Robins, Organisational Behavior, PHI Learning / Pearson Education, 15th edition, 2013.
R2 - Fred Luthans, Organisational Behavior, McGraw Hill, 11th Edition, 2011.
R3 - Schermerhorn, Hunt and Osborn, Organisational behavior, John Wiley, 9th Edition, 2011.
R4 - UdaiPareek, Understanding OrganisationalBehaviour, 2nd Edition, Oxford Higher Education, 2013.

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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA3201	COMPUTER NETWORKS	3	0	0	3

Course Objective	To understand networking concepts and basic communication model
	To understand network architectures and components required for data communication.
	To analyze the function and design strategy of physical, data link, network layer and transport layer
	To acquire knowledge of various application protocol standard developed for Internet
	To understand various security algorithms over application layer

Unit	Description	Instructional Hours
I	**NETWORK FUNDAMENTALS** Uses of Networks – Categories of Networks -Communication model –Data transmission concepts and terminology – Protocol architecture – Protocols – OSI – TCP/IP – LAN Topology - Transmission media	9
II	**DATA LINK LAYER** Data link control - Flow Control – Error Detection and Error Correction - MAC – Ethernet, Token ring, Wireless LAN MAC – Blue Tooth - Bridges.	9
III	**NETWORK LAYER** Network layer – Switching concepts – Circuit switching – Packet switching –IP — Data grams – IP addresses- IPV6– ICMP – IGMP - Routing Protocols – Distance Vector – Link State- BGP.	9
IV	**TRANSPORT LAYER** Transport layer –service –Connection establishment – Flow control – Transmission control protocol – Congestion control and avoidance – User datagram protocol. -Transport for Real Time Applications (RTP).	9
V	**APPLICATION LAYER** Applications - DNS- SMTP – WWW –SNMP- Security –threats and services - DES- RSA- web security –SSL	9
	Total Instructional Hours	45

Course Outcome	CO1: Understand the basic concepts in computer networking.
	CO2: Apply the functions of different layers and in depth knowledge of datalink layer.
	CO3: Analyze the different protocols and network layer components.
	CO4:. Identify the basic functions of transport layer and congestion in networks.
	CO5:.Explain the working of application layer.

REFERENCE BOOKS :

R1 - Larry L. Peterson & Bruce S. Davie, "Computer Networks – A systems Approach", Fourth Edition, Harcourt Asia / Morgan Kaufmann, 2009

R2 - William Stallings, "Data and Computer Communications", Nineth Edition, Prentice Hall , 2011.

R3 - BehrouzA.Forouzan, Data Communication and Networking, 5th Edition, Tata McGraw Hill, 2014

R4 - Andrew S.Tannenbaum David J. Wetherall, "Computer Networks" Fifth Edition , Pearson Education 2011

R5 - James F. Kurose, Keith W. Ross, "Computer Networking: A Top-down Approach, Pearson Education, Limited, sixth edition,2012

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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA3202	COMPILER DESIGN AND ANALYSIS	3	0	0	3

COURSE OBJECTIVE

1. To introduce the major concept areas of language translation and compiler design.
2. To enrich the knowledge in various phases of compiler and its use
3. To extend the knowledge of parser
4. To develop an awareness on code optimization techniques, machine code generation
5. To provide practical programming skills necessary for constructing a compiler

Unit	Description	Instructional Hours
I	**INTRODUCTION** Language Processors – Structure of a compiler -The phases of a compiler- Cousins of the compiler-The grouping of phases-Compiler-construction tools. Simple syntax-directed translation : Introduction -Syntax definition-Syntax-directed translation-Parsing –A translator for simple expressions-Lexical analysis.	9
II	**LEXICAL ANALYSIS** The role of the lexical analyzer-Input buffering-Specification of tokens-Recognition of tokens-A language for specifying lexical analyzers-Finite automata-From a regular expression to an NFA-Design of a lexical analyzer generator-Optimization of DFA -based pattern matchers.	9
III	**SYNTAX ANALYSIS** Introduction: The role of the parser-Context-free grammars-Writing grammar-Top down parsing-Bottom-up parsing-Operator-precedence parsing-LR parsers-Using ambiguous grammars-Parser generators.	9
IV	**INTERMEDIATE CODE GENERATION** Variants of Syntax Tree – Three Address Code – Types and Declarations – Type checking – Rules of type checking – Type Conversion – Control Flow – Back patching	9
V	**CODE GENERATION** Issues in the Design of a Code Generator – The Target Language – Addresses in the Target Code – Basic Blocks and Flow Graphs – Optimization of Basic Blocks - A Simple Code Generator – DAG Representation of Basic Blocks – Peephole Optimization – Code Generation from DAG- Register Allocation and Assignment	9
	Total Instructional Hours	45

Course Outcome

CO1: To Acquire the knowledge of compiler & its features
CO2: To Understand the role of a lexical analyzer and identify and design top down and bottom up Parsing techniques
CO3: To Construct a syntax tree and generate three address codes
CO4: To Compare flow graphs and basic blocks and write efficient codes using peephole optimization
CO5:To Implement various optimization and code generation algorithms for the design of a compiler

REFERENCE BOOKS :

R1 - Alfred V. Aho, Monica S.Lam, Ravi Sethi, Jeffrey D.Ullman, —Compilers: Principles, Techniques and Tools, Second Edition, Pearson Education,2013.
R2 - Allen I. Holub, "Compiler Design in C", Prentice-Hall software series, 2012
R3 - Randy Allen, Ken Kennedy, "Optimizing Compilers for Modern Architectures: A Dependence based Approach", Morgan Kaufmann Publishers, 2012
R4 - Steven S. Muchnick, "Advanced Compiler Design and Implementation", Morgan Kaufmann Publishers - Elsevier Science, India, Indian Reprint 2013.
R5 - Keith D Cooper and Linda Torczon, "Engineering a Compiler", Morgan Kaufmann Publishers Elsevier

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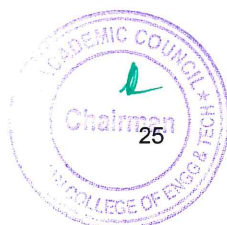
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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA3203	JAVA PROGRAMMING	3	0	0	3

Course Objective	
	1. To impart the fundamental concepts of core JAVA.
	2. To explain the concepts of Multithreading
	3. To explore the skills in program development using Exception handling and I/O programming
	4. To gain the built in knowledge of standalone and web applications.
	5. To understand the concepts needed for database connectivity.

