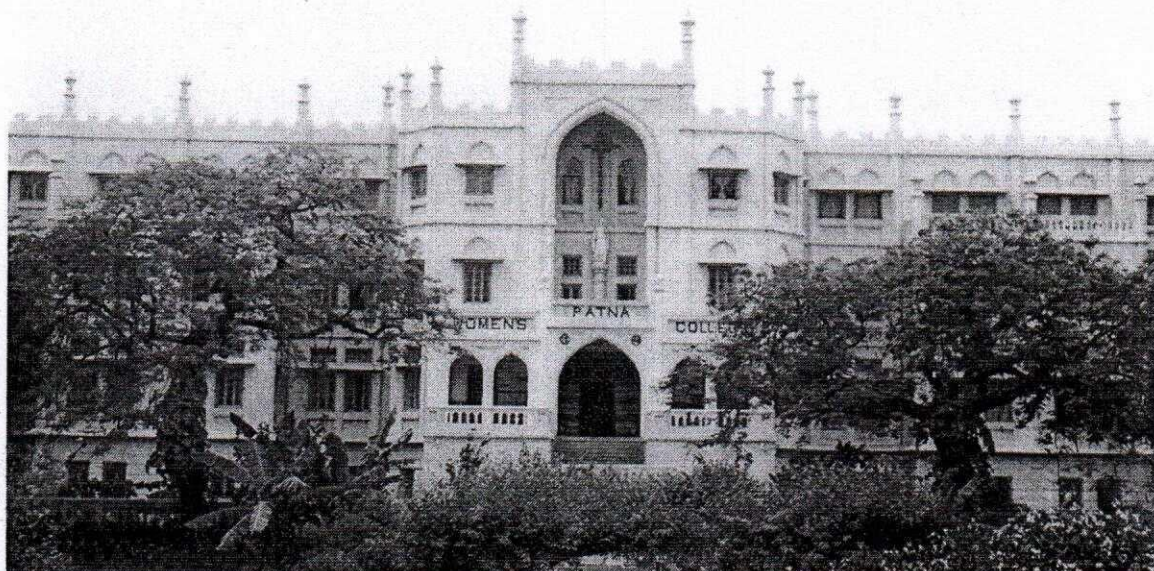


PATNA WOMEN'S COLLEGE, PATNA
(An Autonomous College of Patna University)



MASTER IN COMPUTER APPLICATIONS
(MCA)
(Syllabus)
Choice Based Credit System (CBCS)

(1st ACADEMIC COUNCIL MEETING – 22.09.2018 AT 02:00 P.M.)

MCA Details of CBCS Syllabus

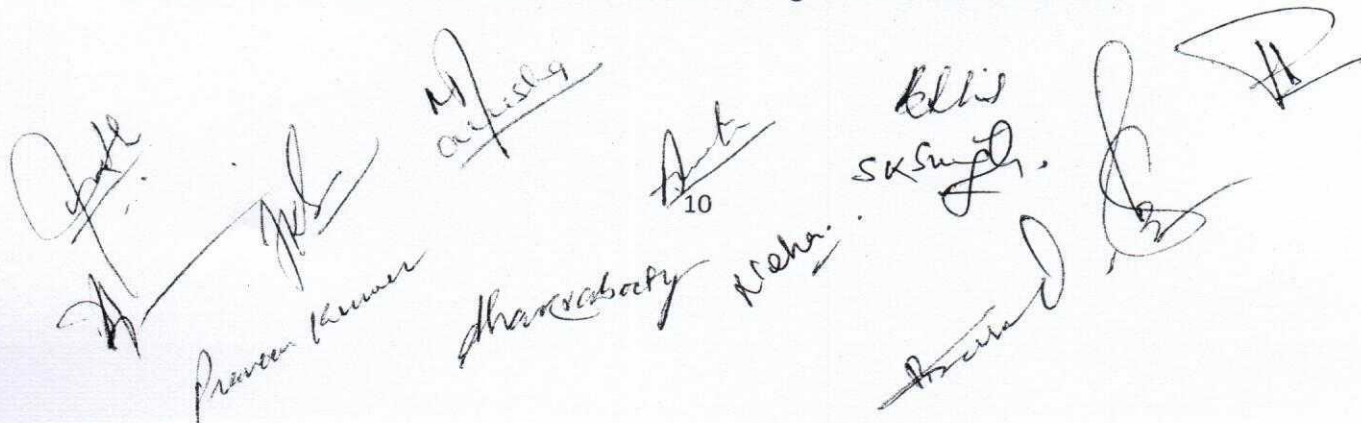
Semester – I

MCA CS1T01 : Digital Logic and Computer Design		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be Covered	No. of Hours
1	DIGITAL FUNDAMENTALS : Digital systems - Binary numbers – Octal - Hexadecimal conversions - Signed binary numbers – Complements - Logic gates - Boolean algebra- K-maps-Standard forms - NAND-NOR implementation.	15
2	COMBINATIONAL AND SEQUENTIAL CIRCUITS : Combinational circuits - Adder- Subtractor - ALU design – Decoder - Encoder – Multiplexers - Sequential circuits – Latches - Flip-flops – Registers – Memories – Up-down Counters.	15
3	PROCESSOR FUNDAMENTALS : Von-Neumann architecture- Processor – Definition – Structure – Category – Technology - ALU concept - Stored programs - Fetch execute cycle - Instruction formats - Clock rate instruction rate– Pipeline - Current processors - Multi core processors, Introduction to Assembly Language.	15
4	Memory : Physical memory – Addressing - Virtual memory - Address translation – Paging – Cache - L1-L2-L3 cache memories - Cache mapping – LRU replacement. DATA TRANSFER : Data transfer - Serial and Parallel data transfer - Full duplex - Half duplex interaction - Bus interface - Programmed I/O – Polling - Interrupt driven I/O - Hardware interrupt mechanism - Interrupt vectors - Multi level of interrupts – DMA - Buffer chaining - Operation chaining.	15
5	Assignment	15
	Total	75

Reading List :

1. Mano Marris, (2006), “*Digital Design*”, Fourth edition, PHI/Pearson,
2. Douglas E. Comer, (2012) “*Essentials of Computer Architecture*”, Sixth Edition, Pearson Education.
3. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, (2002), “*Computer Organization*”, Fifth Edition, Tata McGraw Hill.
4. Stallings William, (2006), “*Computer Organization and Architecture – Designing for Performance*”, Seventh Edition, Pearson Education.
5. Patterson David A and L. Hennessy John, (2005), “*Computer Organization and Design, The Hardware/Software Interface*”, Third Edition, Morgan Kaufmann / Elsevier.

10



Semester – I

MCA CS1T02 : Programming and Data Structure with C		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be Covered	No. of Hours
1	PROBLEM SOLVING & BASICS OF C PROGRAMMING: Introduction- The Problem-Solving Aspect- Top-Down Design- Implementation of Algorithms- Program Verification- The Efficiency of Algorithms- The Analysis of Algorithms. Introduction- Keywords- Identifiers- Basic Data Types in C- Variables- Constants – Input/ Output Statements in C – Operators in C – Conditional Branching Statements – Iterative Statements – Nested Loops – The Break and Continue Statements -Goto Statement. FUNCTIONS, ARRAYS AND STRINGS : Functions-Definitions - Prototypes – Passing Parameters to the Function – Scope of Variables – Storage Classes – Recursive Functions - Arrays – Declaration – Usage – Passing Arrays to Functions – Reading and Writing Strings – String Operations.	15
2	POINTERS AND AGGREGATE DATA TYPES : Pointer Variable Declarations and Initialization – Operators – Uses - Pointer Expressions and Pointer Arithmetic – Relationship between Pointers and Arrays – Arrays of Pointers – Pointers to Functions -Structures-Definition – Initialization – Unions – Bitwise Operators – Enumeration Constants. FILES AND PREPROCESSOR DIRECTIVES: Introduction to Files – Using Files in C – Read and Write Data with Files - Random Access Files – Types of Pre-processor Directives –#define -#include- Conditional Directives.	15
3	LINEAR DATA STRUCTURES – LIST, STACK & QUEUE : Abstract Data Types (ADTs) – List ADT – Array-Based Implementation – Linked List Implementation – Doubly-Linked Lists – Circular Linked Lists – Applications – Cursor-Based Implementation of Linked Lists – Stack ADT: Implementation of Stacks – Applications - Queue ADT: Implementation of Queues – Applications of Queues PRIORITY QUEUES : Queues: Model – Implementations – Binary Heap – Applications of Priority Queues – dHeaps – Leftist Heaps – Skew Heaps – Binomial Queues	15
4	HASHING : Hashing: General Idea – Hash Function – Separate Chaining – Open Addressing – Linear Probing – Quadratic Probing – Double Hashing – Rehashing – Extendible Hashing SORTING AND DISJOINT SET ADT : Lower Bound for Simple Sorting Algorithms – Shell Sort – Heap Sort – Sorting Large Structures – A General Lower Bound for Sorting – Bucket Sort – External Sorting – Disjoint Set ADT: Equivalence Relations – Dynamic Equivalence Problem Basic Data Structure – Smart Union Algorithms – Path Compression – Worst Case for Union-By-Rank and Path Compression	15
5	Assignment	15
	Total	75

Reading List :

1. Dromey R.G., (2013), "How to Solve it by Computer", Pearson Education.
2. Thareja Reema (2017), "Programming in C", OXFORD Higher Education Publication.
3. Kernigan Brian W., and Dennis M. Ritchie, (2011), "The C Programming Language", Prentice Hall.
4. Allen Weiss Mark, (2009), "Data Structures and Algorithm Analysis in C", Pearson Education.

Semester – I

MCA CS1T03: Software Engineering		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Introduction to Software Engineering: Characteristics of software - The Changing Nature of software – Legacy Software and Software myths – A Generic view of process – Software Engineering: A layered Technology and A process framework - Capability Maturity Model Integration - Process Models – Prescriptive models -Specialized Process Models and The Unified Process -An agile view of Process.	15
2	Requirements Analysis and Design : System Engineering - Requirements Engineering – Requirements Engineering Tasks - Initiating the Requirements Engineering Process-Eliciting Requirements – Building the Analysis Model - Analysis Modeling Approaches – Data Modeling Concepts and Scenario based Modeling and Flow Oriented Modeling– Design Engineering - Software Design Concepts- The Design Model	15
3	Testing Strategies and Tactics : Introduction to Testing - Definition of Testing Terminologies-Testing Strategies for Conventional Software-Validation Testing - System Testing - Debugging Process-Testing Tactics – White Box Testing - Black Box Testing - Testing for Specialized Environments Project Management, Estimation and Scheduling : Project Management Spectrum - The People and the Product- The Process and the Project -Metrics for Process and Projects-Estimation - The Project Planning Process – Resources - Decomposition Techniques - Empirical Estimation Models - Project Scheduling Concepts – Timeline charts and Tracking the Scheduling	15
4	Quality, Change and Risk Management: Reactive and Proactive Risk Strategies – Software Risks –Risk Identification and Risk Projection – Risk refinement and Risk Mitigation, Monitoring and Management - Quality Concepts -Software Quality Assurance -Software Reviews and Formal Technical Reviews -Statistical Quality Assurance -The Software Configuration Management and the SCM Repository -Business Process Reengineering - Reverse Engineering	15
5	Assignment	15
	Total	75

Reading List

1. Roger, S. Pressman (2004), *Software Engineering: A Practitioner Approach*, McGraw Hill International Edition, Sixth Edition, New Delhi (For 1 to 5 units).
2. Waman, S Jawadekar (2004), *Software Engineering: Principles and Practice*, McGraw Hill Education Pvt. Limited, New Delhi.
3. Rohit Khurana (2011), *Software Engineering-Principles and Practices*, Vikas Publishing House Pvt. Ltd., Second Edition, New Delhi.
4. Carlo Ghezzi, Mehdi Jazayari, Dino Mandrioli (1991), *Fundamentals of Software Engineering*, Prentice Hall of India, New Delhi.

Handwritten signatures and initials are present at the bottom of the page, including "SK Singh", "Bali", "H", "Aik", "Nehy", "Shanvi", and others.

Semester – I

MCA GITI : Principles of Management PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Management Fundamentals : Managerial Skills – planning, forecasting, Staffing, directing, controlling, Social responsibilities, Levels of Management, Roles & Skills Planning : purpose, principles, characteristics of a good plan, reasons of failures of plans Decision Making : Types of decisions, programmed & non programmed, operational & strategic, barriers in effective decision makings Delegation : Decentralization, accountability, barriers in effective delegation	15
2	Organizational Behaviour : organization, organizational structure, culture; Perception & Learning; Personality and values ; Theories of personality, trait theory, psychoanalytical theory, Introversion, Extroversion, Type A and B personalities Motivation : Positive & Negative Motivation; Theories of motivation – Mc Gregor's Participation Model theory X and theory Y, Maslow's Need Hierarchy theory, Herzberg's Two Factor theory, McClelland's Three Need theory Alderfer's ERG theory, Financial & Non-financial incentives	15
3	Leadership : Concept, Characteristics of good leadership, Leadership Styles, Likert's management Systems & Leadership, Trait Theory of Leadership, Behavioural Theory of Leadership Group Dynamics : Formal & informal groups, Clique, Group formation, Advantages & disadvantages of informal groups, Team Development, Team Spirit	15
4	Organizational Conflict Management : Dynamics of conflict, Resolution of conflict. Organizational Development : Concept; Change management Need for change, resistance to change; Theories of planned change.	15
5	Assignment	15
	Total	75

Reading List:

1. Koontz & Weirich, (2003), *Essentials of Management*, Tata McGraw Hill.
2. VSP Rao, V Hari Krishna – *Management: Text and Cases*, Excel Books.
3. Robbins. S. *Organisational Behaviour*, X edition., Prentice-Hall, India.
4. Hellinegal Slocum, Woodman, *Organisational Behaviour*, IX edn., Thomson learning.

