

Study & Evaluation Scheme

of

Master of Computer Applications

[Applicable for the Batch 2017-18 till revised]



TEERTHANKER MAHAVEER UNIVERSITY

Delhi Road, Moradabad, Uttar Pradesh-244001.

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TEERTHANKER MAHAVEER UNIVERSITY

(Established under Govt. of U. P. Act No. 30, 2008)

Study & Evaluation Scheme Of Master of Computer Applications SUMMARY

Programme : Master of Computer Applications
Duration : Three years full time (Six Semesters)
Medium : English
Minimum Required Attendance : 75%

Maximum Credits : 178
Minimum Credits required for the degree : 163

Assessment :

Internal	External	Total
40	60	100

Internal Evaluation (Theory Papers) :

Class Test I	Class Test II	Class Test III	Attendance	Assignment	Total
Best two out of the three					
10	10	10	10	10	40

Evaluation of Practical/Dissertations & Project Reports :

Internal	External	Total
50	50	100

Duration of Examination :

External	Internal
3 hrs.	1.5hrs.

To qualify the course a student is required to secure a minimum of 45% marks in aggregate including the semester examination and teachers continuous evaluation. (i.e. both internal and external). A candidate who secures less than 45% of marks in a course shall be deemed to have failed in that course. The student should have secured at least 45% marks in aggregate to clear the semester.

Question Paper Structure

1. The question paper shall consist of 6 questions. Out of which first question shall be of short answer type (not exceeding 50 words) and will be compulsory. Question No. 1 shall contain 8 parts representing all units of the syllabus and students shall have to answer any five (weightage 2 marks each).
2. Out of the remaining five questions, The long answer pattern will have internal choice with unit wise questions with internal choice in each unit. In units having numerical, weightage and information should be available both in the syllabus and the paper pattern. The weightage of Question No. 2 to 6 shall be 10 marks each.

Internal Evaluation (50 marks)

The Internal evaluation would also be done by the Internal Examiner based on the experiment performed during the internal examination

EXPERIMENT	ATTENDANCE	VIVA	TOTAL INTERNAL
30 MARKS	10 MARKS	10 MARKS	50 MARKS

External Evaluation (50 marks)

The external evaluation would also be done by the External Examiner based on the experiment performed during the external examination.

EXPERIMENT	FILE WORK	VIVA	TOTAL EXTERNAL
30 MARKS	10 MARKS	10 MARKS	50 MARKS

Seminar/Presentation

Seminar/Presentation will be conducted by Board of Examiners comprising the Principal/Dean and one external expert and the faculty guide or the faculty nominated by the Principal.

STUDY & EVALUATION SCHEME
Programme: MCA

Semester – I

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MCA108	Concepts of C-Programming	4	1	0	5	40	60	100
2	MCA106	Computer Organization & Architecture	4	1	0	5	40	60	100
3	MCA 199	English Communication and Soft Skills - I	0	0	4	2	50	50	100
4	MCA151	C-Programming Lab	0	0	6	3	50	50	100
5	MCA153	Computer Organization Lab	0	0	4	2	50	50	100
Elective (Select Any One)									
6	MCA107	Information Security and Cyber Laws	4	1	0	5	40	60	100
	MCA111	Social Implications of Information Technology							
Elective (Select Any One)									
7	MCA109	Concepts of IoT (Internet of Things)	4	1	0	5	40	60	100
	MCA110	Concepts of Green Technology							
Total			16	4	14	27	310	390	700

Semester – II

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MCA201	Data Structure with C	4	1	0	5	40	60	100
2	MCA206	Operating System	4	1	0	5	40	60	100
3	MCA213	Environmental Studies	4	0	0	4	40	60	100
4	MCA251	Data Structure Lab	0	0	6	3	50	50	100
5	MCA 249	English Communication and Soft Skills - II	3	0	2	4	50	50	100
Elective (Select Any One)									
6	MCA211	Information Storage and Management	4	1	0	5	40	60	100
	MCA212	Ethical Hacking							
Elective (Select Any One)									
7	MCA210	Human Values and Professional Ethics	3	1	0	4	40	60	100
	MCA214	Principles of Management							
Total			22	4	8	30	300	400	700

Semester – III

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MCA304	Design & Analysis of Algorithms	4	1	0	5	40	60	100
2	MCA315	Database Management System	4	1	0	5	40	60	100
3	MCA316	Object Oriented Programming using C++	4	1	0	5	40	60	100
4	MCA 349	English Communication and Soft Skills - III	3	0	2	4	40	60	100
5	MCA356	Database Management System Lab	0	0	4	2	50	50	100
6	MCA357	Object Oriented Programming using C++ Lab	0	0	6	3	50	50	100
7	MCA358	Seminar I	0	0	0	2	50	50	100
Elective (Select Any One)									
8	MCA311	Computer Based Accounting	4	1	0	5	40	60	100
	MCA318	Operational Research							
	MCA319	Enterprise Resource Planning							
	MCA321	Digital and Cyber Forensics							
Elective (Select Any One)									
9	MCA307	E-Commerce	4	1	0	5	40	60	100
	MCA312	Mobile Computing							
	MCA314	Digital Image Processing							
	MCA320	Simulation and Modelling							
Total			23	5	12	36	390	510	900

Semester – IV

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MCA402	Theory of Computation	4	1	0	5	40	60	100
2	MCA416	Linux System Administration	4	1	0	5	40	60	100
3	MCA417	Programming in Java	4	1	0	5	40	60	100
4	MCA418	Computer Networks	4	1	0	5	40	60	100
5	MCA456	Linux System Administration Lab	0	0	4	2	50	50	100
6	MCA457	Programming in Java Lab	0	0	4	2	50	50	100
7	MCA458	Seminar II	0	0	0	2	50	50	100
8	MCA 499	English Communication and Soft Skills - IV	0	0	4	2	50	50	100
Elective (Select Any One)									
9	MCA408	Cryptography & Network Security	4	1	0	5	40	60	100
	MCA419	Advanced Distributed Operating System							
	MCA420	Big Data Analytics							
	MCA421	Data Warehouse & Mining							
Elective (Select Any One)									
10	MCA 422	Graph Theory	4	1	0	5	40	60	100
	MCA 423	Discrete Mathematics							
Total			24	6	12	38	440	560	1000

Semester – V

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MCA502	Dot Net Framework with C#	4	1	0	5	40	60	100
2	MCA520	Software Engineering and Project Management	4	1	0	5	40	60	100
3	MCA523	Android Programming	4	1	0	5	40	60	100
4	MCA549	English Communication and Soft Skills - V	3	0	2	4	40	60	100
Elective (Select Any One)									
5	MCA519	Web Development using PHP	3	1	0	4	40	60	100
	MCA524	Python							
Elective Lab (Select Any One)									
6	MCA555	Web Development using PHP Lab	0	0	4	2	50	50	100
	MCA556	Python Lab							
7	MCA557	Dot Net Framework with C# Lab	0	0	4	2	50	50	100
8	MCA558	Android Programming Lab	0	0	4	2	50	50	100
9	MCA554	Minor Project	0	0	4	2	50	50	100
Elective (Select Any One)									
10	MCA513	Neural Networks	3	1	0	4	40	60	100
	MCA514	Soft Computing							
	MCA515	Fuzzy Logic							
	MCA 522	Cloud Computing							
Total			21	5	18	35	440	560	1000

Semester – VI

S. No.	Course Code	Subject	Periods			Credit	Evaluation Scheme		
			L	T	P		Internal	External	Total
1	MCA602	Internship Program	0	0	24	12	50	50	100
Total			0	0	24	12	50	50	100

MCA - Semester I

Concepts of C-Programming

Course Code: MCA 108

L-4, T-1, P-0, C-5

Objective: The objective of this course module is to provide the sound knowledge of C programming. It facilitates the student to develop programming capability to design programs as well as real life applications using C language. It also cover the concept of core programming like how to implement functions, arrays and how to manage data in files using different operations like Pointers to functions and call back functions, Bitwise operations and a case based upon these operations, MACROs and their pitfalls

Course Contents

Unit - I

C Basics: History of C, Characteristics of C, C Program Structure, data types, Enumerated types, Variables, Defining Global Variables, Printing Out and Inputting Variables, Constants, Arithmetic Operations, Comparison Operators, Logical Operators, Order of Precedence, Escape sequence characters, Conditionals (The if statement , The switch statement) Looping and Iteration (The for statement, The while statement, The do-while statement, break ,continue, goto statements) **(Lecture 08)**

Unit - II

Functions: Function Prototyping, passing parameters (Actual and formal arguments), returning values, recursion, Scope of variable (local/global), Storage classes (auto, extern, static, register), Library Functions. **(Lecture 08)**

Unit - III

Arrays and Strings: Single and Multi-dimensional Arrays, Strings

Pointers: Pointer declaration, Pointers arithmetic, Pointer to an array, Array of pointers, Function pointers,

Dynamic Memory Allocation and Dynamic Structures: malloc, calloc and realloc; sizeof, free **(Lecture 08)**

Unit – IV

Structure and Union: Definition, Programs using Structure and Union, Difference between Structure and Union, User defined data types (typedef), Self referential structures

The C Preprocessor: Macros, File inclusion, Other Preprocessor Commands). **(Lecture 08)**

Unit - V

File Handling: Opening and Closing data files, Read and Write Functions, different modes of Files, Library functions for file handling, Command Line Argument,

Graphics using C: Simple pre defined library functions (getpixel, putpixel, line, rectangle, circle, ellipse, arc) **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. The concept of program structure, data type, operator and control statements.
2. The concepts of function, recursion and storage classes.
3. The use of array, string, pointer and dynamic memory allocation.
4. The use of structure, union and preprocessor directive.
5. The use of file handling and graphics function.

Text Books:

1. BalaguruswamyE., *Programming in ANSI C*, TMH
2. Kanitkar Yashwant, *Let Us C*, BPB
3. Kanitkar Yashwant, *Working With C*, BPB

Reference Books:

1. Yashwant Kanetkar, "Pointers in C" 13th Edition, BPB Publications, 2016.
2. Paul Deitel and Harvey Dietel, "How to Program", PHI, 9th Ed., 2011.
3. Behrouz A. Forouzan and Richard F. Gilberg, "Computer Science A Structured Programming Approach Using C", PHI, 3rd Ed., 2007.
4. Jeri R. Hanly and Elliot B. Koffman, "Problem Solving and Programming in C", Pearson, 5th Ed. 2007.
5. Rama N. Reddy and Carol A. Ziegler, "C Programming for Scientist and Engineers with Applications", Jones and Bartlet, 2010.

*Latest editions of all the suggested books are recommended.

MCA-Semester I

Computer Organization & Architecture

Course Code: MCA106

L-4, T-1, P-0, C-5

Objective: Course Objective is to have a thorough understanding of the basic structure and operation of a digital computer, to discuss in detail the operation of the arithmetic unit, to study the different ways of communicating with I/O devices and standard I/O interfaces.

Course Contents

Unit-I

Number System: Binary, Octal, Hexadecimal and Decimal, Codes: BCD Code, Excess -3 Codes, Gray code, Alphanumeric Codes, Parity Bits, Floating Point Numbers. Binary Arithmetic: Basic Rules of Binary Addition, Subtraction, multiplication and division. Addition and subtraction using 1's and 2's Complement Method. **(Lecture 08)**

Unit-II

Combinational and Sequential Circuit: Logic Gates, Karnaugh Map, SOPs & POSs Boolean Expressions, Demorgan's theorem Combinational Circuits: Implementing Combinational Logic, Arithmetic Circuits: Basic Building Blocks, half adder, full adder, half subtractor, full subtractor, De-multiplexers and Decoders, Encoders, R-S Flip Flop, Level Triggered and Edge Triggered Flip Flops, J-K Flip Flop, Master-slave Flip Flops, T-flip Flop, D-flip Flop. **(Lecture 08)**

Unit - III

Register Transfer and Micro operations: Register Transfer Language, Bus and Memory Transfer, Three State Bus Buffers, Memory Transfer, Arithmetic Micro operation (Binary Adder, Binary Adder-Subtractor, Binary Increment, Arithmetic Circuit), Logic Micro operations(List of logic operation), Shift Micro operations, Arithmetic Logic Shift Unit. **(Lecture 08)**

Unit - IV

Processor Organization: General register organization, Stack organization, Addressing mode, Instruction format, Instruction Cycle, Data transfer & manipulations, Program Control, Introduction to RISC and CISC. **(Lecture 08)**

Unit - V

Input-Output Organization: I/O Interface, I/O bus and interface modules, Asynchronous data transfer: Strobe control, Hand Shaking, Modes of transfer: Programmed I/O, Interrupt initiated I/O, DMA, Interrupts & Interrupt handling, Direct Memory access: DMA Controller and DMA Transfer. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. The concept of number system, codes and binary arithmetic.