Unit	Description	Instructional Hours
I	**INTRODUCTION** Java Features – The Byte Code – Lexical issues - Class Fundamentals – Objects – Overloading Methods – Passing and returning objects – Recursion – Controlling access to members – this keyword - static and final keyword.	9
II	**INHERITANCE & PACKAGES** Nested classes – Inheritance – Using super keyword – Multi Level hierarchy – Method Overriding - Dynamic Method Dispatch – The Object class – Abstract classes - Packages – Access modifiers – Importing packages – Interfaces – Applying interfaces.	9
III	**EXCEPTION HANDLING & THREADS** Exception handling – Using try catch – Nested try- throw – throws – finally – Built in exceptions – user defined exceptions - Chained exceptions; Threads – Thread model – Creating a thread – Thread priorities – Synchronization – Multithreading – Suspending, resuming and stopping threads.	9
IV	**FRAMES & APPLETS** Java Frame – basic GUI components – Delegation event model - Event Classes– Source of events – Event Listener Interface – Applet Programming.	9
V	**FILES & DATABASES** I/O streams – Reading/Writing console – Files - Manipulating Databases with JDBC – Case Study on System class and Utility classes.	9
	Total Instructional Hours	45

Course Outcome	
	CO1:Apprehend the syntax, semantics of Java programming language and create applications using classes and objects
	CO2: Design and create new applications by applying reusability and Packages concept
	CO3: Apply Multithreading concepts to execute parallelism and explore the concept of Exception handling.
	CO4: Implement programs using Frames, Event handlers and Applets
	CO5:Synthesize rich applications using I/O, Files, JDBC and System/Utility classes

REFERENCE BOOKS:
R1- Herbert Schildt, "JAVA - The Complete Reference", Ninth Edition 2014, McGraw-Hill Education,
R2- RashmiKanta Das, "Core Java for Beginners", Third Edition, First Reprint 2015, Vikas Publishing House Pvt Ltd, ISBN – 978-93259-6850-9.
R3-Deitel, Deitel, "Java How to Program", Tenth Edition, PHI, 2015

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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA3204	COMPUTER GRAPHICS AND MULTIMEDIA	3	0	0	3

Course Objective

1. Understand the fundamentals of graphics and multimedia.
2. Gain knowledge in the concepts of 2D and 3D graphics programming.
3. Acquire skills related to multimedia compression and animation
4. Formulate a working definition of interactive multimedia;
5. provides an idea of multimedia authoring and presentations

Unit	Description	Instructional Hours
I	**2D PRIMITIVES** Output primitives- Line drawing , Circle drawing and Ellipse drawing algorithms - Attributes of output primitives - Two dimensional Geometric transformations – Basic Transformation – Matrix representations – Composite transformations – Other transformations - Two dimensional viewing - Cohen-Sutherland Line Clipping, Sutherland Hodgeman Polygon clipping algorithms	9
II	**3D CONCEPTS** Parallel and Perspective projections - Three dimensional object representation - Polygon, Curved lines, Quadric surfaces – Spline Representations - 3D transformations - Viewing – Projections -Visible surface Identification – Classification of Visible Surface Detection Algorithms – Back face detection – Depth Buffer Method – A Buffer Method.	9
III	**COLOR MODELS AND COLOR APPLICATIONS** Color Models - RGB, YIQ, CMY, HSV - Animations - General Computer Animation, Raster, Key frame .	9
IV	**MULTIMEDIA BASICS** Introduction and definitions – Multimedia Authoring Systems – Multimedia Authoring – Editing and Authoring tools – VRML – Graphics and Image Representation	9
V	**MULTIMEDIA SYSTEMS** Compression -Types of Compressions: Lossless - Lossy - Video compression - Image Compression standards – JPEG standard –JPEG 2000 –JPEG LS standard	9
	Total Instructional Hours	45

Course Outcome

CO1: Demonstrate 2D transformation using 2D primitives.
CO2: Implement 3D projections and transformations.
CO3: Identify the different color models.
CO4: Understand the basics of multimedia.
CO5: Illustrate the multimedia authoring systems and compression types

REFERENCE BOOKS

R1 - Donald Hearn, M.Pauline Baker, Computer Graphics C Version, Pearson Education, 2011.
R2 - Ze-Nian Li and Mark S.Drew, Fundamentals of Multimedia, PHI Learning, 2008
R3 - F.S.Hill,Computer Graphics using OPENGL, 2nd edition, Pearson Education,2009
R4 - Prabhat K Andleigh, KiranThakrar, Multimedia systems design, 1st Edition, PHI,2009

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Programme	Course Code	Name Of The Course	L	T	P	C
MCA	16CA3001	SOFTWARE ENGINEERING TOOLS LABORATORY	0	0	4	2

Course Objective	1. To understand the basic concepts of software engineering, life cycle models and project management concepts
	2. To understand in detail about the requirement analysis and requirement engineering processes.
	3. To understand the concepts and principles involved in software design.
	4. To understand the concepts and various types of software testing and project implementation techniques.
	5. To understand the techniques involved in software project management and Risk management.

S.No	Description Of The Experiments
1	Practicing the different types of case tools such as (Rational Rose & other Open Source) used for all the phases of Software development life cycle.
2	Implementation of the Data modeling using CASE Workbenches and develop online railway reservation system.
3	Implementation of the Data modeling using CASE Workbenches for Library management system.
4	Implementation of the Project management using CASE Workbenches and develop Payroll processing application.
5	Implementation of the Source code generators using CASE Workbenches and develop Inventory system
6	Implementation of the Source code generators using CASE Workbenches for Payroll system
7	Implementation of the User-interface development using CASE Workbenches and develop Library management system
8	Implementation of the Programming using CASE Workbenches and Create a dictionary
9	Implementation of the Verification and validation using CASE Workbenches for Payroll system
10	Implementation of the Verification and validation using CASE Workbenches for Library management system

Total Instructional Hours   45

Course Outcome	CO1: Ability to identify the minimum requirements for the development of application.
	CO2: Ability to develop, maintain, efficient, reliable and cost effective software solutions.
	CO3: Ability to critically thinking and evaluate assumptions and arguments.