Semester – I

MCA GIT2: Discrete Mathematical Structure

PWC (5 credits – 4 theory + 1 Assignment)

Unit	Topics to be covered	No. of hours
1	Statements: Defines, notion of propositions and examples. Connectives: Negation, disjunction, conjunction, conditional and bi-conditional Statement formulas and truth tables. Programming on mathematical logic. Formulas and tautologies: Well-formed formulas, tautologies, equivalence of formulas, duality laws and tautological implications, truth table. Normal forms: Disjunctive normal form, conjunctive normal form, principal disjunctive normal form, principal conjunctive normal form, ordering and uniqueness of normal forms. Different Notations: Completely parenthesized infix notation and Polish notation. Theory of inference for the statement calculus: validity using truth tables, rules of inference, consistency of premises and indirect method of proof, automatic theorem proving. Sets, Relations and Functions: Introducing Sets, Operations on sets, Relations, Functions	15
2	Combinatorics: Multiplication and Addition Principles, Permutations – Notations, Circular Permutations, Permutations of Objects and Necessarily Distinct, Combinations – Formula for $CC(n,r)$. Combination with Repetition, The Binomial Expansion, Pascal's Formula for $C(n,r)$, Some Identities Involving Binomial coefficients, The Multinomial Expansion, Applications, to Combinatorial Probability, Elements of Classical Probability Theory, Addition Theorem in Probability, Recurrence relations (nth order recurrence relation with constant coefficients, Homogeneous recurrence relations, Inhomogeneous recurrence relation), Generating function.	15
3	Boolean algebra: Definition and examples, sub-algebra, direct product and homomorphism. Boolean functions: Boolean forms, values of Boolean expressions and Boolean functions. Disjunctive and conjunctive normal forms. Boolean, expansion theorem, Representation and minimization of Boolean functions, design examples using Boolean algebra.	15

Handwritten signatures and marks at the bottom of the page, including "SK Singh", "14", and various other signatures.

4	A brief recap of Relations and ordering: Relations, binary relations, equivalence relations, partial ordering, partially ordered sets, Hasse Diagram Lattices: Definitions and examples, Lattices as partially ordered sets, some properties of lattices, lattices as algebraic systems, sub-lattices, direct product and homomorphism. Graphs: Graph terminology, types of graph connected graphs, components of graph, Euler graph, Hamiltonian path and circuits, Graph coloring, Chromatic number. Finite Automata: Basic concepts of Automation theory, Deterministic finite Automation (DFA), transition function, transition table, Non Deterministic Finite Automata (NDFA), Mealy and Moore Machine, Minimization of finite Automation.	15
5	Assignment	15
	Total	75

Reading List:

1. Tremblay and Manohar, (2008), "*Discrete Mathematical Structures*", Tata McGraw Hill
2. Semyour Lipschutz, Patil Varsha, (2010), "*Discrete Mathematics*" IInd Edition Schaum's Series TMH
3. Basavaraj S Anami, Venkanna S Madalli, (2016), *Discrete mathematics A Concept –based Approach*, University Press
4. Norman Biggs, *Discrete Mathematics*, Second Edition, Pearson Publication.



 The block contains several handwritten signatures in black ink. Some of the legible names include 'S.K. Singh', 'Pearson Kumar', 'B. S. Anami', 'V. S. Madalli', 'N. Biggs', and 'S. Manohar'. There are also some less legible signatures and initials.

Semester – I

MCA CS1L04 : Mini Project Using C		
PWC (3 credits: 2 Practical + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	The C projects enlisted below are mini projects, mini games, and small applications. Most of these projects utilize functions, file handling, and data structure effectively. Try to analyze and understand the source code of these projects, and you'll learn how to add, modify, view, search and delete data using file to create a similar project.	15
2	<ul style="list-style-type: none">• Bank Management System• Calendar Application• Contact Management System• Cricket Score Sheet• Customer Billing System• Cyber Management System• Department Store Management System• Employee Record System• Hangman Game• Hospital Management System• Library Management System• Phonebook Application• Quiz Game• Typing Tutor etc.	15
3	Assignment	15
	Total	45

SK Singh
Ramesh Kumar
Prasad
Neha
Adi
Blhs
Alfiah
Shivraj

Semester – I

MCA SE1L01 : Word Power, Business English and Group Discussion		
PWC (2 credits : 2 Practicals)		
Unit	Topics to be covered	No. of hours
1	Introduction to Communication: Need & Components of Effective Communication -Conviction, confidence & enthusiasm, Listening. Oral/spoken communication skill & testing -voice and accent, voice clarity, voice modulation & intonation, word stress, etc. Communication Process & Handling: Feedback & questioning technique, KISS (keep it short & sweet) in communication – Composing effective messages. Non – Verbal Communication: its importance and nuances: Facial Expression, Posture, Gesture, Eye contact, appearance (dress code).	10
2	Business Writing: Principles of Business Writing, Types of Business Writing, Business Letters, Business Letters: Format and Style, Types of Business Letters.	10
3	Interview Skills: Types of Interviews; ensuring success in job interviews; Appropriate use of non-verbal communication Group Discussion: Differences between group discussion and debate; Ensuring success in group discussions. Team building practices through group exercises, team task /Role play, Ability to Mixing & accommodation, Ability to work together.	10
	Total	30

Reading List:

1. Bovee, Courtland, L., John V. Thill and Barbara E. Schatzman., (2004), *Business Communication Today*, Seventh Edition. Delhi: Pearson Education.
2. Lesikar, Raymond V and Marie E. Flatley, (2002), *Basic Business Communication: Skills for Empowering the Internet Generation*, Ninth Edition. New Delhi: Tata McGraw-Hill Publishing Company Ltd.

SK Singh,
Praveen Kumar
Arundhati
Sharmada
Neha
Bliss
Ant
M/
17

Semester – I

MCA SE1L02 : Lab on Business Data Processing with Office Automation		
PWC Package		
(2 credits : 2 Practicals)		
Unit	Topics to be covered	No. of hours
1	<u>Excel Syllabus</u> Introduction to Excel Building Formula and Function Function Categories: Mathematical, Statistical, Financial, Date & Time, Logical, Text Charting Data: What is Chart? Chart elements, Chart types Creating chart using: Chart tools on the Chart toolbar, The Chart Wizard, Modifying Chart, Printing Chart Sharing and Managing Data: What is a List? Creating a list, Sorting data, Filtering data <ul style="list-style-type: none">• Auto filter• Advance filter Excel Analysis Tools: Goal Seek, Scenario Manager Analysing and Organizing data Analysing data using What-if analysis <ul style="list-style-type: none">• Using a one-input data table• Using a two-input data table Subtotal command, Creating Pivot table Printing a Workbook	15
2	<u>Word Syllabus</u> <ul style="list-style-type: none">• Editing Features, Spell Check, Thesaurus, Auto Correct, Create Your Own Default Dictionary in MS Word, Check Word Count, Track Changes, Page View, Zoom• Paragraph Formatting• Tables, Lists, Bulleted and Numbered Lists, Creating a Nested List• Page Formatting• Inserting Graphics, Pictures, and Table of Contents, Watermarks• Advanced Tools<ul style="list-style-type: none">○ References and Citations, How to Insert Citations, Adding a Bibliography, Adding Footnotes, Macros, Compare and Merge Documents, Protect Document, Mail Merge	15
	Total	30

Semester – II

MCA CS2T05 : Object Oriented Programming		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	<p>Introduction to Java Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting, Java Methods (Defining, Scope, Passing and Returning Arguments, Type Conversion and Type and Checking, Built-in Java Class Methods),</p> <p>Arrays, Strings and I/O : Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System.out and the Scanner class, Byte and Character streams, Reading/Writing from console and files.</p>	15
2	<p>Object-Oriented Programming Overview Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection.</p> <p>Inheritance, Interfaces, Packages, Enumerations, Autoboxing and Metadata Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net), Wrapper Classes, Autoboxing/Unboxing, Enumerations and Metadata.</p>	15
3	<p>Exception Handling, Threading, Networking and Database Connectivity Exception types, uncaught exceptions, throw, built-in exceptions, Creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Using java.net package, Overview of TCP/IP and Datagram programming. Accessing and manipulating databases using JDBC.</p>	15

Praveen Kumar
Sachin Singh
19
Anshu
Neha
Bhish
Anshu
Anshu

4	Applets and Event Handling Java Applets: Introduction to Applets, Writing Java Applets, Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms, Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using the AWT controls, Swing components of Java Foundation Classes such as labels, buttons, textfields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts. Overview of servlets.	15
5	Assignment	15
	Total	75

Reading List:

1. Schildt Herbert (2007), Seventh Edition, *Java: The Complete Reference*, The McGraw-Hill, New Delhi.
2. S. Horstmann, Cornel Gray I (2001), *Core Java 2 Volume In, Fundamentals*, Addition Wesley, New York.
3. Arnold and Gosling, J. (2000), 2nd Edition, *The Java Programming Language*, Addition Wesley, New Delhi.
4. Gittleman Art (2002), *Ultimate Java Programming*, Wiley Publications, New York.
5. Schildt Herbert (2007), *Java: The Complete Reference*, The McGraw-Hill, Eight Edition, New Delhi.

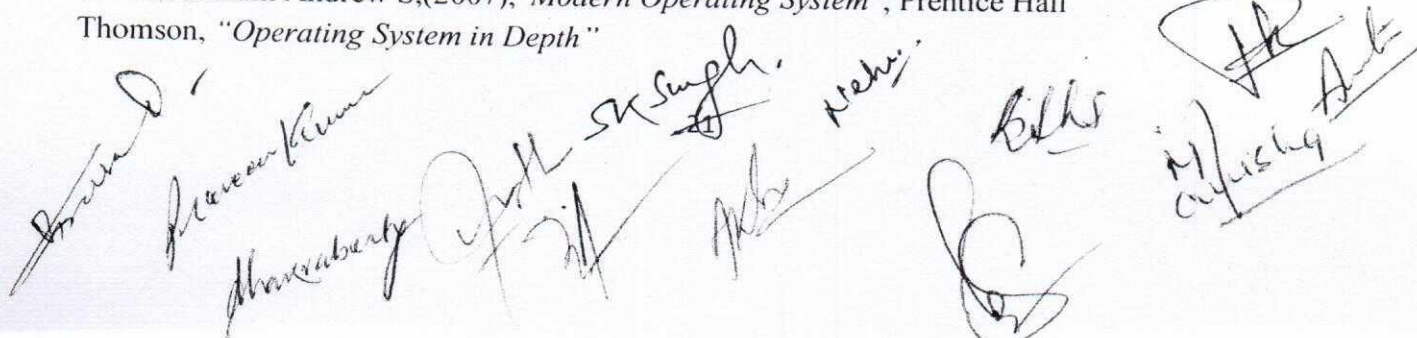
Praveen Kumar
 Anurag
 S.K. Singh
 Neha
 B.L.S.
 M. Jishu
 Anil

Semester – II

MCA CS2T06 : Operating System and Shell Programming PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Processes & Threads OS Definition, features and functionalities, Logical View , User View, Concept of System Calls & System Programs, Concept of OS structure, Concept of Virtual Machine Process Management: Process Concept, Process Control Block, Process operations: Create, Kill, suspend, Inter-process Communication, IPC types, IPC in Client-Server, RTOS, Case Study: IPC in LINUX, Threads: Multithreading Models- threading issues.	15
2	Process Scheduling : Scheduling Concept, Scheduling Criteria, Scheduling algorithms, Numerical exercise based on algorithms, Scheduling Evaluation, Case study: Process scheduling in LINUX Process Synchronization –Critical Section problem – Semaphores-Classical problems of synchronization-critical regions-Monitors-Deadlock Characterization-Deadlock handling-Deadlock Prevention-Deadlock avoidance-Deadlock Detection-Deadlock	15
3	Memory Management -Swapping-Contiguous Memory allocation-Paging-Segmentation-Virtual Memory-Demand paging-Page Replacement-allocation of frames-Thrashing. Case study: Memory Management in LINUX File management & I/O Systems : File Structure, File Attributes, Operations, types, Protection & Access Control I/O Hardware (Polling, Interrupt-driven I/O, DMA), Application I/O Interface, Kernel I/O Subsystem	15
4	Disk Management Disk Structure, Disk Scheduling algorithm: FCFS, SSTF, SCAN Algorithm, LOOK Algorithm, C-SCAN, and C-LOOK Algorithms, Numerical exercise based on Disk algorithms, Disk management, Swap Space concept and Management, RAID structure Introduction to Shell Scripting.	15
5	Assignment	15
	Total	75

Reading List:

1. Chauhan Naresh ,(2016), "Operating System", Oxford University Publication
2. Silberschatz Abraham,(1982), "Operating System Concepts"
3. Tanenbaum Andrew S,(2007),"Modern Operating System", Prentice Hall Thomson, "Operating System in Depth"


 A collection of handwritten signatures in black ink, likely belonging to the faculty members who approved the syllabus. The signatures are written in a cursive style and are scattered across the bottom of the page.