2. The concept of combinational and sequential circuit
3. The concept of register transfer and micro operation.
4. The concept of processor organization.
5. Input/output mechanisms.

Text Books:

1. Mano M., *Computer System Architecture*, Prentice Hall of India.
2. Mano Morris, *Digital Logic*, Prentice Hall of India.
3. Stallings, *Computer Organization*, Prentice Hall of India.

Reference Books:

1. Vravice, Zaky & Hamacher, *Computer Organization*, Tata Mc Graw Hill
2. Tannenbaum, *Structured Computer Organization*, Prentice Hall of India.
3. Hayes John P., *Computer Organization*, McGraw Hill.

*Latest editions of all the suggested books are recommended.

MCA-Semester I

English Communication and Soft Skills – I

Course Code: MCA199

L-0, T-0, P-4, C-2

Objectives:

1. To remove the phobia of conversing in English.
2. To make the learners able to express themselves among peers & teachers.
3. To enable students improve their vocabulary.
4. To enable the learners introduce themselves in English in their real life situations.

Course Outcomes: At the end of the semester, the learner will be able to:

1. Remove fear of speaking in English among peers & teachers.
2. Develop the ability to speak in English (even if grammatically not correct).
3. Use vocabulary taught for speaking and writing simple sentence for day to day conversation.
4. Use taught vocabulary for writing applications for different purposes.

Unit – I Fear of Failure, Reasons of Fear of Failure & How to overcome it (12 hours)

- Self-Introduction
- Identifying strengths and weakness
- Fear of Failure: Signs of Fear of Failure, Reasons of Fear of Failure, Strategies to overcome Fear of Failure
- Positive Attitude
- Motivation
- Building Self Confidence

Unit – II Confidence, Presentability, Etiquettes & Manners (10 hours)

- Body Language: Facial Expression, Eye Contact, Gesture, Posture, Tips to have appropriate body language
- Grooming & Dressing Sense
- Etiquette & Manners: Social Etiquettes, Telephonic Etiquettes, Dining Etiquettes, Etiquettes to handle cultural differences, Etiquettes of Effective Conversation.
- Problem Sounds (s-sh,j-z,v-b)

Unit – III Conversation Practice, commonly made mistake & Initiating a conversation (10 hours)

- Vocabulary of commonly used words (50 Words)
- Conversation Practice: At College, At Bank, At Ticket Counter (Railway Station & Movie Theatre)

- How to initiate a conversation
- Commonly made mistakes in conversation
- Basics of Communication: 7Cs of Communication

Unit – IV Application writing

(08 hours)

- Format & Style of Application Writing
- Practice of Application writing on common issues.

Reference Books:

- Mitra, Barun. K. “*Personality Development and Soft skills*” New Delhi: Oxford University Press.
- Kumar, Sanjay. & Pushp Lata. “*Communication Skills*” New Delhi: Oxford University Press.
- Carnegie Dale. “*How to win Friends and Influence People*” New York: Simon & Schuster, 1998
- Harris, Thomas. A. “*I am ok, You are ok*” New York: Harper and Row, 1972
- Coleman, Daniel. “*Emotional Intelligence*” Bantam Book, 2006

Evaluation& Assessment: Students will be evaluated on all the four parameters of LSRW

<i>External Exam</i>	<i>Internal Assessment</i>	<i>Total</i>
50	50	100

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- **Internal Assessment: 50**

<i>Best 2 out of Three CTs</i>	<i>Attendance</i>	<i>Assignments& presentation using computerized tool</i>	<i>Total</i>
20	10	10+10	50

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- **External Assessment:50**

PRACTICAL EXAM*	VIVA	TOTAL
25 Marks	25 Marks	50 Marks

- (The external evaluation would be done by an external examiner based on the Practical Exam and viva conducted during the examination. External examiner will be the English faculty from within the university)

- *** Practical Exam Paper Structure: (One Hour Duration)**
- Question paper should consist of four questions out of which the first question will be objective type of 10 marks. Other three question will be long, each of 05 marks.

MCA- Semester I

C- Programming Lab

Course Code: MCA151

L-0, T-0, P-6, C-3

Objective: The objective of this lab is to develop logical and conceptual skills of programming in the students so that they can develop programs in 'C' language.

All programs mentioned below are to be performed:

1. Programs based on data Types
2. Programs to calculate factorial, Fibonacci series.
3. Programs on Arrays – Maximum, Minimum, Sum of the elements, etc
4. Basic Sorting Algorithms
5. Function based programs
6. Returning from Functions
7. Static data handling examples
8. Pointers based address manipulations programs
9. Programs to handle data through the use of structures.
10. Programs based on file handling – create, read, append etc

Course Outcomes:

After the successful completion of the course the student will be able to understand:

1. The use of structured program development in C as applied to both large software systems and to small programming projects.
2. The use of arrays, functions, pointers, macro processors, structures, unions, files
3. The use and structure Graphics programming in C.
4. The concept of file handling.

MCA- Semester I

Computer Organization Lab

Course Code: MCA153

L-0, T-0, P-4, C-2

The student will be required to perform the following experiments:

1. Verify the truth tables of Logic gates (AND, OR, NOT, NAND, NOR, XOR, XNOR).
2. To study NAND, NOR, XOR, XNOR using basic gates.
3. To study logic gates using NAND gate.
4. To study logic gates using NOR gate.
5. Implement Arithmetic expressions using basic gates.
6. Implement Arithmetic expressions using NAND gates.
7. To Implement Arithmetic expressions using NOR gates.
8. Verify the truth tables of flip-flops.
9. To implement Master-Slave Flip-flop.
10. To implement 4*1 multiplexer
11. To implement 8*1 multiplexer
12. To implement 8*1 multiplexer using two 4*1 multiplexer.
13. To implement 1*4 de-multiplexer
14. To implement 1*8 de-multiplexer
15. To implement 1*8 de-multiplexer using two 1*4 de-multiplexer.
16. To implement 2 to 4 Decoder
17. To implement 3 to 8 Decoder
18. To implement 2 to 4 Decoder with NAND Gates.
19. To implement 3 to 8 Decoder using Two 2 to 4 Decoder.
20. To implement Register with parallel Load.
21. To implement Shift Register.
22. To implement 4-bit synchronous binary counter.

23. To implement 4-bit binary Adder.
24. Design 3 bit Gray Code to binary converters
25. Design BCD to Excess-3 code converter.
26. Design a Gray-to Excess-3 Code converter using NAND gates
27. To study Binary adder subtractor.
28. To study Binary incrementer.
29. To study arithmetic circuit.

Course Outcomes:

After the successful completion of the course the student will be able to:

1. Design the gates on simulator.
2. Design the combinational circuits
3. Design the sequential circuit.
4. Implement the registers
5. Design the different convert.

Elective (Select Any One)

MCA- Semester I

Information Security and Cyber Laws

Course Code: MCA107

L-4, T-1, P-0, C-5

Objective: The objective of this subject is to make the students aware about the importance of information security. They will also learn about cybercrimes and acquire a critical understanding of cyber laws in order to prevent their information systems from cybercrimes and to give the learners in depth knowledge of Information security Act and frame work for data security. It helps to develop the understanding of relationship between commerce and cyberspace.

Course Contents

Unit-I

History of Information Systems and its Importance, basics, Changing Nature of Information Systems, Need of Distributed Information Systems, Role of Internet and Web Services, Information System Threats and attacks, Classification of Threats and Assessing Damages

Security in Mobile and Wireless Computing: Security Challenges in Mobile Devices, authentication Service Security, Security Implication for organizations, Laptops Security Concepts in Internet and World Wide Web: Brief review of Internet Protocols-TCP/IP. Functions of various networking components- routers, bridges, switches, hub, gateway.

(Lecture 08)

Unit-II

Basic Principles of Information Security, Confidentiality, Integrity Availability and other terms in Information Security, Information Classification and their Roles. Security Threats to E Commerce, Virtual Organization, and Business Transactions on Web, E Governance and EDI, Concepts in Electronics payment systems, E Cash, Credit/Debit Cards.

(Lecture 08)

Unit-III

Physical Security: Needs, Disaster and Controls, Basic Tenets of Physical Security and Physical Entry Controls. Access Control- Biometrics, Factors in Biometrics Systems, Benefits, and Criteria for selection of Biometrics, Design Issues in Biometric Systems, Interoperability Issues, Economic and Social Aspects, Legal Challenges. Framework for Information Security, ISO 27001, Security Metrics, Information Security V/s Privacy.

(Lecture 08)

Unit-IV

Model of Cryptographic Systems, Issues in Documents Security, System of Keys, Public Key Cryptography, Digital Signature, Requirement of Digital Signature System, Finger Prints, Firewalls, Design and Implementation Issues, Policies, Network Security: Basic Concepts, Dimensions, Perimeter for Network Protection, Network Attacks, Need of Intrusion Monitoring and Detection, Intrusion Detection. Virtual Private Networks: Need, Use of Tunneling with VPN, Authentication Mechanisms, Types of VPNs and their Usage, Security Concerns in VPN.

(Lecture 08)

Unit-V

Laws, Investigation and Ethics: Cyber Crime, Information Security and Law, Types & overview of Cyber Crimes, Cyber Law Issues in E-Business Management, Overview of Indian IT Act, Ethical Issues in Intellectual property rights, Copy Right, Patents, Data privacy and protection, Domain Name, Software piracy, Plagiarism, Ethical hacking. **(Lecture 08)**

Course Outcomes:

After the successful completion of the course the student will be able to understand:

1. An overview of information security: confidentiality, integrity, and availability
2. Malicious software (Viruses, trojans, rootkits, worms, botnets)
3. Access control theory, access control matrix, cybercrime crime
4. Intellectual property, copyright, patent, trade secret
5. Network Intrusion detection and prevention systems

Text Books:

1. Godbole, "Information Systems Security", Willey
2. Merkov, Breithaupt, "Information Security", Pearson Education

Reference Books:

1. Yadav, "Foundations of Information Technology", New Age, Delhi
2. Schou, Shoemaker, "Information Assurance for the Enterprise", Tata McGraw Hill
3. Sood, "Cyber Laws Simplified", Mc Graw Hill
4. Furnell, "Computer Insecurity", Springer

*Latest editions of all the suggested books are recommended.

MCA-Semester I

Social Implications of Information Technology

Course Code: MCA111

L-4, T-1, P-0, C-5

Course Contents

The aim of this course is to help students to learn about the social implications of Information Technology. The paper identifies trends in information technology that have had a significant social impact and identifies their social impact.

Unit-1

Importance of social dimensions of science and technology, global perspectives of technology on society, legal implications of advances in IT. **(Lecture 08)**

Unit-II

How do social and technical choices reshape access to people, services and technologies. Influencing factors such as geography of access, the architecture of networks, the power of receivers and senders and control over the content. **(Lecture 08)**

Unit-III

Social and economic role of eminent social scientists and IT professionals, Information Technology and the reach of boundaries of business and management, Redesigning of work place. **(Lecture 08)**

Unit-IV

The intelligence household, IT in learning and education using digital devices, social and ethical implication, Privacy and surveillance in everyday life , impact of IT on culture. **(Lecture 08)**

Unit-IV

Government challenges of technological, cyber crime laws **(Lecture 08)**

Course Outcomes:

After the successful completion of the course the student will be able to understand:

1. Information and risk.
2. Threats and attacks.
3. Cyber-security architecture and operations.
4. Secure systems and products.
5. Cyber-security management.

Text Books:

1. Dutton, W.H., “*Society on the line: Information politics in digital age*”, Oxford University Press.
2. “*Social, Ethical and Policy Implications of Information and Technology*”, by Linda L. Brennan, Victoria Johnson
3. Castells M., “*The Internet Galaxy*”, Oxford University Press

Reference Books:

1. Teich, A.H., “*Technology and the future*”, Newyork s1. Martinpress.
2. <http://www.alteich.com>
3. <http://www.students.ou.edu.C/Kara.C.chiodo-1/orwell.html>

*Latest editions of all the suggested books are recommended.