Software required:
- **Languages:** C/C++/Java/JSDK/Web browser.
- Any front end tool (like VB, VC++) etc
- **Any backend tool** (Oracle, Ms-Access, SQL) etc.
- **Any CASE tool** (Rational Rose or other Open Source)

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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA3002	JAVA PROGRAMMING LABORATORY	0	0	4	2

Course Objective

1. To impart the basic programming constructs in Java to develop simple object oriented programs
2. To explore the skills in program development using Exception handling and multi-threading concepts.
3. To develop applications using I/O Streams
4. To gain programming skills to establish database connectivity
5. To gain the built in knowledge of standalone and web applications

Expt. No.	Description of the Experiments
1.	Create an Employee payroll application using classes, objects and constructors. Create objects for three different employees and calculate HRA, DA and total pay
2.	Create a Banking Application to calculate simple interest and compound interest using Abstract class, Packages and Interface.
3.	Write a Java program to illustrate Method Overloading to calculate the area of the following shapes (i) Square (ii) Rectangle (iii) Circle
4.	Write a Java program to implement multi threading concepts

Write a Java program to illustrate Method Overriding for the following:

5.	Get the empid, name, grade, salary, designation from the user. Create a base class employee and display the employee details using show( ) method. Create a derived class sports employee and display the sports details using show( ) method.

Write a Java Program to throw a User Defined Exception for the following

6.	Credit Point Validation

Age Less Than Twenty

Write a Java program to implement the following in-built exceptions:

7.	Array Index Out Of Bounds Exception

Arithmetic Exception

8.	Develop with suitable hierarchy, classes for Point, Shape, Rectangle, Square, Circle, Ellipse, Triangle, Polygon, etc. Design a simple test application to demonstrate dynamic polymorphism.
9.	Write a window based Graphic User Interface applications using frames and applets to simulate a calculator application. Use Grid Layout to place the components
10.	Write a java program to implement different forms of Inheritance for employee information system.

Write a java program with Database Connectivity for the following web based application to check the status of student result.

11.	Create a Database for student with the following fields: Regno, Name, Mark1, Mark2, Mark3, Mark4, Mark5 and Grade.

Create a HTML for getting Regno from the user.

Create an application program for displaying the student details for the corresponding Regno

Total Practical Hours 45

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Course Outcome	CO1:Develop programs using OOPS concepts. CO2: Analyze the various Java packages and understand the way the classes are organized CO3:Implement programs using Input and Output in Java. CO4:Execute programs in Applet, AWT and Event handlers in Java. CO5:Design programs using Database connectivity

Software required:

- Java 2.0, NetBeans 8.0

Programme	Course Code	Name Of The Course	L	T	P	C
MCA	16CA3003	COMPUTER GRAPHICS AND MULTIMEDIA LABORATORY	0	0	4	2

Course Objective	1. The objectives of the course are to: Understand the need of developing graphics applications. 2. Learn the hardware involved in building graphics applications. 3. Learn algorithmic development of graphics primitives like: line, circle, ellipse, polygon etc. 4. Learn the representation and transformation of graphical images and pictures. 5. Learn the concept of Color Generation.

S.No   **Description Of The Experiments**

1
LINE DRAWING AND CIRCLE DRAWING ALGORITHMS
Implement Line drawing algorithm like DDA, Bresenham's Line Drawing, Mid circle drawing

2
TWO DIMENSIONAL TRANSFORMATIONS:
Creation of two dimensional objects and applying simple transformations like Translation, Scaling, Rotation and applying Composite transformations

3
THREE DIMENSIONAL TRANSFORMATIONS:
Creation of simple three dimensional objects like cube, cone and cylinder and applying simple transformations like Translation, Scaling, Rotation and applying Composite transformations.

4
IMAGE EDITING:
Image enhancement, Image transformation from color to gray scale and vice versa, Image manipulation and Image optimization for web - Usage of editing tools, layers, filters, special effects and color modes.

Total Instructional Hours   **45**

Course Outcome	CO1: Understand the basic concepts of computer graphics. CO2: Apply clipping and filling techniques for modifying an object. CO3: Understand the concepts of different type of geometric transformation of objects in 2D and 3D. CO4: Understand the practical implementation of modeling, rendering, viewing of objects in 2D. CO5: Understand the concepts of Viewing, Curves and surfaces

Software required:

- Turbo C , Adobe PhotoShop 6

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Programme	Course Code	Name Of The Course	L	T	P	C
MCA	16CA3004	CAREER AND SOFT SKILL DEVELOPMENT – I	0	0	2	1

Course Objective	1. To enhance the performance of students in placement, interviews and Group discussion.
	2. To understand team dynamics & effectiveness.
	3. To learn leadership qualities and practice them.

S.NO	DESCRIPTION OF THE EXPERIMENTS	PRACTICAL HOURS
1	1. Introduction to Communication 2. The Process of Communication. 3. Verbal and Non- Verbal communication. . 4. Barriers of Communication. 5. Dyadic Communication.	15
2.	1. Listening Process 2. Purpose of Listening 3. Common Barriers to the Listening Process 4. Measures to improve listening skill 5. Intensive Listening and Listening for specific information.	10
3.	1. Reading and understanding written materials. 2. Techniques of reading, skimming, and Scanning. 3. General Principles of Writing. 4. Writing Memo, circular and Notice. 5. Report Writing.	10
4.	1. Group Discussion Techniques. 2. Developing body language. 3. Practicing etiquette . 4. Delivering a Presentation. 5. Developing interpersonal relationship. 6. Types of Interviews and Career Planning.	10

	TOTAL INSTRUCTIONAL HOURS	45

RECORD LAY OUT

1. Every student has to maintain a record in which he / she has to incorporate the following details.
2. Students have to collect materials related to topics for Group Discussion / Debate.
3. 10 assignments of Lab observations related to Presentation Skills about 200 words each.
4. Covering letter with Bio data / Resume / Curriculum Vitae.
5. Paper Presentation Topics with source materials to be pasted in the record.

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Course Outcome	CO1: Display competence in oral, written, and visual communication.
	CO2: Show an understanding of opportunities in the field of communication.
	CO3: Demonstrate positive group communication exchanges.
	CO4: Apply appropriate communication skills across settings, purposes, and audiences.
	CO5: Build and maintain healthy and effective relationships.

REFERENCE BOOKS:

R1 - Interactive Multimedia Programs on Managing Time and Stress.
R2 - Personality Development (CD-ROM), Times Multimedia, Mumbai.
R3 - Robert M Sherfield "Developing Soft Skills" 4th edition, New Delhi: Pearson Education, 2009.