Semester – II

MCA CS2T07 : Automata Theory		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Theory of Automata: Definition of an automaton, Transition system, Acceptability of a string by FA, Nondeterministic finite state machine, equivalence of DFA and NDFA, Mealy and Moore models. Minimization of Finite Automata.	15
2	Formal Languages, Regular Sets and Regular Grammars: Definition, Languages and their relation, Chomsky classification of language, Recursive and recursive enumerable Sets, Regular expression. and Finite automaton, Pumping Lemma for regular sets, Application of Pumping lemma, Closure property of regular sets, Regular sets and regular grammar.	15
3	Context-free Language: Context free language and derivation trees, ambiguity in context free languages. Simplification of context free languages: (left recursion, unit production elimination, eliminating null values), Normal forms of context free languages, Pumping lemma.	15
4	Pushdown Automation: Definition, Acceptance by PDA, Push down automation and Context free languages. Parsing and Pushdown automata. Turing Machine: Turing Machines model, Representation of TM, Languages acceptability by TM, design of TM. Universal Turing Machines (UTM). Turing machine and type, grammars, Halting problem, Linear bounded automata and languages.	15
5	Assignment	15
	Total	75

Reading List:

1. Hopcraft, Motwani and Ullman. *Introduction to Automata Theory. Languages and Computation*, PE.
2. Cohen, *Introduction to Computer theory*, John Wiley.
3. Martin, *Theory of Computation*, TMH.
4. Papadimitriou, *Elements of the Theory of Computation*, PHI.

Semester – II

MCA GI2T3: Management & Information System And E-Commerce		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Management system: Organization, Types of Organization, Types of Management system, Levels of Management, Management System Requirement, Role of MIS, Objectives, characteristics, Components of MIS, System- Information System: classification, characteristics, Information Resource Management: Objective, component, Information System: TPS, MIS, ISS, OAS, Data Processing, Introduction to DBMS: objectives, components	15
2	Decision Support System: Types of Decision, Decision making process and MIS, Decision support system: DSS Definition, characteristics, Types of DSS, DSS components, DSS functions DSS Model: Development of DSS, DSS Applications, Group DSS Portfolio Management & IT application: Portfolio Management Concept, Portfolio Management Method, Design and Implementation of Portfolio management, Tools and Techniques.	15
3	Management Function and Business process: Sale and Order processing, Finance & Budgeting, Human Resource Management, Production Plan & Control, Marketing Enterprise Resource Plan (ERP): Evolution of Enterprise Information System, Concept of ERP, Supply Chain Management, Customer Relationship Management, ERP Design and Implementation, ERP tools : SAP, iCUBE.	15
4	Introduction, Advantages and Disadvantages of E-commerce, Traditional commerce vs. E-commerce, Growth of E-Commerce, E-Commerce Models, Electronic payment Systems, E-Customer Relationship Management, E-Supply Chain Management, security Issues in E-Commerce	15
5	Assignment	15
	Total	75

Reading List:

1. Laudon K.C. and Laudon J.P., *Management Information System (Managing the Digital firm)* PHI.
2. Sadagopan S., *Management Information System*, TMH

23

Handwritten signatures and initials are present below the reading list, including names like Anurag, SK Singh, and others.

Semester – II

MCA GI2T4 : Statistical and Numerical Computing		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Basic statistics: Measure of central tendency, dispersion. Probability' distribution, introduction to mass function, density function, distribution function, estimation of parameters. Regression Analysis: Linear and Non linear regression. Multiple regression Testing of Hypothesis: Test of Significance, Chi-square test, t-test, ANOVA, F-test.	15
2	Interpolation: Newton's Forward, Backward, Sterling & Bessel's Interpolation formula. Lagrange's Interpolation.	15
3	Integration: Trapezoidal, Simpson's 1/3rd, Weddel's Rule, Romberg integration. Gauss-Legendre two & three point formula, Newton cotes Formula. Gram-Schmidt orthogonalisation, Tchebycheff Polynomial.	15
4	Solution of transcendental and system of linear equations: Method of Iteration, Method of Bisection. Newton - Raphson Method, Regula-Falsi method. Secant Method; Gauss Elimination Method, Gauss-Jacobi, Gauss-Seidel' LU factorization, Tridiagonalisation, Inverse interpolation. Least Square curve fitting: linear & non-linear. Solution of Differential Equations: Picard's method, Euler-modified method, Taylor's Series method, Runge-Kutta method, Milne's Predictor-Corrector method.	15
5	Assignment	15
	Total	75

Reading List:

1. Pal, *Numerical Methods*, OUP
2. Balaguruswamy. *Numerical and Statistical Methods*, TMH
3. V. Rajaraman, "*Introductory methods of Numerical Analysis*", PHI.
4. A.M. Goon, M.K. Gupta and T.S. Dasgupta, "*Fundamental of Statistics*", The World Press Pvt. Ltd.

Semester – II

MCA CS2L08 : Mini Project using Java		
PWC (3 credits: 2 Practical + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Apply concept of Java & DBMS to develop mini project such as: 1) IT Infrastructure Management System 2) Inventory Management System 3) Student Management System 4) HR Management System 5) Library Management System	30
2	Assignment	15
	Total	45

Manvraj Singh
Ramendra Kumar
Pradeep - SK Singh
Abhishek
Belhar
Alka Singh
Neelam

Semester – II

MCA SE203 : Personality Development & Inter Religious Values		
PWC (2 credits: 2 Practical)		
Unit	Topics to be covered	No. of hours
1	Nature and Need of Inter-Religious study, Scope of Comparative Religion.	05
2	Salient Features of Hinduism, Jainism and Buddhism, Salient Features of Christianity, Islam, and Sikhism	10
3	Similarities and Differences among Religions, Conflicting Truth claim of different religions and inter-religious Harmony	10
4	Religious Tolerance, Secularism	05
	Total	30

Reading List:

1. Chudhary, C. Neeraj (1979). "Hinduism", B.I. Publication, New Delhi.
2. Devraj, N.K., (1917)- "Hinduism and Christianity" Asian Publishing House.
3. Gordh, Geo rge, -"Christian Faith and its Cultural Expression", Printed in USA.
4. Hick, John,- "Philosophy of Religion", Prentice Hall of India.
5. Hopfe, M. Lewis (1983)- "Religion of the World", Macmillan Publishing Co. Inc, New Yourk.
6. Masih, Y. (1990)- "Comparative study of Religion", Motilal Banarsidass.
7. Seth, S. Arijit, Pummer, Reinhard, (1979)- "Comparative Religion", Vikas Publishing House Pvt. Ltd. Delhi.
8. Singh, B.N. (1994)- "Vishwa Dharma Darshan ki Samasyain", Ratna Printing Works.
9. Tiwari, Nath Kedar, (1983)- "Comparative Religion", Motilal Baransidass.
10. Ward,CHS (1998)- "Early Buddhism", Caxton Publication, Delhi.

Semester – II

MCA SE2L04 : Lab on Responsive Web Designing		
PWC (2 credits: 2 Practical)		
Unit	Topics to be covered	No. of hours
1	HTML Basics, HTML5 Semantic Elements, CSS, CSS3, Responsive Websites, Viewport, Bootstrap - Grid System, Typography, Navigation bar, Carousal, Glyphicons, Tables, Images, Tabs, Modal, Using JavaScript, Using jQuery	30
	Total	30

[Handwritten signatures and initials]

Manvabarty
S. Singh
Ravi Kumar
B. Singh
Neha
M. Singh
A. Singh



DEPARTMENT OF MCA

PATNA WOMEN'S COLLEGE, PATNA

(An Autonomous College, affiliated to Patna University)

Avila Convent, Bailey Road, Patna – 800 001, Bihar, India

Tel: 0612-2531186

BOARD OF STUDIES MEETING

14th September, 2018

A meeting of Board of Studies of Department of Master of Computer Applications,

Patna Women's College, Patna was held on **14th September, 2018** at **01:30 p.m.** in the Departmental Staff room of the College.

Agenda of the meeting were as under:

1. Approval of the Choice Based Credit System (CBCS) syllabus for Core Course (CC) / Generic Inter Disciplinary (GI) / Discipline Specific Elective (DSE) / Skill Enhancement Lab Course (SEL) for Semester I and II according to the Choice Based Credit System suggested by UGC, New Delhi.
2. Approval of the list of Examiners.
3. Any other

Following members of the Board of Studies were present:

1. Prof. S.K Singh (Expert recommended by P.U.)
2. Prof. A.K. Nayak (Subject Expert from outside the Parent University)
3. Dr. Prabhat Kumar (Subject Expert from outside the Parent University)
4. Mr. S. K Srivastava (Representative from Industry/Corporate Sector)
5. Ms. Neha (Alumnus 1st Batch)
6. Dr. Bhawna Sinha
7. Ms. Sushmita Chakraborty
8. Ms. Manisha Prasad
9. Ms. Amrita Prakash
10. Mr. Praveen Kumar
11. Mr. B.K Prasad
12. Mr. Amitabh
13. Mr. Ajit Kumar Singh

S.K. Singh

A.K. Nayak

Dr. Prabhat Kumar

Mr. S.K. Srivastava

Ms. Neha

Dr. Bhawna Sinha
14/9/18

Ms. Sushmita Chakraborty
14/9/18

Mr. Praveen Kumar
14/9/18

Mr. B.K. Prasad
14/9/18

Mr. Amitabh
14/9/18

Mr. Ajit Kumar Singh
14/9/18



DEPARTMENT OF MCA

PATNA WOMEN'S COLLEGE, PATNA

(An Autonomous College, affiliated to Patna University)
Avila Convent, Bailey Road, Patna – 800 001, Bihar, India
Tel: 0612-2531186

Resolutions:

1. Resolved that syllabus for Semester I and Semester II, both for Core Course (CC) / Generic Inter Disciplinary (GI) / Discipline Specific Elective (DSE) / Skill Enhancement Lab Course (SEL), as prescribed by UGC, New Delhi be adopted with minor changes.

- The nomenclature of the papers of Semesters-I were suggested as :

MCA CS1T01	: Digital Logic & Computer Design	: 5 credits	100 mks
MCA Cs1T02	: Programming & Data Structure with C	: 5 credits	100 mks
MCA CS1T03	: Software Engineering	: 5 credits	100 mks
MCA CS1L04	: Mini Project using C (No Change)	: 3 credits	100 mks
GI1T1	: Principles of Management	: 5 credits	100 mks
GI1T2	: Discrete Mathematical Structure (No Change)	: 5 credits	100 mks
SE1L01	: Word Power, Business English & Group Discussion	: 2 credits	50 mks
SE1L02	: Lab on Business Data Processing with Office Automation	: 2 credits	50 mks

- The nomenclature of the papers of Semesters-II were suggested as :

MCA CS2T05	: Object Oriented Programming	: 5 credits	100 mks
MCA CS2T06	: Operating System & Shell Programming	: 5 credits	100 mks
MCA CS2T07	: Automata Theory	: 5 credits	100 mks
MCA CS2L08	: Mini Project using Java	: 3 credits	100 mks
GI2T3	: Management Information System & E-Commerce	: 5 credits	100 mks
GI2T4	: Discrete Mathematical Structure (No Change)	: 5 credits	100 mks
SE2L03	: Word Power, Business English & Group Discussion	: 2 credits	50 mks
SE2L04	: Lab on Business Data Processing with Office Automation	: 2 credits	50 mks

No Change in Skill Enhancement Lab papers. That can be considered as value addition.

2. Resolved that syllabus for rest of the semesters be discussed and finalised in the next Board of Studies (BoS) meeting when the College Management spells out. The dates for the same.
3. Resolved the list of Examiners for Semester I and Semester II, both for Core Course (CC) / Generic Inter Disciplinary (GI) / Discipline Specific Elective (DSE) / Skill Enhancement Lab

Course (SEL). List of examiners is attached herewith.