Elective (Select Any One)

MCA-Semester I

Concepts of IoT (Internet of Things)

Course Code: MCA109

L-4, T-1, P-0, C-5

Objective

The course aims to introduce students to the concepts underlying the Internet of Things (IoT) through a series of lectures on the various topics that are important to understand the state-of-the-art as well as the trends for IoT. In order to pass the course, the students should be able to:

Content

Unit I

Introduction to Internet in general and Internet of Things: Introduction to Internet: layers, protocols, packets, services; Local Area Networks, MAC level, link protocols such as: point-to-point protocols, Ethernet, WiFi 802.11, cellular Internet access, and Machine-to-Machine (M2M). **(Lecture 08)**

Unit II

IoT Technology Fundamentals: IoT definitions: overview, applications, potential & challenges, and architecture; Devices and gateways, Local and wide area networking; Data management, Business processes in IoT, Everything as a Service(XaaS), IoT Analytics, Knowledge Management. **(Lecture 08)**

Unit III

IoT-An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations. IoT examples: Case studies, e.g. sensor body-area-network and control of a smart home. **(Lecture 08)**

Unit IV

IoT Architecture-State of the Art – Introduction, State of the art, **Architecture Reference Model-** Introduction, Reference Model and architecture, IoT reference Model; IoT Reference Architecture: Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. **(Lecture 08)**

Unit V

Real-World Design Constraints- Introduction, Technical Design constraints, Data representation and visualization, Interaction and remote control. Uses of IoT in Industrial Automation, Commercial Building Automation , Wireless communication, etc. **(Lecture 08)**

Course Outcomes:

After the successful completion of the course the student will be able to:

1. Describe the concept of IoT, its fundamentals
2. Describe IoT architecture, and protocols
3. Conceptually describe countermeasures for Internet of Things devices
4. Compare and contrast the threat environment based on industry and/or device type.
5. Contrast the constraints of real world design.

Textbook:

1. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, David Boyle, **“From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence”**, 1st Edition, Academic Press, 2014.

Reference Books:

1. Vijay Madisetti and Arshdeep Bahga, **“Internet of Things (A Hands-on-Approach)”**, 1st Edition, VPT, 2014.
2. Francis daCosta, **“Rethinking the Internet of Things: A Scalable Approach to Connecting Everything”**, 1st Edition, Apress Publications, 2013

*Latest editions of all the suggested books are recommended.

MCA-Semester I

Concepts of Green Technology

Course Code: MCA110

L-4, T-1, P-0, C-5

Course Objective:

The course aims to introduce the students to *Technology* that is considered environmental friendly based on its production process or supply chain.

Unit-I

Introduction of Green Protocols: Need, Goal and Limitation of Green Technology, Principles of Green Technology with their explanations and examples. Sustainable development, atom economy, reduction of toxicity. **(Lecture 08)**

Unit-II

Relate Safety to Wind, Hydroelectricity, Fuel Cell, Solar and Biomass Technologies, Introduction to Wind Technology, Understand the Science of Wind Technology, Produce electrical energy via a wind-driven generator. Explore control mechanisms of wind-generated electricity. **(Lecture 08)**

Unit-III

Introduction to Hydroelectric & Fuel Cell Technologies, Understand the science of Hydroelectric & Fuel Cell Technologies, produce electrical energy through a hydroelectric system and through a fuel cell system. Explore control mechanisms of hydroelectricity and fuel cells; Build a hydrogen powered Car-Fuel cell X7. **(Lecture 08)**

Unit-IV

Introduction to Solar Technology, Understand the Science of Solar Technology, Understand basic electronics, understand how solar energy is collected and stored. **(Lecture 08)**

Unit-V

Introduction to Biomass Technology, Understand the science of Biomass and Biofuel Technologies, Understand how Biomass is produced. **(Lecture 08)**

Course Outcomes:

After the successful completion of the course the student will be able to understand:

1. Need, Goal and Limitation of Green Computing.
2. Describes green computing and science of various technologies like Wind Technology.
3. Fuel Cell Technologies.
4. Solar Technology.
5. Biomass Technology.

Textbook:

1. Soli J. Arceivala, "Green Technologies", McGraw Hill Education; First edition, 2014.

2. S.K.Garg, “**Environmental Studies and Green Technologies**”, Khanna Publication, First Edition, 2012.
3. V. Sivasubramanian, “**Environmental Sustainability Using Green Technology**”, CRC Press, First Edition, 2016.

Reference Books:

1. David Dornfeld, “**Green Manufacturing: Fundamentals and Applications (Green Energy and Technology)**”, Springer, 2012.
2. Francis daCosta, “**Green Technologies: Concepts, Methodologies, Tools and Applications: 3 (Premier Reference Source)**”, IGI Global; 1st edition, 2011.

*Latest editions of all the suggested books are recommended.

MCA-Semester II

Data Structure with C

Course Code: MCA201

L-4, T-1, P-0, C-5

Objective:

The purpose of this course is to provide the students with solid foundations in the basic concepts of programming: data structures. The main objective of the course is to teach the students how to select and design data structures and algorithms that are appropriate for problems that they might encounter.

Course Contents

Unit-I

Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time Space trade off. **Arrays :** Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered List, Sparse Matrices, and Vectors, Arrays in terms of pointers, Static and Dynamic Memory Management. **Recursion:** Recursive definition and processes, recursion in C, example of recursion, Tower of Hanoi Problem, simulating recursion. Backtracking, recursive algorithms, principles of recursion, tail recursion, removal of recursion.

(Lecture 08)

Unit-II

Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Linked Representation of Stack, Operations Associated with Stacks, and Application of stack, Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.

Queues: Array representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Deque, and Priority Queue

Linked List: Representation and Implementation: Singly Linked List, Doubly Linked List, Circular Linked List, Circular Doubly Linked List, Header Linked List. Operations on Linked List: Insert, Delete, Searching, Traversing. Array and Queue Implementation using Linked List, Polynomial representation and addition.

(Lecture 08)

Unit-III

Sorting: Insertion Sort, Bubble Sort, Selection Sort, Quick Sort, Merge Sort, Heap Sort and Radix Sort, Practical consideration for Internal Sorting. **Searching and Hashing:** Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

(Lecture 08)

Unit-IV

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary

trees, Traversing Binary trees, Threaded Binary trees, Traversing Threaded Binary trees, Huffman algorithm, Binary Search Trees: Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B trees. **(Lecture 08)**

Unit-V

Graphs: Graph definitions and concepts: Edge, Vertices, and Graph representation using Adjacency matrix, Adjacency lists. Types of graphs: Weighted, Unweighted, Directed, Undirected Graphs. Graph operations: creation, insertion, deletion, traversals and searching (depth-first, breadth first) of various types of graphs and Dijkstra's algorithm for shortest distance calculation. Spanning Trees and Minimum Cost Spanning Trees. File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

(Lecture 08)

Course Outcomes:

After the successful completion of the course the student will be able to understand:

1. Use of array and recursion.
2. Use of stack Queue and Linked List.
3. Perform sorting, searching and hashing on given data structure.
4. Use of tree.
5. Use of graph.

Text Books:

1. S. Lipschutz, Data Structures , TMH
2. Yashwant Kanitkar "Data Structure using C"
3. R. S. Salaria, "Data Structures & Algorithms Using C"

Reference Books:

1. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia
2. T. H .Cormen "Introduction to Algorithms " PHI
3. K Loudon, "Mastering Algorithms With C", Shroff Publisher & Distributors
4. A M Tenenbaum, "Data Structure using C", Pearson

*Latest editions of all the suggested books are recommended

MCA- Semester II

Operating System

Course Code: MCA206

L-4, T-1, P-0, C-5

Objective: This course has theory component to teach students the concepts and principles that underlie modern operating systems. In this component, students will learn about processes and processor management, concurrency and synchronization, memory management schemes, file system and secondary storage management, security and protection, etc.

Course Contents

Unit - I

Introduction to the Operating System, Types of Operating System: Batch System, Time Sharing System, Real Time System. Multi Programming, Distributed System, Functions of Operating System and its services. **(Lecture 08)**

Unit - II

Process Management: Process Concept, Process State, Process Control Block, Process Scheduling, CPU Scheduling - CPU Scheduling, Scheduling Criteria, Scheduling Algorithms, Preemptive & Non Preemptive Scheduling. **(Lecture 08)**

Unit - III

Process Synchronization: Critical Section Problem, Race Condition, Synchronization Hardware, Semaphores, Classical Problems of Synchronization. Dead Locks: Characterization, Methods for Handling Deadlock, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock. **(Lecture 08)**

Unit - IV

Memory Management: Contiguous Allocation, External and Internal Fragmentation, Paging & Segmentation. Virtual Memory: Concept of Virtual Memory, Concept of Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing. **(Lecture 08)**

Unit - V

Directory Structure, Allocation Methods: Contiguous Allocation, Linked Allocation, Indexed Allocation Free Space Management. Disk Structure, Disk Scheduling Algorithms, Disk Management. **(Lecture 08)**

Course Outcomes:

After the successful completion of the course the student will be able to:

1. Understand about various operating systems and the functions and services provided by the operating system.
2. Understand the process management, process concepts and how process synchronized.
3. Understand the detailed operation deadlock and deadlock characterization.
4. Understand different memory management techniques like paging segmentation etc.

5. Understanding the concept of Disc access, Disc management and Disc Scheduling.

Text Books:

1. Silbershatz and Galvin," Operating System Concept", Addison Wesley Eighth Edition, 2009.
2. Nutt, G., "Operating Systems", Addison-Wesley.
3. Godbole Achyut, "Operating System", Tata McGraw Hill Education, 2011.

Reference Books:

1. Flynn, Mchoes, "Understanding Operating System", Thomson Press, Sixth Edition, 2013
2. Tannenbaum,"Modern Operating System Concept", PHI Learning,Third Edition, 2009.
3. Joshi, R. C. and Tapaswi, S., "Operating Systems", Wiley Dreamtech.

*Latest editions of all the suggested books are recommended.

MCA – Semester II

Environmental Studies

Course Code: MCA213

L-4, T-0, P-0, C-4

Objective: To create awareness among students about environment protection.

Course Outcomes:

Based on this course, the student will understand / evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development.

Course Content:

Unit I

Definition and Scope of environmental studies, multidisciplinary nature of environmental studies, Concept of sustainability & sustainable development.

Ecology and Environment: Concept of an Ecosystem-its structure and functions, Energy Flow in an Eco-system, Food Chain, Food Web, Ecological Pyramid & Ecological succession, Study of following ecosystems: Forest Ecosystem, Grass land Ecosystem & Aquatic Ecosystem & Desert Ecosystem.

(Lectures 08)

Unit II

Natural Resources: Renewable & Non-Renewable resources; Land resources and land use change; Land degradation, Soil erosion & desertification.

Deforestation: Causes & impacts due to mining, Dam building on forest biodiversity & tribal population. **Energy Resources:** Renewable & Non-Renewable resources, Energy scenario & use of alternate energy sources, Case studies. **Biodiversity:** Hot Spots of Biodiversity in India and World, Conservation, Importance and Factors Responsible for Loss of Biodiversity, Bio geographical Classification of India

(Lectures 08)

Unit III

Environmental Pollutions: Types, Causes, Effects & control; Air, Water, soil & noise pollution, Nuclear hazards & human health risks, Solid waste Management; Control measures of urban & industrial wastes, pollution case studies

(Lectures 08)

Unit IV

Environmental policies & practices: Climate change & Global Warming (Greenhouse Effect), Ozone Layer -Its Depletion and Control Measures, Photochemical Smog, Acid Rain Environmental laws: Environment protection Act; air prevention & control of pollution act, Water Prevention & Control of Pollution Act, Wild Life Protection Act, Forest Conservation Acts, International Acts; Montreal & Kyoto Protocols & Convention on biological diversity, Nature reserves, tribal population & Rights & human

Unit V

Human Communities & Environment:

Human population growth; impacts on environment, human health & welfare, Resettlement & rehabilitation of projects affected person: A case study, Disaster Management; Earthquake, Floods & Droughts, Cyclones & Landslides, Environmental Movements; Chipko, Silent Valley, Vishnoi's of Rajasthan, Environmental Ethics; Role of Indian & other regions & culture in environmental conservation, Environmental communication & public awareness; Case studies. (Lectures 08)

Field Work:

1. Visit to an area to document environmental assets; river/forest/flora-fauna etc.
2. Visit to a local polluted site: urban/ rural/industrial/agricultural.
3. Study of common plants, insects, birds & basic principles of identification.
4. Study of simple ecosystem; pond, river etc.

Text Books:

1. "Environmental Chemistry", De, A. K., New Age Publishers Pvt. Ltd.
2. "Introduction to Environmental Engineering and Science", Masters, G. M., Prentice Hall India Pvt. Ltd.
3. "Fundamentals of Ecology", Odum, E. P., W. B. Saunders Co.

Reference Books:

1. "Biodiversity and Conservation", Bryant, P. J., Hypertext Book
2. "Textbook of Environment Studies", Tewari, Khulbe & Tewari, I. K. Publication

*Latest editions of all the suggested books are recommended.