WEB SOURCES:

W1 - http://www.kent.ac.uk/careers/cv/coveringletters.htm
W2 - http://www.mindtools.com/pages/article/newCDV_34.htm

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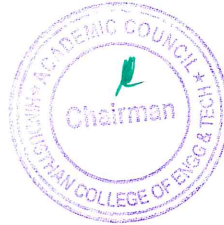
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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA4201	OPERATIONS RESEARCH	3	1	0	4

Course Objective	1. To provide the concept and an understanding of basic concepts in Operations Research Techniques for Analysis and Modeling in Computer Applications.
	2. To understand, develop and solve mathematical model of linear programming problems
	3. To understand, develop and solve mathematical model of Transport and assignment problems
	4. To Understand network modeling for planning and scheduling the project activities
	5. To Understand and differentiate the different queuing models

Unit	Description	Instructional Hours
I	**LINEAR PROGRAMMING MODELS** Mathematical Formulation - Graphical Solution of linear programming models – Simplex method – Artificial variable Techniques- Variants of Simplex method	12
II	**TRANSPORTATION AND ASSIGNMENT MODELS** Mathematical formulation of transportation problem- Methods for finding initial basic feasible solution – optimum solution - degeneracy – Mathematical formulation of assignment models – Hungarian Algorithm – Variants of the Assignment problem	12
III	**INTEGER PROGRAMMING MODELS** Formulation – Gomory's IPP method – Gomory's mixed integer method – Branch and bound technique.	12
IV	**SCHEDULING BY PERT AND CPM** Network Construction – Critical Path Method – Project Evaluation and Review Technique – Resource Analysis in Network Scheduling	12
V	**QUEUEING MODELS** Characteristics of Queuing Models – Poisson Queues - (M / M / 1) : (FIFO / ∞ /∞), (M / M / 1) : (FIFO / N / ∞), (M / M / C) : (FIFO / ∞ / ∞), (M / M / C) : (FIFO / N / ∞) models.	12

Total Instructional Hours   **60**

Course Outcome	CO1: Able to understand and apply linear, integer programming to solve operational problem with constraints
	CO2: Able to Apply transportation and assignment models to find optimal solution in warehousing and Travelling,
	CO3: Able to Demonstrate project scheduling using PERT and CPM
	CO4: Able to Identify and analyze appropriate queuing model to reduce the waiting time in queue.
	CO5: Able to Interpret optimization concepts in real world problems

REFERENCE BOOKS:

R1 - Taha H.A., "Operations Research : An Introduction " 8th Edition, Pearson Education, 2008.

R2 - A.M.Natarajan, P.Balasubramani, A.Tamilarasi, "Operations Research", Pearson Education, Asia, 2014.

R3 - Prem Kumar Gupta, D.S. Hira, "Operations Research", S.Chand& Company Ltd, New Delhi, 3rd Edition , 2008.

R4 - John W. Chinneck "Feasibility and Infeasibility in Optimization Algorithms and Computational Methods' Springer, 2008

R5 - Ibe, O.C. "Fundamentals of Applied Probability and Random Processes", Elsevier, U.P., 1st Indian Reprint, 2007.

R6 - Gross, D. and Harris, C.M., "Fundamentals of Queueing Theory", Wiley Student, 3rd Edition, New Jersy, 2008.

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Programme	Course code	Name of the course	L	T	P	C
MCA	16CM4321	EMBEDDED SYSTEMS	3	0	0	3

Course Objective	1. To gain knowledge about how the I/O devices are interfaced with 8051 microcontroller
	2. To Learn Assembly language programming in 8051.
	3. To understand the Basic concepts of 8051 microcontroller and Embedded systems
	4. To understand the basic embedded system design.
	5. To understand various case studies.

Unit	Description	Instructional Hours
I	**INTRODUCTION TO 8-BIT MICROCONTROLLER** Intel 8051 Architecture- Processor and Memory Organization-Interrupts of 8051 - Addressing Modes - Instruction Set –Memory mapped I/O - I/O mapped I/O-Assembly Language Programming Using 8051	9
II	**INTERFACING WITH 8051** Input- Output Interfacing – Bus Standards – PCI – ISA – Timing And Control – Input Output Devices –Serial And Parallel Communication – Motor Control- Programming Display Devices – ARM Architecture.	9
III	**EMBEDDED SYTEM** Embedded Systems- Processor Embedded Into A System-Embedded Hardware And Software Units- Applications-Design Process-Inter Process Communication – Signal Functions –Mailbox - Pipes –Memory Management Device, Files And I/O Subsystem – Basic Design of RTOS	9
IV	**SYSTEM DESIGN TECHNIQUES** Design methodologies- Design flows - Requirement Analysis – Specifications- System analysis and architecture design – Quality Assurance techniques- Distributed embedded systems – MPSoCs and shared memory multiprocessors	9
V	**CASE STUDY** Automated Teller Machine - Alarm Clock - Audio player – Automatic Chocolate Vending Machine - Digital still camera – Telephone answering machine - Engine control unit – Antilock Braking System.	9
	Total Instructional Hours	45

Course Outcome	CO1: Able to understand 8051 microcontroller functions
	CO2: Able to gain basic knowledge in ARM architecture
	CO3: Able to design and control real time control systems
	CO4: Acquire the knowledge of embedded system design and implement real time functions
	CO5: Able to design embedded system based on case studies

REFERENCES BOOKS:

R1 - Rajkamal, "Embedded System: Architecture, Programming And Design" Tata Mcgraw-HillEducation, Second Edition, 2008.
R2 - Marilyn Wolf, "Computers As A Components" Third Edition, Morgan Kaufmann Series 2012.
R3 - B.KanthRao, "Embedded Systems" PHI Learning Private Limited, 2011
R4 - Jonathan W.Valvano, "Embedded Microcomputer Systems Real Time Interfacing", Third Edition Cengage Learning, 2012.
R5 - K.V.K.K.Prasad, "Embedded Real-Time Systems: Concepts, Design & Programming", Dream Tech Press, 2005.