Signatures of All Present

SK Singh
14.09.2018

[Signature]
14/9/2018

[Signature]
14/9/2018

[Signature]
14/9/18

[Signature]
14/9/18

[Signature]
14/9/18

[Signature]
14/9/18

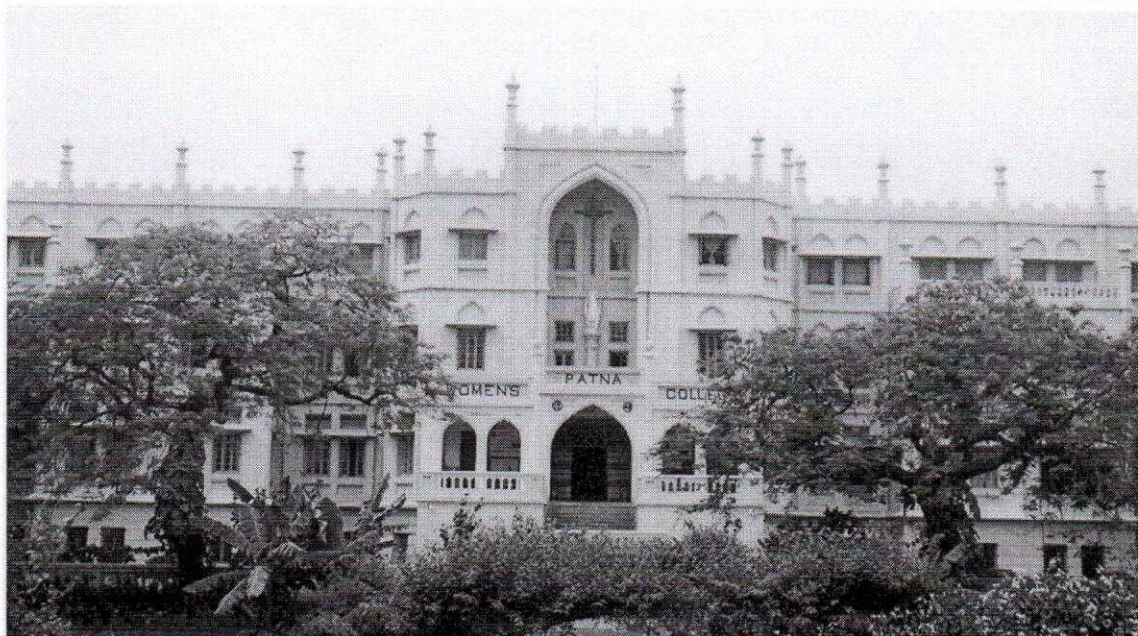
[Signature]
14/9/18

[Signature]
14/9/18

[Signature]
14/9

[Signature]
14/9/18

PATNA WOMEN'S COLLEGE, PATNA
(An Autonomous College of Patna University)



MASTER IN COMPUTER APPLICATIONS
(MCA)
(Syllabus)
Choice Based Credit System (CBCS)

(2nd ACADEMIC COUNCIL MEETING – 13.02.2019 AT 02:00 P.M.)

SYLLABUS
for
Choice Based Credit System
(CBCS)

**MASTER OF COMPUTER
APPLICATIONS (MCA)**

PATNA WOMEN'S COLLEGE
Autonomous
PATNA UNIVERSITY

3rd Cycle NAAC Accredited at 'A' Grade with CGPA 3.58/4
"College with Potential for Excellence" (CPE) Status Accorded by UGC

Semester – III

MCA CS3T09: Web Technologies using J2EE		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Web Programming : Concept of JDBC (Java Database Connectivity), working with SQL, Stored Procedure, Security in Java, Class loader, Byte code Verification, security Manager and permission, Digital Signatures, Code Signing, Encryption. Introduction to J2EE : Its advantage, Enterprise Architecture Types, Understanding EJB, its architecture, EJB Roles, Benefits and limitations of Enterprise Beans. Session Beans: Stateful and Stateless Beans, Entity Beans, Beans Managed Persistence, Container Managed Persistence.	15
2	Advanced Web technology in J2EE: Understanding Directory Services and JNDI, Introduction to LDAP, LDAP operation, working with LDAP Server, Introduction to Web Containers and Web Applications, Introduction to HTTP protocol, Web Application Life Cycle.	15
3	Creating Web Application: Understanding Servlet programming, its Life-Cycle, Servlet Configuration, Understanding Servlet sessions. Understanding of JSP and JSTL, JSP documents, Elements, tag extensions, tag libraries, validation, translation time mechanism, translation-time classes. Understanding JavaServer Pages Standard Tag Library, tags in JSTL, core tag library, XML tag library, using Internationalization Actions,	15
4	Web Application Deployment and Authentication: Enterprise Application Development Process, Deploying Web Application, Understanding CLASSPATH, Securing Web Applications, basic authentication with JAX-RPC Example, Client Certificate Authentication over HTTP/SSL	15
5	Assignment	15
	Total	75

Reading List:

1. Shah Deven N (2012), "A Complete Guide to Internet and Web Programming", Dream Tech Press, New Delhi
2. Kama Raj I (2002), "Internet and Web Technologies", Tata Mc Graw Hill, New Delhi.
3. Young Margaret Levine (2002), "Internet the Complete Reference", Tata McGraw Hill, Second Edition, New Delhi.

[Signature]
12/1/19
[Signature]
12/1/19

[Signature]
12/1/19
[Signature]
12/1/19
[Signature]
12/1/19

[Signature]
12/1/19
[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/2019
[Signature]
12/1/19

Semester – III

MCA CS3T10: Advance Database Management System		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Introduction: Database & Database Users, Characteristics of the Database Systems. Concepts & Architecture, Date Models: hierarchical, relational and network, Schemas & Instances, DBMS Architecture & Data Independence Data Modelling using the Entity-Relationship Approach, Attributes, Tuple, Domain Constraints, key constraints, Integrity constraints, Database Design , Conceptual Design ERD Logical Design Schema, subschema, Relational Data Model & Relational Algebra (Union, Intersection, Cartesian product, Difference), Relational Model Concepts , Relation Operation(SELECT, PROJECT, JOINS DIVISION)	15
2	Structured Query Language: DBMS tools: SQL - A Relational Database Language (DDL, DML, DLC) , View & Queries in SQL, DBMS Applications: ORACLE/a Relational Database Management Systems ORACLE/INGRES, PL/SQL, Case studies on ER diagram, Normalization and SQL	15
3	Relational Data Base Design: Function Dependencies & Normalization for Relational Databases, Data Redundancy, Functional Dependencies, Normal forms based on primary keys (1NF, 2NF, 3NF & BCNF), Boyce-Codd Normal Form. Lossless Join & Dependency perserving decomoposition, Physical Design: (File Organization, Heap Organization Sequential Organization, Index File, ISAM, VSAM), Query Processing and Optimization	15
4	Database Transaction Management: Concurrency Control Techniques & Recovery Techniques: Locking Techniques ,Time stamp ordering, Granularity of Data items, Database Security & Recovery Techniques ,Recovery concepts, Database backup and recovery from catastrophic failures	15
5	Assignment	15
	Total	75

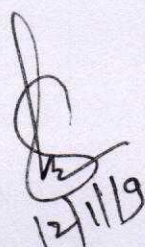
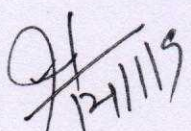
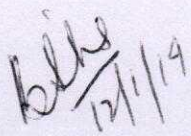
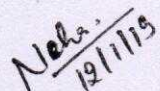
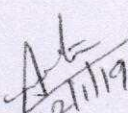
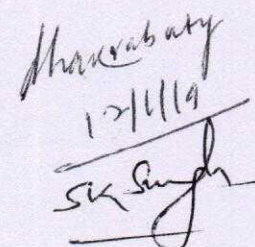
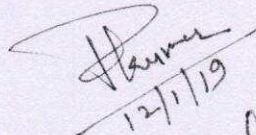
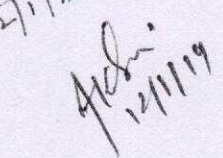
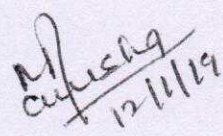
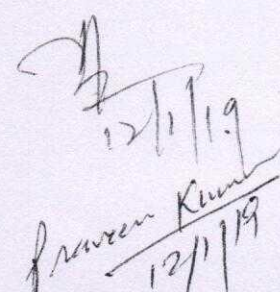
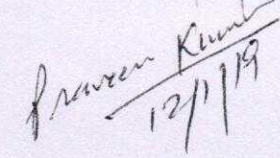
Reading List:

1. Date C.J., Kannan A., Swamynathan S., *Introduction to Database System*
2. Gehani Narain & Annamalai Melliyal, *The Database Book Principles & Practice using the Oracle Database System*
3. Byrass, *SQL/PL/SQL~Prog. Language of Oracle*, BPB Pub

25

Semester – III

MCA CS3T11: Design & Analysis Of Algorithm		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Basics of Algorithms and Mathematics: What is an algorithm? Mathematics for Algorithm Analysis of Algorithm: The efficient algorithm, Average, Best and worst case Asymptotic Notations, Analyzing control statement, Loop invariant and the correctness of the algorithm, Sorting Algorithms and analysis: Bubble sort, Selection sort, Insertion sort, Shell sort Heap sort, Sorting in linear time: Bucket sort, Radix sort and Counting sort	15
2	Divide and Conquer Algorithm: Introduction, Recurrence and different methods to solve recurrence Knapsack Problem DP solution, Activity selection problem DP solution, All pairs shortest paths, Traveling salesman problem. Dynamic Programming: Introduction, The Principle of Optimality, Problem Solving using Dynamic Programming, Knapsack Problem DP solution, Activity selection problem DP solution, All pairs shortest paths, Traveling salesman problem, Merge Sort, Strassen's matrix multiplication.	15
3	Greedy Algorithm : General Characteristics of greedy algorithms, Problem solving using , Greedy Algorithm -Activity selection problem, Elements of Greedy Strategy, Minimum Spanning trees (Kruskal's algorithm, Prim's algorithm), Graphs: Shortest paths, The Knapsack Problem, Job Scheduling Problem, Huffman code Graphs: An introduction using graphs and games, Undirected Graph, Directed Graph, Traversing Graphs, Depth First Search, Breath First Search, Topological sort, Connected components, Euler Tour, Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm, Single Source Shortest Path. Backtracking and Branch and Bound: Introduction, The Eight queens problem , Knapsack problem, Travelling Salesman problem, Minimax principle	15

 12/1/19
 12/1/19
 12/1/19
 12/1/19
 12/1/19
 12/1/19
 12/1/19
 12/1/19
 12/1/19
 12/1/19
 12/1/19

4	Randomized Algorithms and Amortized Analysis: Basics ideas of randomized Algorithms (Las Vegas and Monte Carlo types), Simple examples (Randomized Quick sort and its analysis, Min-Cut algorithm and its analysis), Amortized analysis and its significance (Illustration through examples). Introduction to NP-Completeness: The class P and NP, Polynomial reduction, NP-Completeness Problem, NP-Hard Problems Travelling Salesman problem, Hamiltonian problem, Approximation algorithms.	15
5	Assignment	15
	Total	75

Reading List:

1. Cormen, Thomas H., Charles E., Leiserson, Ronald L. Rivest, and Stein, Clifford, "Introduction to Algorithm", PHI
2. Aho, A.V., Hopcroft, J.E. and Ullman J.D., "The Design and Analysis of Computer Algorithms", Pearson Education.
3. Harris Simen, Ross James, "Beginning Algorithms", Wiley India.
4. Johansonbaugh Richard, and Schaefer Marcus, "Algorithms", Pearson
5. Baase, S., "Algorithms-Introduction to Design and Analysis", Pearson Education.
6. Wilf, H.S. "Algorithms and Complexity", PHI

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19
[Signature]
12/1/19

Semester – III

MCA CS3T12: Data Communication and Computer Networks

PWC

(5 credits – 4 theory + 1 Assignment)

Unit	Topics to be covered	No. of hours
1	<p>Data Communications, Data Networking, and the Internet: General block diagram of communication system, types of communication, Data communications, Applications of data communications Data Communications and Networking.</p> <p>Data Transmission: Fourier analysis, Band limited signals, The communication channel, Maximum data rate of a channel, Electromagnetic spectrum, electromagnetic waves, frequency and wave length, bandwidth, bandwidth and channel capacity, Modulation, types of Modulation, Concepts and Terminology, Analog and Digital Data Transmission, Transmission Impairments, Channel Capacity</p> <p>Transmission Media: Guided Transmission Media, Wireless Transmission, Wireless Propagation, Line-of-Sight Transmission, Optical Fibre -Physics & velocity of propagation of light, Advantages & disadvantages, unguided media: Electromagnetic polarization, attenuation and absorption, optical properties of radio waves, terrestrial propagation of electromagnetic waves, skip distance free-space path loss, microwave, infrared & satellite communication system.</p> <p>Signal Encoding Techniques: Digital Data, Digital Signals; Digital Data, Analog Signals; Analog Data, Digital Signals; Analog Data, Analog Signals</p>	15
2	<p>Digital Data Communication Techniques: Digital communication, advantages of digital communication, ,Sampling Theory, Analog to digital conversion -Pulse Code Modulation (PCM), Delta modulation (DM); encoding of digital signals, Multiplexing and Modulation of Digital Signals, digital radio, digital amplitude modulation, frequency shift keying (FSK), phase shift keying (PSK), quadrature amplitude modulation (QAM), band width efficiency, carrier recovery, differential phase shift keying,(DPSK), clock recovery, probability of error & bit error rate, trellis encoding, Asynchronous and Synchronous Transmission.</p> <p>Data Link Control Protocols: Need for Data Link Control, Service provided by the Data Link Layer, Frame Design Consideration, Flow Control Mechanism, Types of Errors, Error Detection, Error Correction, Line Configurations, Flow Control, Error Control, High-Level Data Link Control (HDLC), , Data Link Error Control Error Control in Stop-and-wait Mechanism & Sliding Window Mechanism, Sequence numbering, Piggybacking Acknowledgements. Mac layer and its different protocols</p>	15

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

Semester – III

MCA GI3T5: Optimization Techniques		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Introduction: Nature and Meaning, History, Management Applications, Modeling. Principles. Characteristics, Scope, Development of OR In India, Role of Computers in OR	15
2	Linear Programming: Introduction and Applications Of LP, Limitations Of LP Formulation of a LP Model, Graphical Solution of a LPP, Simplex Method, Two Phase Method, Big-M Method.	15
3	Transportation, Assignment and Replacement Problem: Introduction to Transportation Problem. Mathematical Formulation, Feasible Solution and Optimum Solution: Introduction to Assignment Problem, Mathematical Formulation. Traveling Salesman Problem; Introduction to Replacement Problem, Capital Equipment, Discounted Cost. Replacement in Anticipation of Failure.	15
4	Queuing Problems: Classification of self problems, processing of n jobs through two machines, three machines, processing of two jobs through m machines. Project Management b5' PERT-CPM: Introduction, History & Applications, Basic Steps. Network Diagram Representation, Rules, Time Estimates and Critical Path in Network, Analysis, Uses and Applications of PERT/CPM.	15
5	Assignment	15
	Total	75

Reading List

1. Pai, "Operation Research", OUP.
2. Paneerselvam, "Operation Research", PHI.
3. Hillier & Liebermann, "Operations Research", TMH.