MCA- Semester II

Data Structure Lab

Course Code: MCA251

L-0, T-0, P-6, C-3

Course Contents

The student will be required to perform the following experiments:

1. Programs to implement Array and Dynamic Array.
2. Implement various sorting techniques.
3. Program to implement recursion in C.
4. Program to implement Stack and Queue Operation.
5. Implement Recursive algorithms – Tower of Hanoi, recursive maximum & minimum etc
6. Program to implement Linked List Operation.
7. Program to implement Stack and Queue Operation using Linked List.
8. Program to implement Binary tree and Binary Search tree.
9. Program to implement *Breadth First Search* and *Depth First Search*.
10. Implementing Priority Heap.

Course Outcomes:

After the successful completion of the course the student will be able to understand:

1. Implementation of array and dynamic array.
2. Implementation of various sorting techniques.
3. Implementation of stack and queue.
4. Implementation of Linked List.
5. Implementation of Tree.

MCA- Semester II

English Communication and Soft Skills-II

Course Code: MCA249

L-3, T-0, P-2, C-4

Objectives:

1. To enhance the vocabulary of learners to prepare for competitive exams like GATE
2. To develop the ability of sentence construction.
3. To enhance learner's writing ability.
4. To make the learner present himself or herself effectively.

Course Outcomes: At the end of the semester, the learner will be able to

1. Learn additional 100 words apart from 50 words learnt in preceding semester (3words/lecture)
2. Write letters effectively.
3. Acquire competence in constructing short sentences dealing day to day activities with grammatical accuracy.
4. Express himself before class / in a group and attain proficiency in deliverance.
5. Acquire adequate knowledge of grammar to prepare for competitive exams like GATE

Course Contents:

Unit – I Vocabulary & Grammar (14 hours)

- Homophones, Homonyms, Synonyms, Antonyms and one-word substitution.
- Parts of Speech, Modals, Tenses and Simple sentence construction.

Unit – II Listening Skills (05 hours)

- Difference between listening & hearing, Types of Listening and Process of listening
- Importance of listening and Barriers to listening

Unit – III Writing Skills (08 hours)

- Letters and Email writing
- Story Narration

Unit – IV Strategies & Structure of Presentation and Problem Sounds (13 hours)

- Managing Time, Audience & Locale, Structure and Organization of Content and 5 W's
- Problem Sounds: S- Sh, J-Z and V-B*

Reference Books:

- Nesfield J.C. “*English Grammar Composition & Usage*” Macmillan Publishers
- Sood Madan “*The Business letters*” Goodwill Publishing House, New Delhi
- Kumar Sanjay & Pushplata “*Communication Skills*” Oxford University Press, New Delhi.

Evaluation& Assessment: Students will be evaluated on all the four parameters of LSRW

<i>External Exam</i>	<i>Internal Assessment</i>	<i>Total</i>
50	50	100

Internal Assessment: 50

<i>Best 2 out of Three CTs</i>	<i>Attendance</i>	<i>Assignments& presentation using computerized tool</i>	<i>Total</i>
20	10	10+10	50

External Assessment:50

PRACTICAL EXAM*	VIVA	TOTAL
25 Marks	25 Marks	50 Marks

(The external evaluation would be done by an external examiner based on the Practical Exam and viva conducted during the examination. External examiner will be the English faculty from within the university)

*** Practical Exam Paper Structure: (One Hour Duration)**

Question paper should consist of four questions out of which the first question will be objective type of 10 marks. Other three question will be long, each of 05 marks.

MCA – Semester II

Information Storage and Management

Course Code: MCA211

L-4, T-1, P-0, C-5

Objective:

The main course objective is to identify the components of managing the data center and Understand logical and physical components of a storage infrastructure and evaluate storage architectures, including storage sub systems SAN, NAS, IPSAN,CAS by Understanding the business continuity, backup and recovery methods.

Course Contents

Unit I

Introduction To Storage And Management

Introduction to Information Storage Management - Data Center Environment Database Management System (DBMS) - Host - Connectivity –Storage-Disk Drive Components- Intelligent Storage System -Components of an Intelligent Storage System- Storage Provisioning- Types of Intelligent Storage Systems (Lecture 08)

Unit II

Storage Networking

Fibre Channel: Overview - SAN and Its Evolution -Components of FC SAN -FC Connectivity- FC Architecture- IPSAN-FCOE-FCIP-Network-Attached Storage- General-Purpose Servers versus NAS Devices - Benefits of NAS- File Systems and Network File Sharing-Components of NAS - NAS I/O Operation. (Lecture 08)

Unit III

Backup And Recovery

Business Continuity -Information Availability -BC Terminology-BC Planning Life Cycle - Failure Analysis -Business Impact Analysis-Backup and Archive - Backup Purpose -Backup Considerations -Backup Granularity - Recovery Considerations-Backup Methods -Backup Architecture - Backup and Restore Operations. (Lecture 08)

Unit IV

Cloud Computing

Cloud Enabling Technologies -Characteristics of Cloud Computing -Benefits of Cloud Computing -Cloud Service Models-Cloud Deployment models-Cloud computing Infrastructure- Cloud Challenges. (Lecture 08)

Unit V

Securing And Managing Storage Infrastructure

Information Security Framework -Storage Security Domains-Security Implementations in Storage Networking - Monitoring the Storage Infrastructure -Storage Infrastructure Management Activities -Storage Infrastructure Management Challenges. (Lecture 08)

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Basics of storage and management.
2. Concepts of storage networking including components, architecture and NAS devices.
3. Basic concepts of backup and recovery, recovery considerations and backup architecture.
4. Knowledge about cloud computing, benefits, various models and challenges.
5. Concepts of information security framework and knowledge about security aspects in storage networking.

Text Books

1. EMC Corporation, “Information Storage and Management”, Wiley India, 2nd Edition.
2. Robert Spalding, “Storage Networks: The Complete Reference”, Tata McGraw Hill, Osborne.

Reference Books

1. Marc Farley, “Building Storage Networks”, Tata McGraw Hill, Osborne, 2nd Edition.
2. Meeta Gupta, “Storage Area Network Fundamentals”, Pearson Education Limited.

*Latest editions of all the suggested books are recommended.

MCA – Semester II

Ethical Hacking

Course Code: MCA212

L-4, T-1, P-0, C-5

Objective:

The main purpose of this course is to make students aware about hacking. The general meaning of hacking is in negative sense. But ethical hacking will let students know how we can prevent our systems from ill aspects of hacking after the study of this course.

UNIT - I

Introduction, Networking & Basics, Foot Printing, Google Hacking, Scanning, Windows Hacking, Linux Hacking, Trojans & Backdoors, Virus & Worms, Proxy & Packet Filtering, Denial of Service, Sniffer, Social Engineering. **(Lecture 08)**

UNIT - II

Introduction to Computer Systems and Networks , information systems and networks (including wireless networks) and their role in industry business and society, System and Network Vulnerability and Threats to Security, various types of attack and the various types of attackers in the context of the vulnerabilities associated with computer and information systems and networks Physical Security. **(Lecture 08)**

UNIT - III

Steganography, Cryptography, Wireless Hacking, Firewall & Honeypots, IDS & IPS, Vulnerability, Penetration Testing, Session Hijacking, Hacking Web Servers, SQL Injection, Cross Site Scripting, Exploit Writing, Buffer Overflow, Reverse Engineering, Email Hacking, Incident Handling & Response, Bluetooth Hacking, Mobile Phones Hacking **(Lecture 08)**

UNIT - IV

An introduction to basic ethical hacking tools and usage of these tools in a professional environment in a form of project **(Lecture 08)**

UNIT - V

An introduction to the particular legal, professional and ethical issues likely to face the domain of ethical hacking. ethical responsibilities, professional integrity and making appropriate use of the tools and techniques associated with ethical hacking. **(Lecture 08)**

Course Outcomes:

After the successful completion of the course the student will be able to understand:

1. Networking & Basics, Foot Printing, Google Hacking.
2. Threats to Security , various types of attack.

3. Steganography, Cryptography, Wireless Hacking.
4. Basic ethical hacking tools and usage of these tools
5. Legal, professional and ethical issues.

Text Books

1. Hands-On Ethical Hacking and Network Defense – By Michael T. Simpson, Kent Backman, James Corley
2. Official Certified Ethical Hacker Review Guide – By Steven DeFino, Barry Kaufman, Nick Valenteen.

Reference Books

1. The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy (Syngress Basics Series) [Paperback]
2. Hands-On Ethical Hacking and Network Defense [Print Replica] [Kindle Edition]

*Latest editions of all the suggested books are recommended.

MCA – Semester II

Human Values and Professional Ethics

Course Code: MCA210

L-3, T-1, P-0, C-4

Objective: Course Objective is to help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.

Course Contents

Unit-I

Course Introduction: Understanding the need, basic guidelines, content and process for Value Education. Self Exploration – what is it? – its content and process; 'Natural Acceptance' and Experiential Validation – as the mechanism of self exploration. Continuous Happiness and Prosperity – A look at basic Human Aspirations. Right Understanding, Relationship and Physical Facilities – the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly – A critical appraisal of the current scenario. Method to fulfill the above human aspirations; understanding and living in harmony at various levels. **(Lecture 08)**

Unit-II

Understanding Harmony in the Human Being – Harmony in Myself: Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' – *Sukh* and *Suvidha*. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: *Sanyam* and *Swasthya*; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure *Sanyam* and *Swasthya*. **(Lecture 08)**

Unit-III

Understanding Harmony in the Family and Society – Harmony in Human-Human Relationship: Understanding harmony in the Family – the basic unit of human interaction. Understanding values in human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship. Understanding the meaning of *Vishwas*; Difference between intention and competence. Understanding meaning of *Samman*; Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals. Visualizing a universal harmonious order in society – Undivided Society (*Akhand Samaj*), Universal Order (*Sarvabhaum Vyawastha*) – from family to world family! **(Lecture 08)**

Unit-IV

Understanding Harmony in the Nature and Existence – Whole existence as co-existence: Understanding the harmony in the nature. Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature. Understanding Existence as Co-Existence (*Sah-astitva*) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence. **(Lecture 08)**

Unit-V

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, c) Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies; management models and production systems. Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers. b) At the level of society: as mutually enriching institutions and organizations. **(Lecture 08)**

Course Outcomes:

After the successful completion of the course the student will be able to understand:

1. Human Aspirations, Right Understanding, Relationship and Physical Facilities.
2. Harmony in the Human Being – Harmony in Myself.
3. Harmony in the Family and Society – Harmony in Human-Human Relationship.
4. Harmony in the Nature and Existence – Whole existence as co-existence.
5. Implications of the above Holistic Understanding of Harmony on Professional Ethics

Text Books:

1. R R Gaur, R Sangal, G P Bagaria, 2009, *A Foundation Course in Value Education*.

Reference Books:

1. Ivan Illich, 2000, *Energy and Equity*, The Trinity Press.
2. A Nagraj, *Jeevan Vidya Ek Parichay*, Divya Path Sansthan.
3. Sussan George, *How the Other Half Dies*, Penguin Press.
4. A. N. Tripathi, *Human Values*, New Age International Publishers.
5. E G Seebauer & Robert L. Berry, *Fundamentals of Ethics for Scientists and Engineers*, Oxford University Press.

*Latest editions of all the suggested books are recommended.

MCA – Semester II

Principles of Management

Course Code: MCA214

L-3, T-1, P-0, C-4

Course Objective

The aim of this subject is to enable the students to describe the nature and scope of management; to know the difference between management and administration; to understand the concepts of organizational behavior and its application in managing people.

Course Contents

Unit – I

Management: Concept, Nature, Importance, Management : Art and Science, Management As a Profession, Management Vs. Administration, Levels of Management, Management Functions, Evolution of Management: Taylor and Scientific Management, Fayol's Administrative Management. **(Lectures 8)**

Unit – II

Planning: Nature, Scope, Objectives and Significance of Planning, Types of Planning, Process of Planning, Barriers to Effective Planning. **(Lectures 8)**

Unit – III

Organizing: Concept, Forms of Organizational Structure, Departmentation, Span of Control, Delegation of Authority, Decision Making. **(Lectures 8)**

Unit – IV

Staffing: Concept, System Approach, Manpower Planning, Job Design, Recruitment & Selection, Training & Development, Performance Appraisal. Directing: Concept, Direction and Supervision Motivation: Concept & importance, Motivation Theories, Morale Building. **(Lectures 8)**

Unit – V

Leadership: Concept & types of Leadership. Controlling: Concept, Types of Control, The Quality Concept, Factors affecting Quality, Pre-control of Inputs, Concurrent Control of Operations. Post Control of Outputs. **(Lectures 8)**

Course Outcomes:

After the successful completion of the course the student will be able to understand:

1. Management Concept, Nature, Importance.
2. Process of Planning, Barriers to Effective Planning.
3. Concept and Forms of Organizational Structure.