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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA4202	NETWORK PROGRAMMING	3	0	0	3

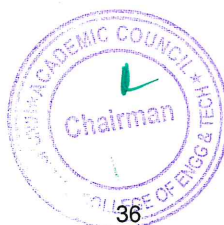| Course Objective	
	1. To state the major components and describe the architecture of the LINUX operating system
	2. To use SHELL programming to create simple tools for the information processing
	3. To understand IPC using various techniques and Signal Generation
	4. To understand usage of TCP/UDP / Raw sockets
	5. To explain Socket programming to design client- server environment

Unit	Description	Instructional Hours
I	**INTRODUCTION TO LINUX & SHELL** Introduction to Linux - Basic commands and file handling commands, Standard I/O, pipes and standard error related commands, Task Control commands UNIX Shell Scripting Introduction - Loop control, Arrays and Arithmetic, Case, Co-routines, practicing sample shell scripts	9
II	**IPC & SIGNALS** Process control – Process relationships - Signals generation and handling, signal functions – Interprocess Communication using PIPE, FIFO, MESSAGE QUEUE, SHARED MEMORY, SEMAPHORES	9
III	**ELEMENTARY TCP SOCKETS** Introduction to Socket Programming –Introduction to Sockets – Socket address Structures – Byte ordering functions – address conversion functions – Elementary TCP Sockets – socket, connect, bind, listen, accept, read, write , close functions –Concurrent Server. TCP Echo Server – TCP Echo Client	9
IV	**ELEMENTARY UDP SOCKETS** Elementary UDP sockets – UDP echo Server – UDP echo Client- Domain name system – gethostbyname function – gethostbyadr function –getservbyname and getservbyport functions	9
V	**ADVANCED SOCKETS** Threaded servers – thread creation and termination – TCP echo server using threads – Mutexes – condition variables – raw sockets – ping program – trace route program	9

	Total Instructional Hours	45

Course Outcome	
	CO1 :Understanding the basics of Linux Environment and Code programs on Shell Scripts
	CO2 :Demonstrate Signal Handling mechanism and implement programs using various IPC techniques
	CO3: Design and implement client-server applications using Elementary TCP Sockets & UDP Sockets
	CO4: Understanding DNS and implement its various functions.
	CO5: Design and Implement applications using Multithreading and Advanced Socket programming

REFERENCE BOOKS:

R1 - W. Richard Stevens, B. Fenner, A.M. Rudoff, "Unix Network Programming – The Sockets Networking API", 3rd edition, Pearson, 2009

R2 - W. Richard Stevens, S.A Rago, "Advanced Programming in the Unix environment", 2nd edition, Pearson, 2013

R3 –B.M.Harwani, Unix and Shell programming, Oxford University Press, 2013

R4 - Matthew, Neil and Richard Stones, "Beginning Linux Programming". John Wiley and Sons, 2011

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Programme	Course code	Name of the course	L	T	P	C
MCA	16CM4001	EMBEDDED SYSTEMS LABORATORY	0	0	4	2

Course Objective	1. Demonstrate the 8051 and ARM kit ,instruction set & write Assembly Language program 2. Apply the programming concepts to 8051 and ARM Microcontroller 3. Use proper peripheral devices and interface to 8051 4. Formulate the concept of mail box in RTOS. 5. Demonstrate ARM based interfacing

S.No   Description Of The Experiments

8051 Experiments using kits

1	Basic arithmetic and Logical operations
2	Square & Cube of a number
3	Matrix Addition and Subtraction
4	Sorting, Largest & Smallest of an array
5	1's and 2's complement of a number
6	Stepper motor control interface

ARM Experiments using kits

7	Blinking of LED's connected through PORTS
8	Relay control
9	Interfacing PWM and LED
10	Mailbox

Total Instructional Hours   **45**

Course Outcome	CO1: Analyze the performance of 8051 programs for various types of inputs. CO2: Formulate the design logic of ARM programs CO3: Develop one industrial application using peripheral devices CO4: Interface various modules with 8051 and ARM CO5: Develop mailbox and enable intra process communication using RTOS

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Programme	Course code	Name of the course	L	T	P	C
MCA	16CA4002	NETWORK PROGRAMMING LABORATORY	0	0	4	2

Course Objective	1. To Understand the Basic Linux Commands and to implement simple programs in Shell Scripts. 2. To understand IPC using various techniques and Signal Generation 3. To understand the use of client/server architecture in application development using TCP ,UDP and Raw Sockets 4. To Understand the Concept of Domain Name System 5. To achieve the concept of synchronization using various techniques

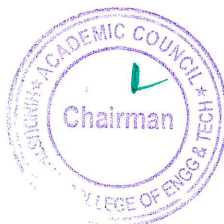| S.No	Description of the Experiments	Total Practical Hours
1	Implementation of Basic Linux Commands, I/O redirection & Pipes and Task Control	
2	Implementation of Basic Shell Scripts	
3	Implementation of Connection oriented service using TCP	
4	Implementation of Connectionless Oriented Service using UDP	
5	Implementation of IPC using PIPE, FIFO, SHARED MEMORY, MESSAGE QUEUE	
6	To illustrate the concept of interrupt signal using signal handler and division by zero using sigaction.	
7	Implement Domain name System using its various Functions	
8	To implement multiple client chatting with a single server	
9	Implement a program for producer and consumer problem to achieve synchronization using semaphores	
10	Implement producer consumer problem using mutex and conditional variables	
11	To implement a trace route program given an IP address.	
12	Implement a Ping program in C	

Total Instructional Hours   45

Course Outcome	CO1 :Understanding the basics of Linux Environment and Code programs on Shell Scripts CO2 :Demonstrate Signal Handling mechanism and implement various IPC techniques CO3: To design and implement client-server applications using Connection oriented and Connectionless methods CO4: Construct various functions of DNS. CO5: Design and Implement applications to achieve Synchronization using semaphores and Mutex and code Ping and Trace route using Raw Sockets.

Software required:
- C with Unix
- Telnet

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Programme	Course Code	Name Of The Course	L	T	P	C
MCA	16CA4003	CAREER AND SOFT SKILL DEVELOPMENT - II	0	0	2	1

S.No	Description Of The Experiments	Practical Hours
1	1. Vocabulary skill. 2. Common Errors in Speaking. 3. Making of Sentences. 4. Writing formal letters. 5. Real Life conversations. 6. Stress and Intonation.	15
2.	1. Positive Attitude & Self Confidence 2. Motivation Skills & Personality Development. 3. Goal Setting. 4. Career Planning. 5. Presentation Skills.	10
3.	1. Interview skills. 2. Debate. 3. Effective use of body language. 4. Group Dynamics 5. Managing Team Performance & Team Conflicts	10
4.	1. Time Management 2. Problem Solving Skill 3. Report Writing 4. E-Mail Writing. 5. Note Making	10

INSTRUCTIONAL HOURS   45

RECORD LAY OUT
1. Every student has to maintain a record in which he / she have to incorporate the following details.
2. Students have to collect materials related to topics for Group Discussion / Debate.
3. 10 assignments of Lab observations related to Presentation Skills about 200 words each.
4. Covering letter with Bio data / Resume / Curriculum Vitae.
5. Paper Presentation Topics with source materials to be pasted in the record.