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/2019

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]

[Signature]
12/1/19

Semester – III

<u>MCA CS3L13</u> : Mini Project III (Lab)		
PWC (3 credits: 2 Practical + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Apply the concept of Web Technology to develop mini project such as: <ul style="list-style-type: none"> 1) Online e-Market Buy/Sell Goods 2) Complaint management System 3) Dynamic College Website 4) Online Job Portal 5) E-Shop 	30
2	Assignment	15
	Total	45

S 12/1/19
Bluba 12/1/19
Nehi 12/1/19
Shankar 12/1/19
Sax Singh 12/6/19
Akhil 12/1/19
Dhanraj 12/1/19
Pranav Kumar 12/1/19
Art 12/1/19

Semester – III

MCA SE3L05 : Lab based on Statistical Package		
PWC (2 credits : 2 Practicals)		
Unit	Topics to be covered	No. of hours
1	Analyze the data from term experiment. Be sure you interpret the results to your instructor. Then, practice with the following problems. As you do the problems remember to answer these questions. You may collaborate with your classmates, but you should try to do the analyses yourself. 1. How many means are being tested? 2. Are the observations independent or related? 3. Is the hypothesis one-tailed or two-tailed? 4. Do the means fit the hypothesis? 5. Where the means significantly different? 6. How do you know?	30
	Total	30

Semester – III

MCA SE3L06 : Lab on Networking		
PWC (2 credits : 2 Practicals)		
Unit	Topics to be covered	No. of hours
1	IP Addressing Data Sharing Data Security Blocking of Site RAID Configuration Blocking of ICMP	30
	Total	30

[Signature]
12/1/19

Nela
12/1/19

Bela
12/1/19

Alek
12/1/19

[Signature]
12/1/19

Shanabady
12/1/19

Mehi
12/1/19

SK
12/1/19

[Signature]
12/1/19

Semester – IV

MCA CS4T14: Web Designing Using .Net Framework		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topic to be covered	No. of hours
1	Introduction to .NET & its Benefits – Architecture of .NET Framework – CLR – CTS – Exploring Visual Studio – C# - Introduction - Data Types – Variables - Object and Classes - Inheritance and Polymorphism - Namespace- System-Input-Output	15
2	Introduction to ASP.NET ASP.NET introduction & Features, Web Server, IIS – Life cycle of ASP.NET - File Types – Exploring ASP.NET web pages – page directives – Application structure – Web Server Controls, Validation controls – Rich web controls Postback, State Management : Viewstate, Cookies, QueryString, Session	15
3	Data controls – Navigation controls –HTML controls – Creating web applications – Deployment. ADO.Net framework – ADO.NET managed providers – Data set – Data source controls – Data binding – Working with: Grid view – Data list	15
4	Advanced Control– Form View – Repeater control – Designing web application. Configuration, Web Services and Publishing Authentication-Authorization – Introduction to Web services - Infrastructure of web services – Code model – Properties – creating web services.	15
5	Assignment	15
	Total	75

Reading List:

1. Walther Stephen, Hoffman Kevin, Dudek Nate (2011), *ASP.NET 4 Unleashed*, Pearson, New Delhi.
2. Kogent (2010), *ASP.NET 3.5 in Simple Steps*, Dreamtech Press, New Delhi.
3. Buczek Greg(2010), *ASP.Net Developer's Guide*, Tata McGraw Hill publishing Company Ltd., New Delhi.
4. Donald Mathew Mac (2010), *ASP.NET Complete Reference*, Tata McGraw Hill publishing Company Ltd., New Delhi.

Bills
12/1/19
Blk
12/1/19
Art
12/1/19
Shankarabhaty
12/1/19
Neh.
12/1/19
Sax Singh
12/1/19
Pamela K.
12/1/19

Semester – IV

MCA CS4T15 : Cryptography		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topic to be covered	No. of hours
1	FUNDAMENTALS AND MATHEMATICS OF CRYPTOGRAPHY Overview - Classical Crypto Systems – Substitution Ciphers – Transposition Ciphers - Stream and Block Ciphers – Introduction to Number Theory – Congruences – Chinese Remainder theorem – Modular Arithmetic - Modular Exponentiation – Fermats and Eulers Theorem - Finite Fields – GF(2n) Fields ENCRYPTION TECHNIQUES :Data Encryption Standard – Advanced Encryption Standard – Confidentiality using Symmetric Encryption	15
2	Public-Key Cryptography and RSA – Key Management - Diffie-Hellman Key Exchange – Elliptic Curve Cryptography – Symmetric Key Distribution – Kerberos - X.509 Authentication Service. HASH FUNCTIONS AND SIGNATURES Message Authentication and Hash Functions – Description of MD Hash Family – Secure Hash Algorithms – SHA-512	15
3	Digital Signatures and Authentication Protocols – Digital Signature Standard – Process - Services - Attacks on Digital Signature - Digital Signature Schemes. NETWORK SECURITY Security at the application layer - E-Mail - Pretty Good Privacy – S/MIME – Security at the transport layer - SSL Architecture – Protocols – Message Formats - TLS – Security at the Network Layer - IPsec – Two modes - Authentication Header (AH) – Encapsulating Security Payload (ESP) – Security Policy – Security Association – Internet Key Exchange.	15
4	SYSTEM SECURITY Intruders – Intrusion Detection – Password Management – Malwares and Related Threats – DOS Attacks - Distributed Denial of Service Attacks - Firewalls – Firewall Types-Configuration and Implementation - Demilitarized Zone - Firewall Forensics -Services and Limitations - Intrusion Prevention System.	15
5	Assignment	15
	Total	75

Reading List:

1. Stallings William, (2013), "Cryptography And Network Security – Principles and Practices", Sixth Edition, Pearson Education,
2. Forouzan Behrouz A., Mukhopadhyay, Debdeep, (2010), "Cryptography and Network Security", Second Edition, Tata Mc Graw Hill.
3. Kahate Atul, (2003), "Cryptography and Network Security", Tata McGraw Hill.
4. Kizza Joseph Migga, (2010), "A Guide to Computer Network Security", Springer International Edition.
5. Pfleeger Charles B., Pfleeger Shari Lawrence, (2007), "Security in Computing", Fourth Edition, Pearson Education.

12/1/19
17/1/19

12/1/19

12/1/19

12/1/19

12/1/19

12/1/19

12/1/19

12/1/19

12/1/19

Semester – IV

MCA CS4T16 : Distributed Computing		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topic to be covered	No. of hours
1	Fundamentals: Definition, Evolution of distributed Computing System Distributed Computing System Models, Distributed Operating System, Designing a distributed Operating System, Introduction of distributed computing environment Message Passing: Introduction Desirable features, Issues in IPC by message passing, synchronization, Buffering, Multi datagram messages, encoding and decoding message data.	15
2	Remote Procedure Calls: Introduction, The RPC Model, Transparency of RPC, Implementing RPC mechanism RPC messages server management, parameter-passing and call semantic, Communication protocols for RPC's. Distributed Shared Memory: Introduction, Architecture of DSM Systems Design and implementation, granularly, structure of shared memory space Consistency models, replacement strategy, Thrashing.	15
3	Resource Management: Desirable feature, Task assignment approach, Load-balancing approach, Load-sharing approach. Process Management: Process Migration, Threads.	15
4	Distributed File Systems: Intakes, Desirable features, File models, File accessing models, file-sharing semantic, File-caching schemes, File replication Fault tolerance, Automatic Transactions, Design principle	15
5	Assignment	15
	Total	75

Reading List:

1. George Coulouris, Jean Dollimore and Tim Kindberg, (2002), "*Distributed Systems Concepts and Design*", Third Edition, Pearson Education Asia.
2. Liu, *Distributed Computing*, Pearson Education.
3. Hagit Attiya and Jennifer Welch, *Distributed Computing*, Wiley India.
4. Sinha P.K., *Distributed Operating Systems: concept and Design*, PHI
5. Tanenbaum, *Distributed Operating System*, Pearson Education

[Handwritten signatures and dates: 12/1/19]

Semester – IV

MCA DSE4T11 : Compiler Design

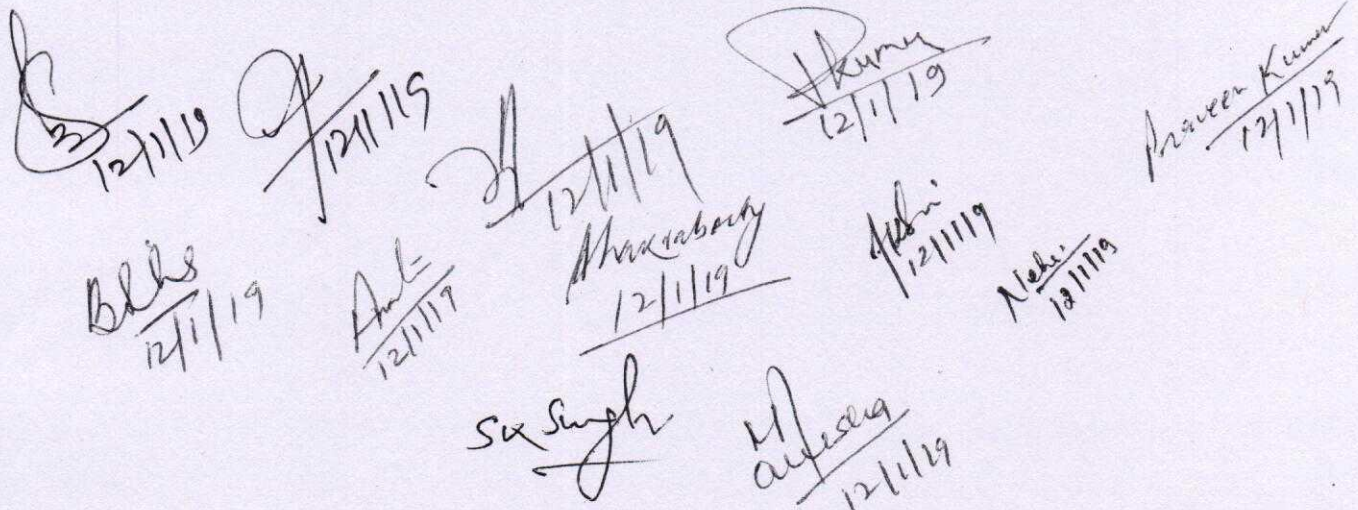
PWC (5 credits – 4 theory + 1 Assignment)

Unit	Topic to be covered	No. of hours
1.	INTRODUCTION TO COMPILING: Compilers Analysis of source Program, The Phases of a compiler, The tasks of a compiler, Analysis of the Source Program, Phases and Passes in compilers. LEXICAL ANALYSIS: Lexical Analysis - The role of Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, A Language for Specifying Lexical Analyzer, Review of Regular Expressions, Finite State Machines, Finite Automata based, Pattern Matching. Specification and recognition of tokens, a language for specifying lexical analyser, Lexical Analyser Generator, Design of Lexical Analyzer generator, Programming assignment on lex, Regular expression to finite automation - Use of a tool for generating lexical analyser.	15
2	SYNTAX ANALYSIS –Introduction to syntax analysis, the Role of Parser, Review of grammars, Chomsky Hierarchy, Context-free Grammars, Writing a Grammar, Top-down Parsing, error recovery in Top down parsers, Bottom-up Parsing, Overview of Shift reduce parsing, Operator-Procedure Parsing, Finite automata of LR(0) items and LR (0) parsing, SLR parsing, Canonical LR Parsing, LALR Parsing, Compaction of LR parsing table, Using ambiguous grammars, Error recovery in bottom up TYPE CHECKING: Type systems, Specification of simple type checker, equivalence of type expressions, type conversions, overloading of functions and operators, Polymorphic functions, an algorithm for unification.	15
3	DYNAMIC STORAGE ALLOCATION TECHNIQUES: Introduction to Dynamic storage, symbol tables, Symbol Table Organization, Symbol attributes and Symbol table entries, Local Symbol Table management, Global Symbol table structure, language facilities for dynamic storage allocation, dynamic storage allocation techniques. Symbol Table for block structured language, Different types of dynamic storage Allocation Techniques, Static versus dynamic storage allocation techniques. INTERMEDIATE CODE GENERATION: Intermediate Languages, Declarations, Assignments, Boolean Expression, Flow control statements - Back patching, Case Statements CODE GENERATION: Introduction to optimization techniques , Issues in the design of code Generator, the target Machine, Run-Time storage Management, Basic blocks and flow graphs, Next-use information	15

4	A SIMPLE CODE GENERATOR: Design of a simple code generator, A simple code generator, Register allocation and Assignment, The DAG representation of Basic blocks. CODE OPTIMIZATION-I: Introduction, Early Optimizations, The Principle of Optimization, Optimization of Basic Blocks, Loops in flow graphs, Constant-Expression Evaluation (Constant Folding, Algebraic Simplifications and Re-association, Value numbering, Copy Propagation. Redundancy Elimination: Common-Sub expression Elimination, Loop-Invariant Code Motion, Partial- Redundancy Elimination, Redundancy Elimination and Re-association, Code Hoisting, Loop Optimizations: Induction-Variable Optimizations, Unnecessary Bounds – Checking Elimination. Procedure Optimizations: Tail-Call Optimization and Tail-Recursion Elimination, Procedure Integration, In-Line Expansion, Leaf-Routine Optimization and Shrink Wrapping.	15
5	Assignment	15
	Total	75

Reading List :

1. Torben/ Mongensen Egidius, *Basics of Compiler design*
2. W Andrew, *Modern Compiler Implementation in C*. Appel Combridge University Press
3. Aho Alfred V., Lam Monica S., Jeffrey Ravi Sethi, , Ullman D., *Compiler Principles, techniques and Tools*, 2nd edition, Pearson Publication.