4. Staffing.
5. Leadership.

Text Books:

1. Koontz Harold & Wehrich Heinz, “*Essentials of Management*”, Tata McGraw Hill.
2. Robbins & Coulter, “*Management*”, Prentice Hall of India.
3. Robbins S.P. and Decenzo David A., “*Fundamentals of Management: Essential Concepts and Applications*”, Pearson Education
4. Wehrich Heinz and Koontz Harold, “*Management: A Global and Entrepreneurial Perspective*”, Tata McGraw Hill

*Latest editions of all the suggested books are recommended.

MCA- Semester III

Design & Analysis of Algorithms

Course Code: MCA304

L-4, T-1, P-0, C-5

Objective:

This subject will introduce student to basic concepts of algorithms, mathematical aspects and analysis of algorithms, sorting and searching algorithms and about algorithm design methods

Course Contents

Unit-I

Introduction: Algorithms, Analysis of Algorithms, Design of Algorithms, Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences and their solution methods.

Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort.

Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort. **(Lecture 08)**

Unit-II

Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Topological Sort, Strongly Connected Components, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All pair Shortest Path, Traveling Salesman Problem. **(Lecture 08)**

Unit-III

Advanced Design and Analysis Techniques: Dynamic programming: Assembly Line Scheduling, Matrix Chain Multiplication, Longest Common Sequence, Greedy Algorithm: Activity Selection Problem, Knapsack problem. Backtracking, Branch and Bound. **(Lecture 08)**

Unit-IV

Advanced Data Structure: Red Black Trees, Augmenting Data Structure, Binomial Heap, BTree and Fibonacci Heap. **(Lecture 08)**

Unit-V

Randomized Algorithms, String Matching: Naïve String Matching, Rabin-Karp, String matching with finite automata, KMP string matching algorithm, NP-Hard and NP-Complete problems. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Design efficient algorithms using the various approaches for real world problems.
2. Analyze the running time of algorithms for problems in various domains.
3. Apply the algorithms and design techniques to solve problems.
4. Randomized algorithm and string matching
5. Augmenting data structure.

Text Books:

1. Introduction to Algorithms, Cormen 3rd Edition.
2. Design and Analysis of Computer Algorithms, Aho, Pearson Education Pub.
3. Fundamentals of Computer Algorithms by Horowitz and Sahani, Galgotia, 2nd Edition

Reference Books:

1. Algorithm Design and Analysis, Udit Agarwal Dhanpat Rai.
2. Computer Algorithms: Introduction to Design and Analysis by Sara Baase and Allen VanGelder, Pearson Education.
3. Algorithm Design by Jon Kleinberg and Eva Tardos, Pearson Education.
4. Fundamental of Algorithms by Brassard Bratley, PHI.

*Latest editions of all the suggested books are recommended.

MCA- Semester III

Database Management System

Course Code: MCA315

L-4, T-1, P-0, C-5

Objective: The objective of this syllabus is to provide the basic information about database management system and their development. The subject covers: the main features and function of the DBMS; the features of relational database and E-R models; implementation SQL queries; the concept of Transaction, Recovery, Concurrency and Security of DBMS; and Designing database. The subject also covers implementation of PL/SQL based programs.

Course Contents

Unit-I

Basic Concepts: An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models and its type with comparative study, schema and instances, data independence and data base language and interfaces, DDL, DML, Database Structure.

Entity-Relationship Models: ER model concepts, notation for ER diagram, mapping constraints, weak entities, keys, extended ER model, relationships of higher degree. **(Lecture 08)**

Unit-II

Introduction to Relational data Model and Language: Relational data model concepts, integrity constraints, referential integrity, Key constraints, Domain constraints. **Relational Algebra:** Introduction, selection, projection, aggregate functions, joins, Relational calculus- Tuple and Domain calculus. **Introduction to SQL:** Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus. **Introduction to PL/SQL:** Basic concepts, programming constructs, cursor, triggers, function, procedure. **(Lecture 08)**

Unit-III

Data Base Design & Normalization: Functional dependencies, trivial and non-trivial dependencies, normal forms, 1NF, 2NF, 3NF, BCNF, 4NF, 5NF, dependencies preservations, loss less join decompositions, concepts of MVD, and JDs. **(Lecture 08)**

Unit-IV

Transaction Processing Concepts: Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling, Introduction to Distributed Database. **(Lecture 08)**

Unit-V

Database Recovery & Concurrency Control Techniques: Database recovery techniques based on deferred or immediate updates, shadow paging, Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Recovery with concurrent transaction, data fragmentation. Overview of concurrency control and recovery in distributed database. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Understanding the fundamentals of RDBMS.
2. Understanding the database design process and its significance.
3. Logic development for database application programming.
4. Insights into recent developments in database technologies.
5. Data base recovery and Concurrency control

Text Books:

1. Date C J, "An Introduction to Database System", Addison Wesley
2. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addison Wesley
4. Alexis Leon & Mathews Leon, "Essentials of Database Management Systems", Leon Vikas Publication

Reference Books:

1. Paul Beynon Davies, "Database Systems", Palgrave Macmillan
2. Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication
3. Majumdar & Bhattacharya, "Database Management System", TMH
4. Ramakrishnan, Gehrke, "Database Management System", McGraw Hill

*Latest editions of all the suggested books are recommended.

MCA- Semester III

Object Oriented Programming Using C++

Course Code: MCA316

L-4, T-1, P-0, C-5

Objective: To get a clear understanding of object-oriented concepts. To understand object oriented programming through C++.

Unit-I

Features of OOP's, Comparison of C and C++, Object Modeling: Objects and classes, links and Association, generalization and inheritance, aggregation, abstract class, multiple inheritances.

Dynamic Modelling: Events and states, operations, nested state diagrams and concurrency, a sample dynamic model. **(Lecture 08)**

Unit-II

C++ Programming Basics: Variables, data type, Manipulator. Type Conversions. Functions, Call by Reference, Call by Address, Call by Value, Default Arguments, Const Arguments, Function Overloading, Inline Function, Enumerations, Data Conversion. **(Lecture 08)**

Unit-III

Object & Classes: Constructors. Default, Copy Constructor, destructor, Object as Function Arguments, Returning Object from Function. Static Data Members, Static Member Functions, Abstract class, Const Data and Classes. Friend Function, Container class, Forward Declaration of class.

Arrays and String: Arrays Fundamentals, Arrays as Class Member Data. Arrays of Object, String, And The Standard C++ String Class. **(Lecture 08)**

Unit-IV

Inheritance: Concept of Inheritance, Derived Class and Base Class, Derived Class Constructors, Overriding Member Function, Public, protected And Private Inheritance, Levels of Inheritance, Multiple Inheritance, Ambiguity in Multiple Inheritance, Constructor calling in different types of inheritance, Aggregation: Classes Within Classes, Inheritance and program Development.

Polymorphism: - Function Overloading, Operator overloading, operator overloading using friend. **(Lecture 08)**

Unit-V

Pointers: Concept, Pointers to function, new & delete, Pointers To Objects, void pointers. Debugging pointers.

Virtual Function: Static Function, Pure Virtual function. Assignment & Copy Initialization, 'this' Pointer, Dynamic Type Information.

Streams and Files - Complete File Handling Mechanism in C++, Error Handling in File Operation, binary file operations, structures and file operations, classes and file operations, random access file processing, Command line Argument.

Templates and Exceptions: Function Templates, Class Templates, Exception handling, Generic Programming. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Solve problems using object oriented programming principles.
2. Develop the ability to solve real-world problems through software development in high-level programming language like Java.
3. Illustrate understanding of the fundamentals and programming skills in the C++ language.

Text Books:

1. Rambaugh Jamesetal, “Object Oriented Design and Modeling”, PHI
2. Object Oriented Programming in-C++ By Robert Lafore Techmedia Publication
3. Mastering in C++ , K. R. Venugopal Pub Tata McGraw-Hill

References Books:

1. Object Oriented Programming in-C++ By Robert Lafore Techmedia Publication
2. The Complete Reference c++ - By Herbert Sehlidt Tata Megraw-hill publication
3. Object Oriented Programming in C++ Saurav Sahay Oxford University Press
4. Balagurusamy E, “Object Oriented Programming with C++”, TMH,
5. Booch Grady, “Object Oriented Analysis and Design with application 3/e”, Pearson

*Latest editions of all the suggested books are recommended.

MCA- Semester III

English Communication and Soft Skills-III

Course Code: MCA349

L-3, T-0, P-2, C-4

Objectives:

1. To enable the learners to upgrade their knowledge of grammar and vocabulary to prepare for competitive exams like GATE.
2. To enable the learner to improve their listening.
3. To enable the learners to improvise their voice modulation in reading and speaking.
4. To enable the learners to enhance their writing and comprehensive skills in English
5. To enable the learners to proactively participate in activities in situational context.

Course Outcomes: At the end of the semester, the learners will be able to

1. Revise the usage of English grammar in day to day context.
2. Acquire adequate knowledge of grammar to prepare for competitive exams like GATE.
3. Use advance English language by using variety of words i.e. idioms and phrases in variety of sentences in functional context.
4. Improve their listening to understand the basic content.
5. Improvise their voice modulation while reading and speaking something.
6. Enhance writing and comprehension skills in English.
7. Present simple power point presentation (PPT).
8. Proactively participate in activities in situational context (like impromptu).

Unit – I Grammar & Vocabulary

(14 hours)

- Correction of Common Errors (with recap of English Grammar with its usage in practical context.)
- Synthesis of sentences: Simple, complex and compound Sentences
- Transformation of sentences
- Commonly used Idiom & Phrases (Progressive learning whole semester)

Unit – II Essence of Effective listening & speaking

(12 hours)

- Listening short conversation/ recording (TED talks / Speeches by eminent personalities)
Critical Review of these abovementioned
- Voice Modulation: Five P's - Pace, Power, Pronunciation, Pause, and Pitch.
- Impromptu
- Power Point Presentation (PPT) Skills: Nuances of presenting PPTs

Unit – III Reading and Comprehension Skills

(08 hours)

- Strategies of Reading comprehension: Four S's
- How to solve a Comprehension (Short unseen passage: 150-200 words)
- Reading Newspaper (Progressive learning whole semester)

Unit – IV Writing Skills

(06 hours)

- Essentials of a paragraph
- Paragraph writing (100-120 words)

Reference Books:

1. Allen, W. *“Living English Structure”* Pearson Education, New Delhi.
2. Joseph, Dr C.J. & Myall E.G. *“A Comprehensive Grammar of Current English”* Inter University Press, Delhi
3. Wren & Martin *“High School English Grammar and Composition”* S.Chand & Co.Ltd., New Delhi.
4. Norman Lewis *“Word Power Made Easy”* Goyal Publications & Distributers, New Delhi.
5. Chaudhary, Sarla *“Basic Concept of Professional Communication”* Dhanpat Rai Publication, New Delhi.
6. Kumar Sanjay & Pushplata *“Communication Skills”* Oxford University Press, New Delhi.
7. Agrawal, Malti *“Professional Communication”* Krishana Prakashan Media (P) Ltd. Meerut.

Evaluation& Assessment: Students will be evaluated on all the four parameters of LSRW

<i>External Exam</i>	<i>Internal Assessment</i>	<i>Total</i>
50	50	100

Internal Assessment: 50

<i>Best 2 out of Three CTs</i>	<i>Attendance</i>	<i>Assignments& presentation using computerized tool</i>	<i>Total</i>
20	10	10+10	50

External Assessment:50

PRACTICAL EXAM*	VIVA	TOTAL
25 Marks	25 Marks	50 Marks

(The external evaluation would be done by an external examiner based on the Practical Exam and viva conducted during the examination. External examiner will be the English faculty from within the university)

*** Practical Exam Paper Structure: (One Hour Duration)**

Question paper should consist of four questions out of which the first question will be objective type of 10 marks. Other three question will be long, each of 05 marks.

MCA- Semester III

Database Management System Lab

Course Code: MCA356

L-0, T-0, P-4, C-2

The student will be required to perform the following experiments:

1. Introduction to SQL Basics
2. Introduction DBMS environment – Oracle 10g, i-sqlplus environment
3. Description of Data Types
4. Implementing DML operations in SQL.
5. Create a sample Relational Database
6. Using DDL to create Tables, Alter Tables, Drop Tables
7. Implementations and updation of data in tables.
8. Use constraints to define Primary Keys, Foreign Keys, Cascade Operations and check Constraints.
9. Using DCL to grant & revoke permissions to users.
10. Taking backup on Hard Drive.
11. Design a Complete Database for a Bank with at least 2-NF conformity.
12. Implementation of PL/SQL blocks and other database objects

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Develop logical thinking to solve SQL Questions
2. Appreciate performance of different types of queries
3. Identify and define the information that is needed to design a database management system for a business information problem.
4. Create conceptual and logical database designs for a business information problem.