COURSE OUTCOME
CO1: Display competence in oral, written, and visual communication.
CO2: Handle Engineering Ethics and Human Values.
CO3: Make effective presentations.
CO4: Show an understanding of opportunities in the field of communication.
CO5: Communicate ethically.

REFERENCE BOOKS:
R1 - International English Language Testing System Practice Tests, Cambridge University Press..
R2 - Personality Development (CD-ROM), Times Multimedia, Mumbai.
R3 - Robert M Sherfield and et al. "Developing Soft Skills" 4th edition, New Delhi: Pearson Education,2009.

WEB SOURCES:
W1 - http://www.kent.ac.uk/careers/cv/coveringletters.htm
W2 - http://www.mindtools.com/pages/article/newCDV_34.htm

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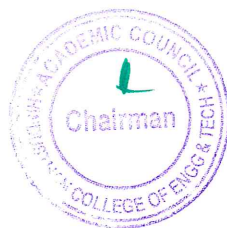
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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA4701	TECHNICAL SEMINAR/TECHNICAL PUBLICATIONS	0	0	4	2

Course Objective

1. Train the students to critically evaluate a well-defined set of research subjects.
2. To summarize the findings concisely in a paper of scientific quality.
3. Ability to understand a topic, communicate it and identify the issues.
4. To promote and develop presentation skills and import a knowledgeable society.
5. Effective use oral and written forms of communication, that results in integrative thinking.

Sl. No.	Description of the Experiments
1.	Every student selects a topic related to current trends and the same should be approved by the respective committee. This selection should have at least 5 distinct primary sources.
2.	Every student must write a short review of the topic and present it to fellow students and faculty (discuss the topic – expose the flaws – analyze the issues) every week.
3.	The faculty should evaluate the short review and award marks with respect to the following. a. Has the student analyzed – not merely quoted – the most significant portions of the primary sources employed? b. Has the student offered original and convincing insights? c. Plagiarism to be checked.
4.	Every student should re-submit and present the review article including issues/ comments/ conclusions which had arisen during the previous discussion.
5.	Every student should submit a final paper as per project specifications along with all short review reports (at least 4 internal reviews) and corresponding evaluation comments.
6.	Every student should appear for a final external review exam to defend themselves.

Total Practical Hours   **45**

Course Outcome

CO1: understand the role that effective presentations have in public/professional contexts.
CO2: Gain experience in formal/ informal presentation.
CO3: Access information in a variety of ways appropriate to a discipline, including locating and using library collections and services and other search tools and databases
CO4: Obtain, select, store, create and use support materials appropriately
CO5: Ability to write technical documents and give oral presentations related to the work completed.

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PROFESSIONAL ELECTIVE I & II

Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA4301	TCP/IP	3	0	0	3

Course Objective	1. Understand the IP addressing schemes.
	2. Understand the fundamentals of network design and implementation
	3. Understand the design and implementation of TCP/IP networks
	4. Understand on network management issues
	5. Learn to design and implement network applications

Unit	Description	Instructional Hours
I	**INTRODUCTION** Internetworking concepts and architecture model – class ful Internet address CIDR – Sub netting and Supernetting – AARP – RARP – IP Routing – ICMP – IPV6.	9
II	**TCP** Services – header – connection establishment and termination – interactive data flow – bulk data flow – timeout and retransmission – persist timer – keep alive timer – futures and performance.	9
III	**IP IMPLEMENTATION** IP global software organization –routing table–routing algorithms – fragmentation and reassembly – error processing (ICMP) – Multicast Processing (IGMP).	9
IV	**TCP IMPLEMENTATION - I** Data structure and input processing – transmission control blocks – segment format – comparison– finite state machine implementation – Output processing – mutual exclusion –computing the computing the TCP Data length.	9
V	**TCP IMPLEMENTATION - II** Timers – events and messages – timer process – deleting and inserting timer event – flow control and adaptive retransmission– congestion avoidance and control – urgent data processing and push function.	9

Total Instructional Hours   **45**

Course Outcome	CO1 : Design and implement TCP/IP networks
	CO2 : Understand the IP addressing schemes and the fundamentals of network design and implementation
	CO3 :Develop data structures for basic protocol functions of TCP/IP
	CO4 : Understand the Design and implement network applications..
	CO5 : Design the data structures for maintaining multiple local and global timers.

REFERENCE BOOKS :

R1 - Douglas E Comer, "Internetworking with TCP/IP Volume one", Pearson Education 6thEdition 2013

R2 - W.Richard Stevens "TCP/IP Illustrated"Vol 1. Pearson Education, 2014

R3 - Forouzan, " TCP/IP Protocol Suite" Second Edition, Tata MC Graw Hill, 2010

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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA4302	SOFTWARE PROJECT MANAGEMENT	3	0	0	3

Course Objective
1. Match organizational needs to the most effective software development model and to Plan and manage projects at each stage of the software development life cycle (SDLC)
2. Create project plans that address real-world management challenges
3. Develop the skills for tracking and controlling software deliverables
4. To learn the cost estimation techniques during the analysis of the project.
5. To understand the quality concepts for ensuring the functionality of the software

Unit	Description	Instructional Hours
I	**INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT** Project Definition – Contract Management – Activities Covered By Software Project Management – Overview Of Project Planning – Stepwise Project Planning.	9
II	**PROJECT EVALUATION** Strategic Assessment – Technical Assessment – Cost Benefit Analysis – Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.	9
III	**ACTIVITY PLANNING** Objectives – Project Schedule – Sequencing And Scheduling Activities – Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity On Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.	9
IV	**MONITORING AND CONTROL** Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Prioritizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.	9
V	**MANAGING PEOPLE AND ORGANIZING TEAMS** Introduction – Understanding Behavior – Organizational Behaviour: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldman–Hackman Job Characteristics Model – Working In Groups – Becoming A Team – Decision Making – Leadership – Organizational Structures – Stress – Health And Safety – Case Studies.	9