 A collection of handwritten signatures and dates, mostly dated 12/1/19. The signatures include:

- Top left: A signature with '12/1/19' below it.
- Below that: 'Bills' with '12/1/19' below it.
- Top middle: A signature with '12/1/19' below it.
- Below that: 'Ank' with '12/1/19' below it.
- Top right: A signature with '12/1/19' below it.
- Below that: 'Praveen Kumar' with '12/1/19' below it.
- Center: A signature with '12/1/19' below it.
- Below that: 'Sax Singh' with '12/1/19' below it.
- Bottom center: A signature with '12/1/19' below it.
- Bottom right: A signature with '12/1/19' below it.

PWC(5 credits – 4 theory + 1 Assignment)

Books

1. Gonzalez Rafael.C. & Woods Richard E. *Digital Image Processing* , 2nd Ed., Prentice Hall
2. Gonzalez R.C. and Thomason M.G. *Syntactic Pattern Recognition : An introduction*
3. Devijver P.A. and Kittler J. *Pattern Recognition - A Statistical Approach*
4. Jain A.K. *Fundamentals of Digital Image Processing*
5. Duda R.O. and Hart P.E. *Pattern Classification and Scene Analysis*
6. Li Ze – Nian *Fundamentals of Multimedia*
7. Mayer Richard E. *Multimedia Learning*

2 12/1/19
Bliss 12/1/19
Alek. 12/1/19
Shakraborty 12/1/19
Sengupta 12/1/19
Mishra 12/1/19

MCA DSE4T13: Computer Graphics

PWC

(5 credits – 4 theory + 1 Assignment)

Unit	Topic to be covered	No. of hours
1	<p>Introduction: History, Advantages, Application, I/O Devices Graphic Packages, Languages.</p> <p>Jag Free Images on a Raster CRT Interactive Graphics processor for Digital Logic Simulation System</p>	15
2	<p>Graphics Techniques: Video-Display Devices, Raster-Scan and Random-Scan Systems; Graphics Monitors, Input Devices, Points and Lines; Line Drawing Algorithms, Mid-Point Circle and Ellipse Algorithms; Scan Line Polygon Fill Algorithm, Boundary-Fill and Flood- Fill</p> <p>Translation, Scaling, Rotation, Reflection and Shear Transformations; Matrix Representations and Homogeneous Coordinates; Composite Transforms, Transformations Between Coordinate Systems, Viewing Pipeline, Viewing Coordinate Reference Frame, Window to View-Port Coordinate Transformation, Viewing Functions, Line and Polygon Clipping Algorithms.</p>	15
3	<p>2-D Geometrical Transforms and Viewing:: Drawing Elementary figures, Polygon Filling, Transformations, Windowing and clipping, Display file segmentation. Interactive Graphics: Interactive input techniques, Event handling, Input functions;</p> <p>Hidden line and surface removal, rendering, Computer Animation, 3D Shaded computer Animation the use of 3D abstract Graphical types in Computer Graphics and Animation. 3-Dimensional Reconstruction. A case study, Real-time graphics.</p>	15
4	<p>3-D Object Representation, Geometric Transformations and Viewing: Polygon Surfaces, Quadric Surfaces, Spline Representation, Bezier and B-Spline Curves; Bezier and B-Spline Surfaces; Illumination Models, Polygon Rendering Methods, Viewing Pipeline and Coordinates; Geneal Projection Transforms and Cipping.</p>	15
5	Assignment	15
	Total	75

Text Books:

1. Hearn Donald, and Baker M.Pauline "*Computer Graphics*" C Version, Pearson Education.
2. Hearn, and Baker "*Mathematical Elements for Computer Graphics*", Tata McGraw Hill Computer Graphics by, PHI
3. Newman and Sproull R. F. "*Principles of Interactive Graphics*", McGraw-Hill.
4. Harrington "*Computer Graphics: A programming approach*", McGraw-Hill.
5. Foley & Dam A. Van, Wesley Addison "*Fundamentals of Interactive Computer Graphics*"

39

Semester – IV

MCA DSE4T21: Artificial Intelligence		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Approaches to AI: Turing Test and Rational Agent Approaches; State Space Representation of Problems, Heuristic Search Techniques, Game Playing, Min-Max Search, Alpha Beta Cutoff Procedures.	15
2	Knowledge Representation: Logic, Semantic Networks, Frames, Rules, Scripts, Conceptual Dependency and Ontologies; Expert Systems, Handling Uncertainty in Knowledge. Planning: Components of a Planning System, Linear and Non Linear Planning; Goal Stack Planning, Hierarchical Planning, STRIPS, Partial Order Planning.	15
3	Natural Language Processing: Grammar and Language; Parsing Techniques, Semantic Analysis and Pragmatics. Multi Agent Systems: Agents and Objects; Agents and Expert Systems; Generic Structure of Multiagent System, Semantic Web, Agent Communication, Knowledge Sharing using Ontologies, Agent Development Tools.	15
4	Fuzzy Sets: Notion of Fuzziness, Membership Functions, Fuzzification and Defuzzification; Operations on Fuzzy Sets, Fuzzy Functions and Linguistic Variables; Fuzzy Relations, Fuzzy Rules and Fuzzy Inference; Fuzzy Control System and Fuzzy Rule Based Systems. Artificial Neural Networks (ANN): Supervised, Unsupervised and Reinforcement Learning; Single Perceptron, Multi Layer Perceptron, Self Organizing Maps, Hopfield Network	15
5	Assignment	15
	Total	75

Reading List

1. Norving Peter and Russell Stuart J., "*Artificial Intelligence: A modern Approach*"
2. S.S, Chandra, Vinod and Hareendrass Anand, "*Artificial Intelligence and Machine Learning*", PHI

2. S.S. Chandra, Vinod and Harendra Anand, "Artificial Intelligence and Machine Learning", PHI

Semester – IV

<u>MCA DSE4T22: Soft Computing</u>		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topic to be covered	No. of hours
1	Neural Networks, Application Scope of Neural Network, Fuzzy Logic, Genetic Algorithm, Hybrid Systems and Soft computing. Artificial Neural Network: Fundamental Concept, Evolution of Neural Networks, Basic Models of Artificial Neural Network, Important Terminologies of ANNs, McCulloch-Pitts Neuron, and Hebb Network	15
2	Introduction to Fuzzy logic, Classical Sets (Crisp Sets), Operations of Classical Sets, Fuzzy Sets Operations. Classical Relations and Fuzzy Relations: Cartesian Product of Relation, Classical Relation, Fuzzy Relations, Tolerance and Equivalence Relations, No interactive Fuzzy Sets. Membership Functions: Features of Membership Functions, Fuzzification and Defuzzification.	15
3	Fuzzy Rule Base and Approximate Reasoning Introduction, Truth Values and Table in Fuzzy Logic, Fuzzy Propositions, Fuzzy Reasoning, Fuzzy Inference System. Fuzzy Decision Making: Individual Decision Making, Multiperson Decision Making, Multiobjective Decision Making, Multiattribute Decision Making, Fuzzy Bayesian Decision Making. Fuzzy Logic Control Systems: Control System Design, Architecture and Operation of FLC system, FLC System Models, Application of FLC Systems.	15
4	Hybrid Soft Computing Techniques Neuro-Fuzzy Hybrid Systems, Generic Neuro-Hybrid Systems, Genetic Fuzzy Hybrid and Fuzzy Genetic Hybrid Systems, Simplified Fuzzy ARTMAP. Applications of Soft Computing: A Fusion Approach of Multispectral Images with SAR (Synthetic Aperture Rader), Optimization of Traveling Salesmen Problem using Genetic Algorithm Approach, Genetic Algorithm-Based Internet Search Technique, Soft computing Based Hybrid Fuzzy Controllers.	15
5	Assignment	15
	Total	75

Reading List:

1. Sivanandam S.N., Deepa S.N. *Principles of Soft Computing*, Wiley.
2. Bernadette Bouchon- Meunier *Fuzzy Logic and Soft Computing*, World Scientific.
3. Chaturvedi Devendra K., *Soft Computing: Techniques and its Applications in Electrical Engineering*, Springer Science & Business Media.

Semester – IV

MCA DSE4T23: Introduction to Machine Learning		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	Introduction to Machine Learning Introduction, Different Types of Learning, Hypothesis Space and Inductive Bias, Evaluation and Cross-Validation, Linear Regression, Introduction to Decision Trees, Learning Decision Tree, Overfitting	15
2	KNN, Feature Selection and Extraction, Bayesian Learning k-Nearest Neighbour, Feature Selection, Feature Extraction, Collaborative Filtering, Exercise on kNN and PCA Bayesian Learning, Naive Bayes, Bayesian Network	15
3	Logistic Regression, SVM and Neural Network Logistic Regression, Introduction Support Vector Machine SVM : The Dual Formulation, SVM : Maximum Margin with Noise, Nonlinear SVM and Kernel Function, SVM : Solution to the Dual Problem Neural Network Introduction, Multilayer Neural Network, Neural Network and Backpropagation Algorithm, Deep Neural Network	15
4	Computational Learning, Sample Complexity and Clustering Introduction to Computational Learning Theory, Sample Complexity : Finite Hypothesis Space, VC Dimension Introduction to Clustering, Kmeans Clustering, Agglomerative Hierarchical Clustering	15
5	Assignment	15
Total		75

Reading List

1. Tom M. Mitchell (2017), *Machine Learning*, McGraw Hill Indian Edition.
 2. Andreas Muller and Sarah Guido (2017), *Introduction to Machine Learning with Python*, O'Reilly Publication, 2nd Edition.
- Yuxi (Hayden) Liu (2017), *Python Machine Learning By Example*, Packt Publishing, Mumbai.

Handwritten signatures and dates (mostly 12/1/19) are present below the reading list, indicating approval or completion of the syllabus.

Semester – IV

MCA CS4L17 : Mini Project IV

PWC (3 credits: 2 Practical + 1 Assignment)

Unit	Topic to be covered	No. of hours
1	Introduction to ASP. Net, Web Server, IIS, Introduction to Visual Studio, Web Server Controls, Validation Controls Postback, State Management, Viewstate , Cookies QueryString, Session, ADO.Net Databound Controls, Repeater, DataList, Gridview Web.config, global.asax	30
2	Assignment	15
	Total	45

[Signature]
12/1/19

Neha
12/1/19

[Signature]
12/1/19

Blh
12/1/19

M. Anand
12/1/19

Ail
12/1/19

Shankarabati
12/1/19
S. S. Singh

glini
12/1/19

Praveen Kumar
12/1/19

[Signature]
12/1/19

Semester – IV

MCA SE4L07 : Technical Presentation and Report Writing

PWC

(2 credit : 2 Practicals)

Unit	Topic to be covered	No. of hours
1	<p>Grammatical Use: punctuation, vowel, consonant, Preposition + noun ,uncountable and plural nouns, verb patterns, uses of tenses, Meanings & opposites</p> <p>Writing Skills: Sentence formation; Use of appropriate diction; Paragraph and Essay Writing; Coherence and Cohesion.</p> <p>Technical Writing: Differences between technical and literary style, Elements of Style, Common Errors.</p> <p>Letter Writing: Formal, informal and demi-official letters; business letter</p> <p>Job Application: Cover letter, Differences between bio-data, CV and Resume.</p> <p>Report Writing: Basics of Report Writing, Structure of a report; Types of reports.</p> <p>Presentation Skills: Oral presentation and public speaking skills; business presentations.</p> <p>Technology-based Communication: Netiquettes: effective e-mail messages; power-point presentation; enhancing editing skills using computer software</p>	30
	Total	30

[Signature]
12/1/19
[Signature]
12/1/19
[Signature]
12/1/19

[Signature]
12/1/19
[Signature]
12/1/19
[Signature]
12/1/19
[Signature]
12/1/19

[Signature]
12/1/19
[Signature]
12/1/19
[Signature]
12/1/19
[Signature]
12/1/19

(2 credit)