MCA- Semester III

Object Oriented Programming Using C++ Lab

Course Code: MCA357

L-0, T-0, P-6, C-3

The students will be performing the following C++ Programming assignments based on class:

1. Using iostream.h functions in C++
2. Implementing a basic class in C++
3. Creation of Objects and parameter passing.
4. Implementing basic programs using object oriented approach
5. Implementing Constructors and destructor
6. Implementing friend functions, inline functions.
7. Implementing Inheritance
8. Implementing Virtual Functions & Virtual Base classes.
9. Implementing Function Overloading, constructor overloading, operator Overloading
10. Using Container Classes.
11. Passing Objects by reference.
12. Implementing Templates and Exceptions
13. Filing operations using fstream.h

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Ability to implement the object oriented concepts like inheritance, polymorphism and other features.
2. Ability to implement collections and genetic programming.

MCA- Semester III

SEMINAR I

Course Code: MCA358

L-0, T-0, P-0, C-2

Selection of topic:

All students pursuing M.C.A. shall submit the proposed topic of the seminar in the first week of the semester to the course coordinator. Care should be taken that the topic selected does not directly relate to the subject of the courses being pursued. The course coordinator shall then forward the list to the concerned Seminar Committee. The topics will then be allocated to the students along with the name of the faculty guide.

Preparation of the seminar

1. The student shall meet the guide for the necessary guidance for the seminar work.
2. During the next two to four weeks the student should read the primary literature germane to the seminar topic. Reading selection should continuously be informed to the guide.
3. After necessary collection of data and literature survey, the students must prepare a report. The report shall be arranged in the sequence consisting of the following:-
 - a. Top Sheet of transparent plastic.
 - b. Top cover.
 - c. Preliminary pages.
 - (i) Title page
 - (ii) Certification page.
 - (iii) Acknowledgment.
 - (iv) Abstract.
 - (v) Table of Content.
 - (vi) List of Figures and Tables.
 - d. Chapters (Main Material).
 - e. Appendices, If any.
 - f. Bibliography/ References.
 - g. Back Cover (Blank sheet).
 - h. Back Sheet of Plastic (May be opaque or transparent).

For Guide If you choose not to sign the acceptance certificate, please indicate reasons for the same from amongst those given below:

- i) The amount of time and effort put in by the student is not sufficient;

- ii) The amount of work put in by the student is not adequate;
- iii) The report does not represent the actual work that was done / expected to be done;
- iv) Any other objection (Please elaborate)

General points for the seminar

1. The report should be typed on A4 sheet. The Paper should be of 70-90 GSM.
2. Each page should have minimum margins as under
 - a. Left 1.5 inches
 - b. Right 0.5 Inches
 - c. Top 1 Inch
 - d. Bottom 1 Inch (Excluding Footer, If any)
3. The printing should be only on one side of the paper
4. The font for normal text should Times New Roman, 12 size for text and 14 size for heading and should be typed in double space. The references may be printed in Italics or in a different font.
5. The Total Report should not exceed 30 pages including top cover and blank pages.
6. One copy completed in all respect as given above is to be submitted to the guide. That will be kept in departmental/University Library.
7. The power point presentation should not exceed 15 minutes which include 5 minutes for discussion/Viva.

Seminar will be evaluated out of total 100 marks. In Internal Evaluation marks will be awarded out of 50 and in external evaluation also marks will be awarded out of 50 on the basis of viva-voce. Internal evaluation will be exercised by the Internal Evaluation Committee of college.

MCA- Semester III

Computer Based Accounting

Course Code: MCA311

L-4, T-1, P-0, C-5

Objective: The basic purpose of this course is to learn the basics of computer oriented accounting.

Course Contents

Unit - I

Accounting: Principles, concepts and conventions, double entry system of accounting, journal entry, Ledger posting and Trial balance. **(Lecture 08)**

Unit - II

Final Accounts: Trading, profit and loss accounts and balance sheet, Introduction to manufacturing account. **(Lecture 08)**

Unit - III

Tally 9.0: Creation of Company, Accounts only & Accounts with Inventory, Alt the company, Creation of password/security, Opening the company making it active, Creating ledger A/c, Altering individual ledger A/c, Viewing/Altering multiple ledger on screen, Inventory creation , Altering stock group, stock items. **(Lecture 08)**

Unit - IV

Accounting Voucher: Payment voucher, Receipt Voucher, Contra voucher, Journal voucher, Purchase voucher, Sales voucher, Purchase Order, Sales order, Stock Journal voucher, physical Stock voucher, Rejection out voucher, Rejection in voucher . **(Lecture 08)**

Unit - V

Accounting Books and Ledgers: Easy Access to the various Books of Account Cash Book, Bank Book, Debit Note book, Credit Note Book Day Book, Ledger Book **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Ability to know about the basic concept of accounting.
2. Ability to learn about creating ledger, balance sheets.
3. Knowledge of computer based accounting tool by using Tally or different versions of Tally

Text Books:

1. Maheswari S.N. & Maheswari S. K., Introduction to Financial Accountancy, Vikas Publications
2. Grewal. T.S. ,Fundamentals of Accounting
3. Goel D.K. , Introduction to Accounting

Reference Books:

1. Jawahar Lal, Financial Accounting, Wheeler Publishing.
2. Gupta R.L. & Radhaswamy-Fundamentals of Accounting
3. Chawla & Jain-Financial Accounting

*Latest editions of all the suggested books are recommended.

MCA Semester III

Operational Research

Course Code: MCA 318

L-4, T-1, P-0, C-5

Objective: Operations research is a vast branch of mathematics and computer science which encompasses many diverse areas of minimization and optimization. The central objective of operations research is optimization, i.e., "to do things best under the given circumstances." This general concept has great many applications in agricultural planning, biotechnology, data analysis, distribution of goods and resources, emergency and rescue operations, engineering systems design, environmental management, financial planning, health care management, inventory control, manpower and resource allocation, manufacturing of goods, military operations, production process control, risk management, sequencing and scheduling of tasks, telecommunications, and traffic control.

Course Contents

Unit -I

Introduction to operation research (OR): Nature and meaning of 'OR', Principles of Modeling, General Methods for solving 'OR' Models, Main Characteristics of 'OR', Main phases of 'OR'. Scope of 'OR', Role of 'OR' in decision making, Quantitative techniques of 'OR', Development of 'OR' in India, Role of computers in Operation Research. Assignment Problems: Definition, Hungarian Method, Travelling salesman problems. **(Lecture 08)**

Unit -II

Linear Programming Problems (LPP): Definition of LPP, Graphical Solutions of Linear Programming Problems, Simplex Method and Artificial Variable Method, Two Phase Method, Duality, Dual Simplex Method. **(Lecture 08)**

Unit -III

Transportation Problems: Introduction to Transportation Model, Matrix Form of TP, Applications of TP Models, Basic Feasible Solution of a TP, Degeneracy in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method, Techniques for Obtaining Optimal Basic Feasible Solution. **(Lecture 08)**

Unit -IV

Sequencing models: Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines – Processing 2 Jobs through m machines – Processing n Jobs through m Machines. **(Lecture 08)**

Unit- V

Replacement: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely.

Inventory Models: Inventory models –various costs-deterministic inventory models, Single period inventory model with shortest cost, stochastic models, Application of inventory models, Economic lot sizes-price breaks. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Identify and develop operational research models from the verbal description of the real system.
2. Understand the mathematical tools that are needed to solve optimisation problems.
3. Use mathematical software to solve the proposed models.
4. Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.

Text Books:

1. Sharma S.D., Introduction to Operation Research, Kedar Nath and Ram Nath & Co., Meerut
2. Kapoor V.K., Operation Research

Reference Books:

1. Taha H.A, Operational Research-An Introduction, Macmillan, 2nd Edition
2. Hiller and Libermann, Introduction to Operational Research, McGraw Hill, Company.
3. Swarup K., Gupta P.K & Manmohan A., Operational Research, S. Chand,.
4. P. K. Gupta and D. S. Hira, "Operations Research", S. Chand & co., 2007.
5. A.M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education, 2005.

*Latest editions of all the suggested books are recommended.

MCA- Semester III

Enterprise Resource Planning

Course code: MCA319

L-4, T-1, P-0, C-5

Objective: The study of this subject will comprehend the technical aspects of ERP systems. The students will learn concepts of reengineering and how they relate to ERP system implementations. They will be able to map business processes using process mapping techniques. The students will have an insight about the steps and activities in the ERP life cycle and be able to identify and describe typical functionality in an ERP system

Course Contents

Unit-I

ERP Introduction: An Overview Integrated Management Information, Integrated Data Model, ERP Introduction , Evolution of ERP, The Structure of ERP, Conceptual Model of ERP, Benefits of ERP, ERP and E-business. **(Lecture 08)**

Unit-II

ERP and Related Technologies: Business Process Reengineering, Data Warehousing, Data Mining, Online Analytic Processing, Product Life Cycle Management, Supply chain Management, Management Information System, Decision Support System, Executive Information System. **(Lecture 08)**

Unit-III

ERP: Functional Modules-Introduction, Functional Modules of ERP Software, ERP Implementation Lifecycle, Implementation Methodology, Hidden Costs, Organizing the Implementation, Vendors, Consultants and Users, Contracts with Vendors, Consultants and Employees, Project Management and Monitoring. **(Lecture 08)**

Unit-IV

ERP for Industries: Market overview of ERP, ERP for petroleum, GAS companies, ERP for Automobile Industry, ERP for FMCG, ERP for Mining industry ERP for retail, ERP for healthcare, ERP for Educational Institution, ERP for Telecom, ERP for banks, ERP for Insurance companies. **(Lecture 08)**

Unit-V

ERP & E-Commerce: Future Directives in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into organizational culture. Using ERP tool: either SAP or ORACLE format to case study. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. To comprehend the technical aspects of ERP systems.

2. To understand concepts of reengineering and how they relate to ERP system implementations.
3. To be able to map business processes using process mapping techniques.
4. To understand the steps and activities in the ERP life cycle.
5. To be able to identify and describe typical functionality in an ERP system.

Text Books:

1. Alexis Leon, “ERP Demystified”, Tata McGraw Hill
2. Rahul V. Altekar “Enterprisewide Resource Planning”, Tata McGraw Hill

Reference Books:

1. Vinod Kumar Garg and Venkitakrishnan N K, “Enterprise Resource Planning – Concepts and Practice”, PHI
2. Joseph A Brady, Ellen F Monk, Bret Wagner, “Concepts in Enterprise Resource Planning”,
3. Thompson Course Technology
4. Mary Summer, “Enterprise Resource Planning”- Pearson Education
5. Ellen Mon, Bret Wagner "Concepts in ERP", Second Edition of Cengage Learning.

*Latest editions of all the suggested books are recommended.

MCA - Semester III

Digital and Cyber Forensics

Course Code: MCA 321

L-4, T-1, P-0, C-5

Objective: The objective of this course module is to provide the sound knowledge of Android Development. It helps the students to develop various apps using Android for different types of mobile devices and tablets.