Total Instructional Hours   **45**

Course Outcome

CO1: Understand the activities during the project scheduling of any software application.
CO2: Understand the risk management activities and the resource allocation for the projects.
CO3: Apply the software estimation and recent quality standards for evaluation of the software projects
CO4: Acquire knowledge and skills needed for the construction of highly reliable software project
CO5: Create reliable, replicable cost estimation that links to the requirements of project planning and managing

REFERENCE BOOKS :

R1- Bob Hughes and MikeCotterell "Software Project Management", Third Edition, TATA McGraw Hill Edition 2009.
R2. Royce, "Software Project Theory", Pearson Education, 2005.
R3.S. A. Kelkar, "Software Project Management: A Concise Study", PHI Learning, 2013

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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA4303	SOFTWARE TESTING	3	0	0	3

<table>
<tr><td rowspan="5">Course Objective</td><td>1. To introduce the concepts of Software bugs and its impact.</td></tr>
<tr><td>2. To understand the basic concepts, types and the way in which effective and efficient testing can be performed</td></tr>
<tr><td>3. To identify the issues in testing management and understand test planning.</td></tr>
<tr><td>4. To introduce various testing techniques along with software production.</td></tr>
<tr><td>5. To understand the standard principles to check the occurrence of defects and its removal.</td></tr>
</table>

Unit	Description	Instructional Hours
I	**INTRODUCTION** Testing as an Organization –Bugs– Software Bugs – Reasons for Bugs – Cost of Bugs – Responsibilities of Software Tester –Software Development Process: Product Component – Life Cycle Models – Testing Realities	9
II	**TESTING FUNDAMENTALS** Examining the Specification – Testing the Software with Blinders On – Examining the Code – Testing the Software with X Ray Glasses.	9
III	**TESTING TYPES** Configuration Testing - Compatibility Testing: Overview –Platform and Application Version – Standards and Guidelines – Foreign Language Testing: Translation Issues – Localization Issues – Configuration and Compatibility Issues – Usability Testing – **Web Site Testing:** Black Box Testing – Gray Box Testing – White Box Testing – Configuration and Compatibility Testing – Usability Testing– Functional(Regression) & Non-Functional(Performance) –Agile.	9
IV	**AUTOMATED TESTING AND TEST TOOLS** Benefits – Test Tools – Software Automation – Random Testing – Bug Bashes and Beta Testing: Test Sharing – Beta Testing – Outsourcing Your Testing – Testing for Software Security. **Test Documentation**: Planning your Test Effort: Goal of Planning – Planning Topics – Writing and Tacking Test Cases: Goal – Test Case Planning– Design – Cases – Procedures – Test Case Organization and Tracking	9
V	**REPORTING THE FINDINGS** Getting Bugs Fixed – Isolating and Reproducing Bugs – Bug Life Cycle – Bug Tracking System – Measuring the Success –KPI's & SLA's **Software Quality Assurance: A Case Study on Test Life Cycle**	9
	Total Instructional Hours	45

<table>
<tr><td rowspan="5">Course Outcome</td><td>CO1: To Understand the tester responsibilities and the software development process.</td></tr>
<tr><td>CO2:To Understand the fundamentals of testing to perform an effective and efficient testing</td></tr>
<tr><td>CO3: Test the software by applying testing techniques to deliver a product free from bugs</td></tr>
<tr><td>CO4: Perform automated testing using test tools and document the testing procedures</td></tr>
<tr><td>CO5: To Appreciate the bug tracking system and the importance of software quality assurance.</td></tr>
</table>

REFERENCE BOOKS:
R1- Ron Patton, Software Testing, Pearson Education, 2nd Edition, Sixteenth Impression,2011
R2-Elfriede Dustin, Effective Software Testing, Pearson Education, 2008
R3- Boris Beizer, Software Testing Techniques, Dream Tech Press, 2009.

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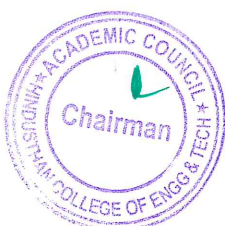| Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA4304	SOFTWARE QUALITY MANAGEMENT	3	0	0	3

Course Objective	1. To introduce the quality management process and its activities 2. To explain the standards and metrics of software. 3. To distinguish between the various activities of quality assurance, quality planning and quality control 4. To understand the importance of standards in the quality management process and their impact on the final product 5. To understand the principles of defect prevention and identify the defects in the software

Unit	Description	Instructional Hours
I	**INTRODUCTION** Quality Control & Assurance–Software Process Assessment - Overview – Assessment Phases – Assessment Principles – Assessment Conduct – Implementation Consideration – Quality Management – Quality Assurance Plan – Considerations –Verification and Validation.	9
II	**CONFIGURATION MANAGEMENT** Need for Configuration Management – Software Product Nomenclature – Configuration Management Functions – Baselines – Responsibilities – Need for Automated Tools – Plan –SCM Support Functions – The Requirement Phase Design Control – The Implementation Phase – Test Phase – SCM Tools – Configuration Accounting and Audit– Release Management Through Source Control.	9
III	**SOFTWARE STANDARDS AND INSPECTION** Definitions – Reason for Software Standards – Benefits – Establishing Standards – Guidelines – Types of Reviews – Inspection Objectives – Basic Inspection Principles – The Conduct of Inspection – Inspection Training.	9
IV	**TESTING AND MANAGING SOFTWARE QUALITY** Testing: Principles – Types – Planning – Development – Execution and Reporting –Tools & Methods – Real Time Testing – Quality Management Paradigm – Quality Motivation – Measurement Criteria – Establishing a Software Quality Program – Estimating Software Quality.	9
V	**DEFECT PREVENTION** Principles of Software Defect Prevention – Process Changes for Defect Prevention – Defect Prevention Considerations – Management Role – Framework for Software Process Change – Managing Resistance to Software Process Change – Case studies	9
	Total Instructional Hours	**45**

Course Outcome	CO1:Understand the concepts of quality control and quality management in software CO2: Understand the concept of software configuration management CO3: Analyze the different types of software standards for quality assurance CO4:Apply quality assurance tools and techniques to ensure software quality CO5:Illustrate quality assurance plans and prevent the defects in the software

REFERENCE BOOKS:

R1-Watts S. Humphrey, "Managing the Software Process, Addison Wesley, Nineteenth Impression", 2013

R2-Roger Pressman S, "Software Engineering: A Practitioner's Approach", 7th Edition, McGraw Hill, 2010.