Unit	Topic to be Covered	No. of hours
1	<p>Imparting practical exposure to students by organizing Industrial visits to various eminent organizations working on latest technologies, which is usually not covered in the regular academic curriculum. The basic intent of Industrial Visit is to expose students to the industrial working environment, wherein they could visualize the application of their theoretical knowledge. At the same time, they could get to know more about the working culture, process integration, process flow pattern, co-ordination among various functions/verticals, various performance indicators etc.</p> <p>Students will make report regarding their visit to IT/Industrial Organizations.</p>	30
	Total	30

B 12/1/19
J 12/1/19
Neha 12/1/19
Afreena 12/1/19
Bliss 12/1/19
Al= 12/1/19
Shamabanti 12/1/19
Jel 12/1/19
Sx Singh
Raman
Ravinder Kumar 12/1/19

Semester – V

MCA CS5T18 : Advanced Web Designing		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of Hours
1	Introduction to Python Overview of Programming : Structure of a Python Program, Elements of Python Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators (Arithmetic operator, Relational operator, Logical or Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator). Creating Python Programs: Input and Output Statements, Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.), Defining Functions, default arguments.	15
2	Overview of PHP structure and syntax Background information of php, Using variables, operators and expressions Conditional statements and iterations in PHP: Conditional Statements: if statement, switch statement. Looping: for loop, while loop, do.while statement, for each statement. Functions and Arrays in PHP: php functions, creating array.	15
3	Accessing MySQL with PHP Mysql structure, Connectivity, Querying the database	15
4	Form Elements, Validating user Input, Error Handling Using radio buttons, checkbox, list box, buttons, text box, etc., processing user input, Handling and Avoiding errors, Exception Handling.	15
5	Assignment	15
	Total	75

Reading List:

1. Naramore Elizabeth, Gerner Jason, Scouarnec Yann Le, Stolz Jeremy, Glass Michael K. (2005): *Beginning PHP5, Apache, and MySQL Web Development*, Wrox.
2. Squier Dan, Mercer David, Kent Allan, Nowicki Steven, Morgan Clark, Choi Wankyu *Beginning PHP5 (Programmer to Programmer) (Paperback)*, Wrox, 2004.
3. Leon Atkinson, Zeev Suraski, "Core PHP Programming", Pearson Publication
4. T. Budd, *Exploring Python*, (2011) TMH, 1st Ed.

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19
[Signature]
12/11/19
[Signature]
12/11/19

[Signature]
12/11/19
[Signature]
12/11/19

[Signature]
12/11/19
[Signature]
12/11/19

Semester – V

MCA CS5T19 : Wireless Network

PWC

(5 credits – 4 theory + 1 Assignment)

Unit	Topics to be covered	No. of Hours
1	Introduction : Issues in mobile computing, overview of wireless telephony: cellular concept, GSM, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS. Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications. Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks.	15
2	Introduction to Adhoc networks definition, characteristics features, applications. Characteristics of Wireless channel, Adhoc Mobility Models:- Indoor and outdoor models. MEDIUM ACCESS PROTOCOLS MAC Protocols: design issues, goals and classification. Contention based protocols-with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN. NETWORK PROTOCOLS Routing Protocols: Design issues, goals and classification.	15
3	Routing: Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing. END-END DELIVERY AND SECURITY Transport layer: Issues in designing-Transport layer classification, adhoc transport protocols. Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols. Cross Layer Design and Integration of Adhoc for 4g Cross Layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary perspective.	15
4	Introduction to sensor networks and its applications Architecture and factors influencing the sensor network design. Routing protocols- data centric routing protocols, hierarchical routing protocols, location based routing, energy efficient routing etc, Node Scheduling and coverage issues, topology control. Querying, data collection and processing, Collaborative information processing and group connectivity. Target tracking and identity management using sensor networks .Localization. Application & future research Challenges.	15
5	Assignment	15
	Total	75

Reading List:

1. Adelstein Frank, Gupta S.K.S., Richard III Golden G. and Schwiebert Loren, "Fundamentals of Mobile and Pervasive Computing", McGraw-Hill Professional.
2. Taniar David, "Mobile Computing: Concepts, Methodologies, Tools, and Applications".
3. Toh C.K., Ad-Hoc Mobile Wireless Networks – Protocols and Systems, Prentice Hall.
4. Stojmenovic and Cacute, Handbook of Wireless Networks and Mobile Computing, Wiley.

12/21/15

7

Belts
12/1/19

Nele
12/1/19

ausgabe
12/1/19

Shanabady
12/1/19

baly
 19
 SK Singh
 12/11/19

le Computing, Wiley.

Semester – V

MCA CS5T20 : Data & Web Mining		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of Hours
1	Data Warehousing: Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi-Dimensional Data Model, Introduction to KDD process – Knowledge Discovery from Databases - Need for Data Preprocessing –Data Cleaning – Data Integration and Transformation . Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Marting. ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse. Relationship between warehouse and mining. Data mining issues in object oriented databases, spatial databases and multimedia databases and text bases.	15
2	Data Mining: Overview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data,(Binning, Clustering, Regression, Computer and Human inspection),Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Description of Data mining query language with examples. Introduction - Data Mining Functionalities - Association Rule Mining – Multidimensional and multilevel association rules. Classification association rules. Association rule algorithms-A priori and frequent pattern growth	15
3	Classification vs. Prediction: Different classification algorithms. Classification by Decision Tree Introduction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – fuzzy set theory and genetic algorithms, Classification methods K-nearest neighbor classifiers	15
4	Cluster Analysis: Types of Data in Cluster Analysis – A Categorization of Major Clustering Methods – Partitioning Methods – Hierarchical methods – Density-Based -Grid-Based Methods – Model-Based Clustering for continuous for discrete data, Scalability of clustering algorithms. Parallel approaches for clustering. Introduction, Web Usage mining, Web content mining, Web log attributes. Web Structure mining	15
5	Assignment	15
	Total	75

Reading List:

1. Han J., Kamber M., Data Mining Concepts and Techniques, Harcourt India.
2. Dunham M., Data Mining: Introductory and Advanced Topics, Pearson Pub.
3. Pujari, A.K., Data Mining Techniques, Universities Prss.
4. Pudi Vikram, Krishna P.Radha, Data Mining,
5. Han Jiawei, Kamber Micheline, Pei Jian, Data Mining Concepts and Techniques, Morgan Kaufmann Pub.

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

Semester – V

MCA DSE5T31 : Mobile Computing		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of Hours
1	INTRODUCTION Aspects of Mobility – Mobile Device Profiles – Device Portability – Mobile Applications – Characteristics and Benefits – Application Model – Infrastructure and Managing Resources – Frameworks and Tools – Generic UI Development – Visual UI – Text to Speech Techniques – Multidodal and Multichannel UI	15
2	TOOLS Google Android Platform – Eclipse Simulator – Android Application Architecture – Event based programming – Apple iPhone Platform – UI and Toolkit Interfaces – Event handling – Graphical Services – Animation Techniques	15
3	APPLICATION DESIGN Memory Management – Design Patterns for Limited Memory - Work Flow for Application development – Techniques for Composing Applications - Dynamic Linking - Plug ins and rule of thumb for using DLLs - Concurrency and Resource Management - Look and Feel	15
4	APPLICATION DEVELOPMENT Intents and Services – Storing and Retrieving data – Communication via the Web – Notification and Alarms – Graphics and Multimedia – Telephony – Location based Services – Packaging and Deployment – Security and Hacking CELLULAR NETWORKS AND WIRELESS LANS Cellular Network Structure and Operation - Principles - Tessellation, Frequency Reuse, Hand off - GSM - System Architecture, Elements, Interfaces, Frame Structure, Protocol Stack, Types of Handover - IEEE 802.11 WLAN - Architecture, Reference Model - Physical layer - MAC Layer - CSMA/CA-Interference Spacing – Security – WEP, 802.1x Authentication	15
5	Assignment	15
	Total	75

Reading List:

1. B'Far Reza,(2009), "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", Cambridge Press University
2. Talukder Asoke K, Ahmed Hasan, R Yavagal Roopa, (2010) "Mobile Computing Technology, Applications and Service Creation", 2nd ed, Tata McGraw Hill.
3. Meier Reto (2010), "Professional Android 2 Application Development", Wrox Wiley.

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

[Signature]
12/11/19

Semester V

MCA DSE5T32: Cloud Computing		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topic to be covered	No. of hours
1	<p>Introduction- Objectives, From collaborative to the Cloud – A short history Client – Server Computing, Peer-to-Peer Computing, Distributed Computing, Collaborative Computing, Cloud Computing, Functioning of Cloud Computing, Cloud Architecture, Cloud Storage, Cloud Services, Industrial Applications, Infrastructure Services , Platform Services, Software Services - Software as service , Management and Administration, Performance, Security and Energy Efficiency</p> <p>Cloud Computing Technology- Introduction-Objectives, Clients – Mobile – Thin – Thick, Security - Data Linkage - Offloading Work - Logging - Forensics - Development – Auditing, Network- Basic Public Internet- The Accelerated Internet- Optimized Internet Overlay- Site-to-Site VPN- Cloud Providers- Cloud Consumers - Pipe Size- Redundancy, Services- Identity- Integration- Mapping- Payments- Search.</p>	15
2	<p>Accessing the Cloud and Data Management - Introduction- Objectives, Platforms- Web Application Framework- Web Hosting Services- Proprietary Methods, Web Applications- API's in Cloud Computing, Browsers for Cloud Computing- Internet Explorer- Mozilla Firefox- Safari- Chrome.</p> <p>Information Storage in Cloud Computing- Introduction- Objectives, Storage as a Service, Storage Providers- Amazon Simple Storage Service- Nirvanix- Google</p>	15
3	<p>Data Management- Introduction- Objectives, Data Security- Data Location- Data Control- Securing data for transport, Scalability and Cloud Services- Large Scale Data Processing- Databases and Data Stores- Data Archival.</p> <p>Cloud Computing Standards- Introduction- Objectives, Best Practices and Standards, Practical Issues- Interoperability- Portability- Integration- Security, Standards Organizations and Groups- Cloud Security Alliance- Distributed Management Task Force (DMTF)- National Institute of Standards and Technology (NIST)- Open Cloud Consortium (OCC)</p>	15

[Signature]
12/1/19

Neha
12/1/19

Shruti
12/1/19

Pranav
12/1/19

Pranav Kumar
12/1/19

4	Desktop and Device Management- Introduction- Objectives, Desktop Virtualization- Across Industries- Client Desktops, Desktop placement in the cloud- Merits- Desktop as a Service (DaaS), Desktop Management- Watching the four areas- Asset Management. . Cloud Governance-Introduction-objectives, IT Governance, Deciding the Governor, Risk Assessment of running the cloud- Understanding possible risks- Performance monitoring and measurement- Measurement Methods, Working of Governance- Establishment of the Governance Body- IT Service Performance – Monitoring and Measuring- Cataloging control and Compliance Data, Virtualization concepts	15
5	Assignment	15
	Total	75

Reading Lists:

1. Kai Hwang, Geoffrey C.Fox, and Jack J. Dongarra, "Distributed and Cloud Computing", Elsevier India Private Limited, 2012.
2. Foster and Kesselman, "The Grid : Blueprint for a New Computing Infrastructure", Morgan Kauffman publishers Inc.2004
3. Coulouris, Dollimore and Kindber, "Distributed System: Concept and Design", Fifth Edition, Addison Wesley, 2011.
4. Michael Miller, "Cloud Computing", Dorling Kindersley India,2009. 5. Anthony T. Velte, Toby J. Velte and Robert Elsenpeter, "Cloud computing: A practical Approach", McGraw Hill,2010