Course Contents

Unit - I

Computer Forensic Introduction to Computer/Cyber Forensic, Cyber Forensic Steps (Identification, Seizure, Acquisition, Authentication, Presentation, Preservation). Who is Computer Forensic Expert? Cyber Forensic Investigation Process. The Goal of the Forensic Investigation, Why Investigate (Internet usage exceeds norm, Using e-mail inappropriately, Use of Internet, e-mail, or PC in a non-work-related manner, Theft of information, Violation of security policies or procedures, Intellectual property infractions, Electronic tampering), Establishing a Basis or Justification to Investigate, Determine the Impact of Incident, Auditing V/s Cyber Forensic Investigations. **(Lecture 08)**

Unit - II

Incident Response Introduction to Incident Response Process(What is Computer Security Incident, What are the goals of Incident Response, Who is involved in Incident Response Process, Incident Response Methodology, Formulate a Response Strategy, Investigate the Incident.),Preparing For Incident Response, Overview of Pre-incident Preparation, Identifying Risk, Post Detection of an Incident. **(Lecture 08)**

Unit - III

Cyber Forensic Tools and Utilities Introduction, Examining Breadth of Products, Cyber Forensic Tools. What's the Right Incident Response Tool for Your Organization? , Tool Review Forensic Toolkit, EnCase, Cyber check suites, what is disk Imaging etc. Specifications for Forensic tools Tested. **(Lecture 08)**

Unit - IV

Evidence Collection and Analysis Tools Volatile and Non volatile Evidences collection (Safeback, Gettime, FileList, Filecvt and Excel, Getfree, Swapfiles and Getswap, GetSlack, Temporary Files), Detailed Procedures for Obtaining a bit stream backup of hard drive, File System (Details of File system, Data Structure Of File System,Data Recovery in Different file system). **(Lecture 08)**

Unit - V

Biometrics Introduction to Biometrics, What is Biometrics, Use of Biometrics, Model of Biometric system Various types of Biometric methods, User Acceptance, Evaluating Accuracy, Advantages & disadvantages of biometrics. General Biometric System (Identification and Verification), General Architecture Comparison of different Biometric Technologies, What makes Biometrics difficult. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Basic concepts of Computer Forensics
2. Details about incident response
3. An idea about tools and utilities in cyber forensics
4. Concepts of evidence collection
5. Aspects of biometrics

Text Books:

1. Incident Response and Computer Forensic by Kelvin Mandia, TMH Publication
2. Digital Forensics: Digital Evidence in Criminal Investigations by Angus McKenzie Marshall
3. Cyber Forensic A Field Manual for Collecting, Examining and Preserving Evidence of Computer Crimes by Albert J Menendez. Auerbach Publications.
4. First Responder's Guide to Computer Forensics by Richard Nolanetal. - Carnegi Mellon.

Reference Books:

1. Cyber Forensic by Marecella Menendez.
2. Computer Forensic by Newman.
3. Cyber Crime Investigation Field Guide, by B Middleton.

*Latest editions of all the suggested books are recommended.

MCA- Semester III

E-Commerce

Course Code: MCA307

L-4, T-1, P-0, C-5

Objective: The purpose of this course is to introduce e-commerce, its impacts on business processes, and key issues in the development of web-based business information systems and applications. This course deals with issues of security, electronic payments, mobile commerce and the future aspects of e-commerce.

Course Contents

Unit - I

Introduction: History of Electronic commerce, Different type of e-commerce, Advantages and Disadvantages, Architectural framework, Network Infrastructure, Information super highway, E-Commerce applications. **Electronic market place of buyers and sellers:** Consumer and business markets: ordering on-line, Advertisement and Marketing on Internet, Offering customer product on the net. **(Lecture 08)**

Unit - II

Mobile Commerce: Introduction, Mobile computing framework, wireless technology and switching method, mobile information access device, mobile computing application. **(Lecture 08)**

Unit - III

Security and E-commerce: Client–server security, data and message security, document security, firewalls, Cryptography Techniques, Cyber laws, Cyber crimes & frauds, hacking threats. **(Lecture 08)**

Unit - IV

Electronic Payments: Characteristics of E-payment system, Type of E-payment, digital token–based e-payment, smart card, credit card payment systems, SET Protocol for credit card payment, risk on e-payment, designing e-payment, EDI, EDI Implementation, Value added networks. **(Lecture 08)**

Unit - V

Electronic-Commerce Market: : Strategies for marketing, Sales and Promotions, Strategies for Purchasing and Support activities, Strategies for Web Auctions, Online advertisements, Role of Social Networking sites in e-commerce, Virtual Communities, Strategies for Electronic Business, Web portal concepts. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. The basic concepts and technologies used in the field of management information systems.
2. Have the knowledge of the different types of management information systems
3. Understand the processes of developing and implementing information systems

4. Be aware of the ethical, social, and security issues of information systems
5. Understand the role of information systems in organizations, the strategic management processes, and the implications for the management.

Text Books:

1. Ravi Kalakota, Andrew Winston, “Frontiers of Electronic Commerce”, Addison Wesley.
2. Bajaj and Nag, “E-Commerce the cutting edge of Business”, TMH
3. Henry Chan “E-Commerce Fundamentals and application”, Wiley publication

Reference Books:

1. Daniel Amor, “**The E-Business (R) Evolution**”, Prentice Hall, PTR, New Delhi.
2. P. Loshin, John Vacca, “Electronic commerce”, Firewall Media, New Delhi
3. David “E- Commerce Strategies, Technology and applications “, TMH
4. Jeffrey “Introduction to E-commerce”, TMH

*Latest editions of all the suggested books are recommended.

MCA- Semester III

Mobile Computing

Course Code: MCA312

L-4, T-1, P-0, C-5

Objective: The objective of this course is to understand fundamental concepts of mobile computing. These include mobility and service management, data management, routing in mobile ad hoc and sensor networks, and security issues for mobile systems.

Course Contents

Unit - I

Introduction: Issues in mobile computing, Study of Electromagnetic Spectrum: Radio wave, Microwave, Infrared, Overview of wireless communication, Cellular concept, sharing of wireless channels: FDMA, TDMA, CDMA, GSM: location management-HLR, VLR, handoffs, channel allocation, Differences among CDMA & GPRS, EDGE, 3G Technologies. **(Lecture 08)**

Unit - II

Mobile Data Communication: WLANs (Wireless LANs); IEEE 802.11 standard; Mobile IP; Wireless Application Protocol (WAP); Mobile Internet Standards; WAP Gateway and Protocols; Wireless Markup Languages (WML). **(Lectures 08)**

Unit - III

Third Generation (3G) Mobile Services: International Mobile Telecommunications 2000 (IMT 2000) vision; Wideband Code Division Multiple Access (W-CDMA); and CDMA 2000; Quality of services in 3G. **(Lecture 08)**

Unit - IV

Mobile Ad hoc networks, Routing protocols, Route discovery & maintenance: Global State Routing (GSR), Destination Sequenced Distance Vector Routing (DSDV), Dynamic Source Routing (DSR), Ad- Hoc On demand Distance Vector Routing (AODV), Temporary Ordered Routing Algorithm (TORA) **(Lecture 08)**

Unit - V

Mobile Internet & wireless Web: WAP, WAP Protocol stack, security issues in mobile computing, IEEE 802.11 security through WEP, Bluetooth security, WAP 2.0 security. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Evaluate the architecture and principles of operation of computer systems and networks.
2. Develop consumer and enterprise mobile applications using representative mobile devices and platforms using modern development methodologies.
3. Assess the capabilities of next-generation networks and the role of wireless technologies in network design and operation.
4. Evaluate network protocols, routing algorithms, connectivity methods and characteristics.
5. Select appropriate wireless technologies in commercial and enterprise applications.

Text Books:

1. J.Schiller “Mobile communication, “Pearson “
2. Lin, Y. B. and Chlamatac, I, *Wireless and mobile Networks Architecture*, John Wiley & Sons.
3. Pandya, R., *Mobile & Personnel communication Systems and Services*, Prentice Hall India.

Reference Books:

1. Mobile Computing Technology, Applications & Service creation, “Ashoke K. Talikdar,
2. Mobile Computing Theory & Practice “Kumkumgarg – PEARSON”.

*Latest editions of all the suggested books are recommended.

MCA- Semester III

Digital Image Processing

Course Code: MCA314

L-4, T-1, P-0, C-5

Objective:

The study of this subject will help to get an overview of the field of image processing, to understand the fundamental algorithms and how to implement them. The student will gain experience in applying image processing algorithms to real problems.

Course Contents

Unit - I

Image Fundamentals and Transforms: Elements of visual perception – Image sampling and quantization basic relationship between pixels – Basic geometric transformations – Introduction to fourier transform and DFT – Properties of 2D fourier transform – FFT – Separable image transforms – Walsh-Hadamard – Discrete cosine transform – Haar-Slant – Karhunen-Loeve transforms. **(Lecture 08)**

Unit - II

Image Enhancement Techniques: Spatial domain methods – Basic grey level transformation – Histogram equalization – Image subtraction – Image averaging – Spatial filtering – Smoothing – Sharpening filters – Laplacian filters – Frequency domain filters – Smoothing – Sharpening filters – Homomorphic filtering. **(Lecture 08)**

Unit -III

Image Restoration: Model of image degradation/restoration process – Noise models – Inverse filtering – Least mean square filtering – Constrained least mean square filtering – Blind image restoration – Pseudo inverse – Singular value decomposition. **(Lecture 08)**

Unit -IV

Image Compression: Lossless compression – Variable length coding – LZW coding – Bit plane coding – Predictive coding – PCM – Lossy compression – Transform coding – Wavelet coding – Basics of image compression standards – JPEG – MPEG – Basics of vector quantization. **(Lecture 08)**

Unit -V

Image Segmentation and Representation: Edge detection – Thresholding – Region based segmentation – Boundary representation – Chain codes – Polygonal approximation – Boundary segments – Boundary descriptors – Simple descriptors – Fourier descriptors – Regional descriptors – Simple descriptors – Texture. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Ability to apply knowledge of mathematics, science, and engineering.
2. Ability to design and conduct experiments, as well as to analyze and interpret data.

3. Ability to identify, formulates, and solves engineering problems.
4. Ability to recognition of the need for, and an ability to engage in life-long learning.

Text Book:

1. Rafael C Gonzalez and Richard E Woods, “Digital Image Processing 3rd Edition, Pearson Education, 2003.

References:

1. William K Pratt, “Digital Image Processing”, John Willey.
2. A. K. Jain, “Fundamentals of Digital Image Processing”, PHI, New Delhi, 1995.
3. Chanda Dutta Magundar, “Digital Image Processing and Applications”, PHI, 2000.

*Latest editions of all the suggested books are recommended.

MCA- Semester III

Simulation and Modeling

Course code: MCA 320

L-4, T-1, P-0, C-5

Objective: This subject aims at analysis of problems before implementing it through simulation techniques and to predict the performance of system by providing historical data with the use of computers. It is one of the emerging fields and currently all large projects go for simulation.

Course Contents

Unit -I

System definition and components, stochastic activities, continuous and discrete Systems, System modeling, types of models, static and dynamic physical models, Static and dynamic mathematical models, Full corporate model, types of system study. **(Lecture 08)**

Unit -II

System simulation, Basic nature of simulation, technique of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation, simulation of pure-pursuit problem single-server queuing system and an inventory problem, Monte Carlo simulation, Distributed Lag models, Cobweb model. **(Lecture 08)**

Unit -III

Simulation of continuous systems, analog vs. digital simulation, simulation of water reservoir system, simulation of a servo system, simulation of an autopilot Discrete system Simulation, Fixed time-step vs. event-to-event model, generation of random numbers, Test for randomness, Generalization of non-uniformly distributed random numbers, Monte-Carlo computation vs. stochastic simulation. **(Lecture 08)**

Unit -IV

System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, System Dynamics diagrams, Feedback in Socio-Economic systems. **(Lecture 08)**

Unit -V

Simulation of PERT networks, Critical path computation, uncertainties in Activity duration, Resource allocation and consideration, Simulation software, Simulation languages, continuous and discrete simulation languages, Expression based languages, object-oriented simulation, general-purpose vs. application-oriented simulation packages. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Ability of Knowledge based problem formulation
2. Defining the system

3. Ability of model translation
4. Ability of verification, validation
5. Ability of experimental design and analysis

Text Books:

1. Geoffrey Gordon, "System Simulation", PHI
2. Narsingh Deo, "System Simulation with digital computer", PHI
3. Averill M. Law, W. David Kelton, "Simulation Modeling and Analysis", TMH

Reference Books:

1. Banks, Carson, "Discrete Event System Simulation", PHI

Note: Web references to be used as required

*Latest editions of all the suggested books are recommended.

MCA- Semester IV

Theory of Computation

Course Code: MCA402

L-4, T-1, P-0, C-5

Objective: The primary objective of a Theory of Computation (TOC) course is to introduce the fundamental mathematical and computational principles that are the foundation of computer science. These include topics such as PDA, Turing machines, Automata, grammars and formal languages and Normal Forms.

Course Contents

Unit-I

Fundamentals: Strings, Alphabet, Language, Operations, Finite state machine, Definitions, Finite automaton model, acceptance of strings and languages, Deterministic finite automaton and non deterministic finite automaton, Transition diagrams and language recognizers, Chomsky hierarchy of languages. **(Lecture 08)**

Unit-II

Finite Automata: NFA with ϵ transitions-Significance, Acceptance of languages. Conversions and Equivalence, Equivalence between NFA with and without null transitions, NFA to DFA conversion, Minimization of FSM, Equivalence between two FSM's, Finite Automata with output-Moore and Mealy machines. **(Lecture 08)**

Unit-III

Regular Languages: Regular sets, Regular expressions, Identify rules, Constructing finite Automata for a given regular expressions, Conversion of finite automata to regular expressions, Pumping lemma of regular sets.