R3 - Jeff Tian, "Software Quality Engineering: Testing, Quality Assurance and Quantifiable Improvement" ,wiley India, 2009

R4 - Chris Hawkins, Margaret Ross, Geoff , "Software Quality Management VI: Quality Improvement Issues", Springer 2012

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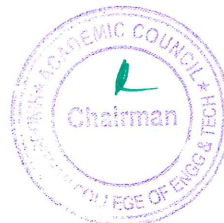Dean (Academics)
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Programme	Course Code	Name of the Course	L	T	P	C
MCA	16CA4305	CYBER SECURITY	3	0	0	3

<table>
<tr><td rowspan="5">Course Objective</td><td>1. Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.</td></tr>
<tr><td>2. Gain familiarity with prevalent network and distributed system attacks, defenses against them, and forensics to investigate the aftermath.</td></tr>
<tr><td>3. Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.</td></tr>
<tr><td>4. Understand the legal aspects of forensics</td></tr>
<tr><td>5. Recognize the state of the practice and the gaps in technology, policy, and legal issues.</td></tr>
</table>

Unit	Description	Total Instructional Hours
I	**DISK FORENSICS** Computer Forensics - Digital data – digital object – digital event – digital device- Hard disk – types of disc – Disk characteristics – file systems - Headers/Magic Numbers- Registry Forensics - Registry – registry data types –RegEdit - Data hiding.	9
II	**SOFTWARE FORENSICS** Live Forensics, Volatile Live Vs Offline Forensics, Artifacts - System Information - Linux ~ Windows – System commands - Network information – Network commands - Live Forensics scenarios- Obfuscation – code Obfuscation - data hiding in Images - Software Forensic challenges – Principles of Steganography.	9
III	**NETWORK FORENSICS** Network forensics - vulnerability analysis - Malware Concepts - Virus components- Function of replicator, concealer and dispatcher- Trigger Mechanisms- Virus families - worms & virus - sandboxing - Key Loggers - Port Scans – SYN flood - Email Forensics - email spoofing – Phishing – mail header analysis - Network forensics- Wireshark – Capture and Display Filters - pcap analysis- DoS – DDoS Attacks – types - Honey Pots - Forensic evidences - log analysis & evidence collection.	9
IV	**CYBER SECURITY INTRODUCTION** History - Critical Characteristics of Information - NSTISSC Security Model - Components an Information system - Securing the components - Balancing Security and Access - The SDLC - The Security SDLC.	9
V	**SECURITY INVESTIGATION AND ANALYSIS** Need for Security - Threats - Attacks – Legal - Ethical and Professional Issues. Risk Management: Identifying and assessing - Risk Assessing and Controlling Risk.	9

Total Instructional Hours   45

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	CO1:Understand and analyze the fundamentals of Disk forensics
Course	CO2:Understand and analyze the fundamentals of Software forensics
Outcome	CO3: Understand and analyze the fundamentals of Network forensics
	CO4:Understand and analyze fundamentals of cyber security and relationship between IT and forensics
	CO5:Understand and analyze the security investigation

REFERENCE BOOKS:

R1-Albert J Marcella, et al, Cyber forensics, 2nd edition, Auerbach, 2008
R2-Harlon Carvey, Windows Registry forensics, Syngress, 2011
R3-Andrew Hoog, Android forensics, Syngress,2011
R4-Michael E Whitman and Herbert J Mattord, "Principles of information Security", Vikas Publishing House, New Delhi,2003.

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Programme	Course code	Name of the course	L	T	P	C
MCA	16BA4352	ACCOUNTING AND FINANCIAL MANAGEMENT	3	0	0	3

Course Objective

1. To enable the students to study the basic accounting concepts and preparation of financial statements.
2. To enable the students to study the techniques of financial statement analysis
3. To enable the students to study the application of cost accounting technique to ascertain the cost of products or services
4. To enable the students to study the cost volume profit analysis and preparation of various budgets in the modern business
5. To enable the students to study the role of financial management in the modern business enterprise and the appraisal methods on capital assets

Unit	Description	Instructional hours
I	**FINANCIAL ACCOUNTING** Financial Accounting – Meaning and Definition. Accounting Concepts and conventions. Double entry principles of book keeping. Journal entry-Posting in to Ledger-Preparation of Trial Balance- Preparation of Final Accounts.	10
II	**FINANCIAL STATEMENT ANALYSIS** Analysis of financial statements -Techniques of Interpretation of financial statements-Comparative statement-Common size statement-Trend analysis-Ratio Analysis- Funds Flow -Cash Flow Analysis.	10
III	**COST AND MANAGEMENT ACCOUNTING** Definitions Cost Accounting and Management Accounting –Distinction between Financial Accounting with Cost Accounting and Management Accounting. Cost Terminology – functional classification of cost. Cost Centre- Cost Unit. Elements of Cost – Preparation of Cost Sheet	5
IV	**MARGINAL COSTING AND BUDGETARY CONTROL** Marginal costing - Marginal Costing. Equation-Contribution. Break Even Analysis-Breakeven point- applications of marginal costing- Meaning and need of budgetary control.-Different types of budgets- Preparation of budget -Cash budget- flexible budget and other budgets.	10
V	**FINANCIAL MANAGEMENT** Financial Management an overview. Objectives and functions of Financial Management-Concept of Time value of money- Techniques in computation of time value of money. Meaning and nature of Capital Budgeting Decision- Methods of appraisal capital budgeting. Non-discounted cash flow techniques and discounted cash flow techniques.	10
	Total instructional hours	45

Course Outcome

CO1: Students can able to understand the practice of preparation of financial statement in the modern business.
CO2: Students can able to understand the techniques on analysis of financial statement in the modern business
CO3: Students can able to understand the application of cost accounting techniques while computing the cost of products and services
CO4: Students can able to understand the cost volume profit analysis and preparation of various budgets in the modern business
CO5: Students can able to understand the role of financial management in the modern business enterprise and the appraisal methods on capital assets

Note : 50% Theory, 50 % Problems

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REFERENCE BOOKS :

R1- M.N. Arora, Accounting for Management, Himalaya Publishing House, New Delhi, 2016

R2- Dr.A.Murthy and Dr.S.Gurusamy, Management Accounting, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2015.

R3- Dr. V.R. Palanivelu, Financial Management, S. Chand & Company, New Delhi, 2016

R4- R.S.N.Pillai and V.Bagavathi, Financial Accounting, S.Chand publishing, New Delhi 2012.

R5- R.S.N.Pillai and V.Bagavathi, Management Accounting, S.Chand publishing, New Delhi 2012

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