[Signature]
12/1/19

Neha
12/1/19

M. Jaiswal
12/1/19

Manvika
12/1/19

[Signature]
12/1/2019

[Signature]
12/1/19

Rishi
12/1/19

Adi
12/1/19

[Signature]
12/1/19

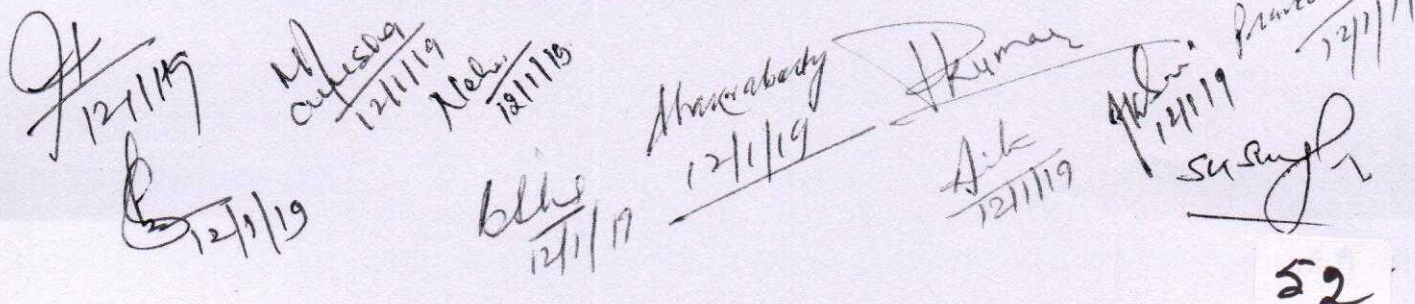
Six Singh

Pravish Kumar
12/1/19

MCA DSE5T33: Internet of Things		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of Hours
1	INTRODUCTION : Definitions and Functional Requirements, Motivation , Architecture: Web 3.0, View of IoT, Ubiquitous IoT, Applications, Four Pillars of IoT, DNA of IoT, The Toolkit Approach for user Participation in the Internet of Things. Middleware for IoT: Overview, Communication middleware for IoT, IoT Information Security.	15
2	PROTOCOL : Protocol Standardization for IoT, Efforts, M2M and WSN Protocols, SCADA and RFID Protocols, Issues with IoT Standardization, Unified Data Standards, Protocols, IEEE 802.15.4, BACNet Protocol, Modbus, KNX, Zigbee Architecture, Network layer, APS layer Security.	15
3	SENSOR : Basics of Sensors and actuators: examples and working principles of sensors and actuators – Cloud computing and IOT, Equivalent Microcontroller platform ,Setting up the board, Programming for IOT, Reading from Sensors Communication: Connecting microcontroller with mobile devices, communication through bluetooth and USB, connection with the internet using wifi / Ethernet.	15
4	INTEGRATION : Integrated Billing Solutions in the Internet of Things Business Models for the Internet of Things, Network Dynamics: Population Models, Information Cascades. Dynamics: Structural Models, Cascading Behaviour in Networks, The Small-World Phenomenon; Web of Things versus Internet of Things, Two Pillars of the Web, Architecture Standardization for WoT.	15
5	Tutorial	15
	Total	75

TEXT BOOKS :

1. Zhou Honbo “*The Internet of Things in the Cloud: A Middleware Perspective*”, CRC Press.
2. Harrison Mark; Michahelles- (Eds.) Florian, Dieter Uckelmann, “*Architecting the Internet of Things*”, Springer.
3. Easley David and Kleinberg Jon, “*Networks, Crowds, and Markets: Reasoning About a Highly Connected World*”, Cambridge University Press.
4. Hersent Olivier, Elloumi Omar and Boswarthick David, “*The Internet of Things: Applications to the Smart Grid and Building Automation*”, Willey.



 JH 12/1/19
 M. J. 12/1/19
 N. 12/1/19
 blis 12/1/19
 H. 12/1/19
 A. K. 12/1/19
 S. 12/1/19
 P. 12/1/19
 52

Semester – V

MCA DSE5T41 : Parallel Computing		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of Hours
1	Parallel Computers-Introduction The Demand of Computational Speed, Types of Parallel Computers, Architectural Features of Message passing Multicomputer, Networked Computers as a Multicomputer Platform, Potential for increased computational speed. Parallel Computer Architecture: A Taxonomy of Parallel Architectures, Control Mechanism, Address-space Organization, Interconnection Networks, Processors Granularity ;SIMD Architecture : Overview of SIMD Architecture, Design and Performance Issues; MIMD Architecture : Shared Memory Architecture, Uniform and Non-uniform Memory Access Multi Processors, Parallel Vector Processors (PVP), Symmetric Multiple Processors (SMP), CC-NUMA, NUMA and COMA Architectures. Distributed Memory Architecture : Cluster Architecture - Design and other Issues ,MPP Architecture.	15
2	System Interconnection and Gigabit Network Basics of Interconnection Network Network Topologies and Properties, Buses, Crossbar, and Multistage switches, Gigabit Network Technologies, Comparison of Network Technologies Parallel Programming: Paradigms and Programmability: Algorithmic Paradigms, Programmability issues Parallel Programming Examples; Parallel Programming Models :Implicit Parallelism, Explicit Parallel Models, Other Parallel Programming Models ;Shared Memory Programming : The POSIX Threads (P-threads) Model, The Open MP Standard; Message-Passing Programming : The Message Passing Paradigm, Message Passing Interface (MPI), Parallel Virtual Machine (PVM). Data Parallel Programming : The Data Parallel Model , The Fortran 90 Approach, Other Data Parallel Approaches.	15
3	Performance Metrics and Benchmarks Performance Metrics for Parallel Systems, Run Time, Speedup, Efficiency Cost. Scalability and Speedup Analysis : Amdahl's Law: Fixed Problem Size, Gustafson's Law: Fixed Time, Sun and Ni's Law: Memory Bounding, Iso performance Models. System and Application Benchmarks : Micro Benchmarks, Parallel Computing Benchmarks, Business and TPC Benchmarks, SPEC Benchmark Family ; Performance v/s Cost, Performance of parallel Computers, Performance of Parallel Programs. Parallel Paradigms and Programming Models : Parallel Programming Models, Implicit Parallelism, Explicit Parallel Models, Other Parallel Programming Models. Shared Memory Programming : The POSIX Threads (P-threads) Model, The Open MP Standard.	15

[Signature]
12/1/19

Neha
12/1/19

Ankur
12/1/19

Ram Kumar
12/1/19


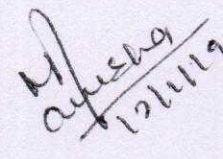
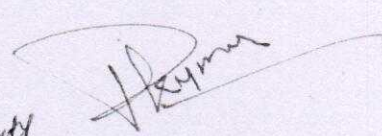

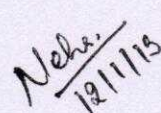
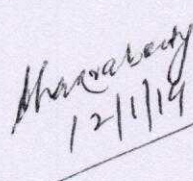
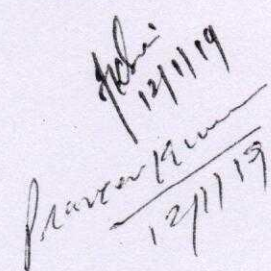
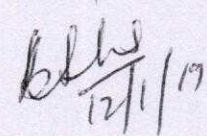

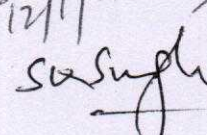
Suman
12/1/19

Abhi
12/1/19

4	Message-Passing Programming The Message Passing Paradigm, Message Passing Interface (MPI), Parallel Virtual Machine (PVM). Data Parallel Programming: The Data Parallel Model, the FORTRAN 90 Approach, Other Data Parallel Approaches Parallel Algorithms and Applications Sorting Algorithms, Searching Algorithms, Dynamic Programming, Matrix Multiplication, Dense Matrix Computations, Sparse Matrix Computations.	15
5	Assignment	15
	Total	75

Reading List:

1. Hwang Kai and Zhiwei Xu (1997), "Scalable Parallel Computing", McGraw Hill New York.
2. Wilkinson Barry and Allen Michael (1999), "Parallel Programming", Pearson Education Asia.
3. Brawer Steven, "Introduction to Parallel Programming"
4. Shasikumar M., shikhare Dinesh and Prakash P. Ravi, "Introduction to Parallel Processing".
5. Rajaraman V. and Murthy C. Siva Ram, "Parallel Computers-Architecture and Programming"

 12/1/19
 12/1/19

 12/1/19
 12/1/19
 12/1/19
 12/1/19
 12/1/19
 12/1/19


Semester – V

MCA DSE5T42: Enterprise Resource Management		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topic to be covered	No. of hours
1	ERP Introduction: Introduction, ERP Planning, Definition, ERP-A System Perspective, Components of an ERP System, Operating System, Evolution, Benefits of ERP, Reasons for the growth of ERP Market ERP & Related Technologies : Introduction: BPR, MIS, DSS, EIS, Introduction to Product Life Cycle Management (PLM), Advantages & Areas of PLM,	15
2	ERP Marketplace and Market Dynamics Market Overview, SAPAG, Product & Technology, Knowing ERP Market, ERP Functional Modules: Introduction, Finance, Sales & Distribution Manufacturing, Human Resources, Plant Maintenance, ERP Implementation Strategy : ERP Implementation, BIG Bang Strategy, Variants, Phased & Parallel Implementation	15
3	Vendors, Consultants and Employees In-House ERP Development & Implementation, Cost-Benefit Analysis, Supply Chain, Detailed Analysis,	15
4	ERP vs. E-Commerce: Meaning of E-Commerce, Future Directives in ERP, ERP & Internet, Integrating ERP into Organizational Culture, ERP & CRM Integration.	15
5	Assignment	15
	Total	75

Reading List:

1. Zaveri Jyotindra (2012), "Enterprise Resource Planning", Himalaya Publishing House, 2nd Revised Edition
2. Goyal, D.P,(2011), "Enterprise Resource Planning" , Tata Mc.Graw-Hill Education.

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]

[Signature]
12/1/19

[Signature]
12/1/19

Semester – V

MCA DSE5T43: Big Data Analytics		
PWC (5 credits – 4 theory + 1 Assignment)		
Unit	Topics to be covered	No. of hours
1	INTRODUCTION TO BIG DATA AND HADOOP : Types of Digital Data, Introduction to Big Data, Big Data Analytics, History of Hadoop, Apache Hadoop, Analyzing Data with Unix tools, Analyzing Data with Hadoop, IBM Big Data Strategy, Introduction to NoSQL. Introduction to Infosphere BigInsights and Big Sheets.	15
2	HDFS(Hadoop Distributed File System) : The Design of HDFS, HDFS Concepts, Command Line Interface, Hadoop file system interfaces, Data flow, Data Ingestion Tools, Data Ingest with Flume	15
3	Map Reduce : Anatomy of a Map Reduce Job Run, Failures, Job Scheduling, Shuffle and Sort, Task Execution, Map Reduce Types and Formats, Map Reduce Features.	15
4	Data Analytics with R : Introduction, Supervised Learning, Unsupervised Learning, Collaborative Filtering.	15
5	Assignment	15
	Total	75

Reference Books:

1. Eaton Chris, Deroos Dirk, “*Understanding Big data*”, Tata McGraw Hill.
2. Lublinsky Boris, T. Smith Kevin, Yakubovich Alexey, “*Professional Hadoop Solutions*”, Wiley Publication
3. White Tom, (2012) “*HADOOP: The definitive Guide*”, O Reilly Publication.

[Signature]
12/1/19

[Signature]
12/1/19

Neha
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]

[Signature]

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

Semester – V

MCA CS5L21: Mini Project V		
PWC (3 credits: 2 Practical + 1 Tutorial)		
Unit	Topics to be covered	No. of Hours
1	Apply the concept of Python & PHP to develop mini project such as: 1) Online e-Market Buy/Sell Goods 2) Complaint Management System 3) Dynamic College Website 4) Online Job Portal 5) E-Shop	30
2	Assignment	15
	Total	45

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

[Signature]

Semester – V

MCA SE5L09 : Lab based on E –Learning		
PWC (2 credits)		
Unit	Topics to be covered	No. of Hours
1	Students can choose any course approved by the department from the following portals: 1. Spoken Tutorial 2. Swayam Portal 3. NPTEL	30
	Total	30

Jf
12/1/19

M. J. S. S.
12/1/19
Neha
12/1/19

[Signature]
12/1/19

B. S. S.
12/1/19

Anurag
12/1/19

S. K. Singh

[Signature]
12/1/19

A. K.
12/1/19

K. S. S.
12/1/19

Semester – V

MCA SE5L10 : Android App Development

PWC

(2 credits)

Unit	Topics to be covered	No. of Hours
1	<p>EXPERIMENTS</p> <p>The following experiments to be practiced</p> <ol style="list-style-type: none"> 1. Survey of Mobile Application Development Tools. 2. Form design for mobile applications. 3. Applications using controls. 4. Graphical and Multimedia applications. 5. Data retrieval applications. 6. Networking applications. 7. Gaming applications. (Perform the experiments from 2 to 7 in J2ME and Android SDK framework) 	30
	Total	30

P. K.
12/1/19

M. Singh
12/1/19

Neha
12/1/19

Shravan

bls
12/1/19

Shravathy
12/1/19

S. S.
12/1/19

A. K.
12/1/19

Ravi
12/1/19

Praveen Kumar
12/1/19

Semester – VI

MCA CS6P22 : Internship

PWC (5 credits)

A student has to undertake a software development project work of atleast four months duration during the 6th semester. Project work may be done individually or in groups in case of bigger projects. However if project is done in groups, each student must be given a responsibility for a distinct module and care should be taken to see the progress of individual modules is independent of others

[Signature]
12/1/19

Neha
12/1/19

[Signature]

M. Jaiswal
12/1/19

[Signature]
12/1/19

[Signature]
12/1/19

dharmabodhi
12/1/19

[Signature]
12/1/19

Ravleen Kumar
12/1/19

Sax Sax
12/1/19

A. K.
12/1/19

Semester – VI

MCA CS6P23 : Project

PWC

(10 credits)

In Semester VI there shall be two papers i.e. Internship and Project of 500 Marks (15 credits) out of which all 15 credits for the development of the project and project report (unguided learning hours). The VI semester, being kept for fulfillment of the academic requirement, is entirely devoted to preparation of a major project report. For this purpose, each candidate shall have to undertake a major project, at least of 4 month durations, in a reputed organization.

[Signature]
12/1/19

Neha
12/1/19

Afusa
12/1/19
Harman
12/1/19

[Signature]
12/1/19

Bshs
12/1/19

Ak
12/1/19
Sx Singh

Arshi
12/1/19

Praveen Kumar
12/1/19