Grammar Formalism: Regular grammars-right linear and left linear grammars, Equivalence between regular linear grammar and FA, Context free grammar, Derivation trees, Sentential forms, Rightmost and leftmost derivation of strings. **(Lecture 08)**

Unit-IV

Context Free Grammars: Ambiguity in context free grammars. Minimization of context free grammars, Chomsky normal form, Greiback normal form, Pumping lemma for context free languages. **(Lecture 08)**

Unit-V

Push Down Automata: Push down automata, Definition, Model, Acceptance of CFL, Acceptance by final state and acceptance by empty state and its equivalence. Equivalence of CFL and PDA, Introduction to Turing Machine, TM Definition, TM Model, Design of TM. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars.
2. Demonstrate the understanding of key notions, such as algorithm, computability, decidability, and complexity through problem solving.
3. Prove the basic results of the Theory of Computation.
4. State and explain the relevance of the Turing machines.

Text Books:

1. K.L.P. Mishra and N.Chandrasekaran, “Theory of Computer Science (Automata, Languages and Computation)”, PHI
2. Hopcroft, Ullman, “Introduction to Automata Theory, Language and Computation”, Nerosa Publishing House

Reference Books:

1. Martin J. C., “Introduction to Languages and Theory of Computations”, TMH
2. Papadimitrou, C. and Lewis, C.L., “Elements of theory of Computations”, PHI
3. Cohen D. I. A., “Introduction to Computer theory”, John Wiley & Sons
4. Kumar Rajendra, “Theory of Automata (Languages and Computation)”, PPM

*Latest editions of all the suggested books are recommended.

MCA- Semester IV

Linux System Administration

Course Code: MCA416

L-4, T-1, P-0, C-5

Objective: This course provides a practical introduction to Linux system Administration. It helps students gain knowledge and skills required for the role of Linux system administrator.

Course Content

Unit-I

Basics of Linux : Introduction to Linux - History, Architecture, Comparison with UNIX, Features and Facilities of Linux, Basic commands in Linux, Files and File Structure - Linux File System, Boot block, Super block, Inode table, Data blocks, Linux standard directories. File naming Conventions, Path, Types of file names and Users, File Commands in Linux file comparisons, Directory Commands Text Editors-Functions of a Text Editor, vi Editor, Locating Files File Access Permissions [FAP], Viewing and Changing FAPs, Redirection, Filters, Pipes. **(Lecture 08)**

Unit-II

Shell Programming: Basics of shell programming, various types of shell available in Linux, Comparisons between various shells, shell programming in bash, Conditional statements- if statement, case statement, select statement- shell programs, Looping statements, Iterations, repeat statement, shift command- shell programs, Command Substitution - expr command, arithmetic expansion - shell programs, Parameter passing and arguments- - shell programs, Shell variables, system shell variables, shell keywords- - shell programs 2.8 Creating Shell programs for automating system tasks. **(Lecture 08)**

Unit-III

User Management : Common administrative tasks, identifying administrative files configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, User management tools, Command line user management, Changing permissions and ownerships Creating and managing groups, creating groups with useradd, Modifying group attributes with groupmod, Modifying user attributes with usermod, Temporary disabling of users accounts, deleting groups and users, Creating and mounting file system.

System Management : Checking and monitoring system performance - file security & Permissions, Becoming super user using su. Getting system information with uname, host name, Disk partitions & sizes, users, kernel, Installing and removing packages, Backup and restore, command line tools, Compress utilities - tar, cpio, dump, rsync and restore utilities, Miscellaneous Backup solutions . **(Lecture 08)**

Unit-IV

Communication : Communication in Linux - mesg, who- T, talk, write, Communication in Linux - wall, finger, chfn, ping, traceroute utilities, email facilities, Configuration of servers- Telnet, FTP

Configuration of servers- DHCP, NFS, Configuration of servers- SSH, Proxy Server(Squid) Configuration of servers- Web server (Apache), Samba. Daemons- init, crond, atd, xinetd, inetd, The services file. named, sshd, httpd. **(Lecture 08)**

Unit-V

Network Management : Managing the X Window System, Configuring X Server – Setting Display Resolution and Changing Video Card Type, TCP/IP Networking: TCP/IP explained, Understanding and Setting up Network Interface Card (NIC), Working with Gateways, Working with Gateways Routers, Configuring DHCP Server and Client, Editing Network Configuration. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. To describe and use the LINUX operating system.
2. To describe and use the fundamental LINUX system tools and utilities.
3. To describe and write shell scripts in order to perform basic shell programming.
4. To describe and understand the LINUX file system.

Text Books:

1. A Practical Guide to Fedora and Red Hat Enterprise Linux, - Mark G. Sobell, Pearson
2. Linux: Learning the Essentials –James K L, PHI

Reference Books:

1. Linux Administration: A Beginner's Guide, WALE SOYINKA – TMH
2. Collings Terry and Wall Kurt, Red Hat Linux Networking & System Administration, Wiley Indian.
3. Linux: The Complete Reference, Sixth Edition, Richard Petersen, TMH

*Latest editions of all the suggested books are recommended.

MCA- Semester IV

Programming in Java

Course Code: MCA417

L-4, T-1, P-0, C-5

Course Objective: The objective of this course is to make the students proficient in Java and JEE. The course elaborates the entire details about Java from the beginning to advanced frame works. On completion of this course students can develop different applications in Java.

Course Content

Unit -I

Fundamental Programming Structures: Introduction to Java, Data Types, Variables, Operators, Control Flow, Arrays, Big Numbers. **Objects and Classes:** Introduction to Object Oriented Programming, Classes, Inner classes, Access Specifiers, Methods, Argument Passing Mechanism, Constructors, Overloading, finalize, static, Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Object Wrappers and Autoboxing, Packages and Interfaces. **(Lecture 08)**

Unit- II

String Handling, Exception Handling, Input/Output, Networking. **Graphics Programming:** Applet Fundamentals, Introducing AWT, Graphics, Colors, Fonts, Displaying Image. **Event Handling:** Delegation Event Model, Event Classes, Event Listener Interfaces. **AWT Controls:** Button, Label, Checkbox, Checkbox Group, Choice, List, Scrollbar, Text Field, Text Area, Menu. **Layout Managers:** Flow Layout, Border Layout, Grid Layout, Card Layout, Removing Layout Management and Using Insets. **(Lecture 08)**

Unit- III

Swings: Swings Overview, Creating a Swing Applet and Application. **Swing Components:** Image Icon, JLabel, JTextField, JTextArea, JButton, JCheckBox, JRadioButton, JComboBox, JList, JProgressBar, Using Menu & Toolbar, Different Panes, JPanel, JTable, JSlider, JInternalFrame, Dialog Boxes.

Multithreading: Thread States, Thread Priorities, Synchronization, multithreading applications with Applets and Swings **(Lecture 08)**

Unit- IV

JDBC: Introduction to JDBC, Types of JDBC Drivers, java.sql package, Using stored procedures and Metadata. **Utilities:** Using JAR and JAVADOC utilities.

Introduction to Beans: Java Bean API, Beans properties, Simple Bean Example, Enterprise Java Bean-Entity Beans, Session Beans, Message Driven Beans. **(Lecture 08)**

Unit- V

Java Servlets: Servlet Basics, Servlet API, Life Cycle of Servlet, Running Servlet, HTTP Redirects, Session Management

**Java Server Pages (JSP): JSP Elements, Implicit Objects, Using Bean, Introduction to JSTL.
(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Be able to understand better the object-oriented approach in programming. Students should be able to analyze and design a computer program to solve real world problems based on object-oriented principles.
2. Be able to write computer programs to solve real world problems in Java
3. To learn and appreciate the importance and merits of proper comments in source code and API documentations
4. Be able to write simple GUI interfaces for a computer program to interact with users, and to understand the event-based GUI handling principles.
5. To learn advance features in Java development.

Text Books:

1. Patrick Naughton & Herbert Schildt, *The Complete Reference JAVA2*, Tata Mc Graw Hill
2. Cay S. Horstmann & Gary Cornell, *Core Java 2 Volume I – Fundamentals*, PHI

Reference Books:

1. Balagurusamy E., *Programming in JAVA*, Tata McGraw Hill
2. Steven Holzner, *Java2 Black Book*, Dreamtech
3. Herbert Schildt, *The Complete Reference JAVA2*, Tata McGraw Hill

*Latest editions of all the suggested books are recommended.

MCA- Semester IV

Computer Networks

Course Code: MCA418

L-4, T-1, P-0, C-5

Objective: The objective of this course is to provide the knowledge of the concepts of Computer Networks and emerging network technologies. The course provides the in depth understanding of wired and wireless networks, IPv6, Virtual Private Networks, Network hardware and algorithms.

Course Contents

Unit -I

Congestion and Quality of Service (QoS): Data traffic, Congestion, Congestion Control, Open loop and Closed Loop Congestion Control in TCP and Frame Relay, Quality of Service, Flow Characterization, Flow Classes, Need for QoS, Resource Allocation, Best Effort Service Features, Techniques to Improve QoS. **(Lecture 08)**

Unit-II

ATM Protocol Reference Model: Introduction, Transmission Convergence (TC) Sub-layer, Physical Medium Dependent (PMD) Sub-layer, Physical Layer Standards for ATM.

ATM Layer: ATM Cell Header Structure at UNI, ATM Cell Header Structure at NNI, ATM Layer Functions. **(Lecture 08)**

Unit-III

Virtual Private Network (VPN): Types of VPN, VPN General Architecture, Current VPN Advantages and Disadvantages, VPN Security Issues, VPN Standards.

IP Addressing: IPv4 header format, Classless Addressing of IP, Calculating network and host, calculating subnetting, IPv6 addressing, Header format of IPv6, Advantage of IPv6 **(Lecture 08)**

Unit-IV

Wireless Local Area Networks: Introduction, Wireless LAN Topologies, Wireless LAN Requirements, the Physical Layer, the Medium Access Control (MAC) Layer, Latest Developments, Wireless LAN standards **(Lecture 08)**

Unit-V

Interconnection Networks: Introduction, Banyan Networks- Properties, Crossbar Switch, Three Stage Class Networks, Rearrangeable Networks, Folding Algorithm, Benes Networks.

SONET/SDH: SONET/SDH Architecture, SONET Layers, SONET Frames, STS Multiplexing, SONET Network. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Understand Network fundamentals and terminology.
2. Understand principles of LAN design such as topology and configuration depending on types of users accessing the network.
3. Understand different type of network interfaces and their uses by identifying and using basic Network components, choosing appropriate network type and media.
4. Understand network industry standards such as: the OSI model, Routing Protocols, Address Resolution and Reverse Address Resolution Protocols, IP Addresses and Subnetting, MAC Addressing.

Text Books:

1. Wireless Communications - Andrea Goldsmith, 2005, Cambridge University Press.
2. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, 2004, PHI.
3. Data Communication and Networking - B. A.Forouzan, 4th updating, 2004, TMH

Reference Books:

1. Introduction to Broadband Communication Systems- Sadiku, Mathew N.O., Akujuobi, Cajetan.M, PHI
2. Wireless Networks- P. Nicopolitidis, A. S. Pomportsis, G. I. Papadimitriou, M. S. Obaidat, 2003, JohnWiley & Sons
3. High Performance TCP / IP Networking – Mahaboob Hassan, Jain Raj, PHI.
4. Telecommunication System Engineering – Roger L. Freeman, 4/ed., Wiley-Interscience, John Wiley & Sons, 2004.

*Latest editions of all the suggested books are recommended.

MCA- Semester IV

Linux System Administration Lab

Course Code: MCA456

L-0, T-0, P-4, C-2

- 1 Installation of Linux, network based installation
- 2 Basic Overview of various commands- cal, pwd, cd, ls, mv, cp, rm, mkdir, rmdir, more, less, touch.
- 3 Creating and viewing files using cat, file comparisons, disk related commands, checking disk free spaces.
- 4 Batch commands, kill, ps, who, Printing commands, find, sort, touch, file, file processing commands- wc, cut, paste etc
- 5 Mathematical commands - expr, factor etc. Filter commands- pr, head, tail, cut, sort, uniq,
- 6 tr - Filter using regular expression grep, egrep, sed, awk
- 7 Shell Programming -Shells, Scripting Rationale Creating a bash Script, bash Start up Files, A Script's Environment, Exporting Variables, Exit Status, Programming the Shell 8Parameter Passing, Operators, looping, Input and Output.
- 9 Process Management with Linux, File System management, User Administration, Linux Start up and Shutdown, Software package Management
- 10 Network Administration: Server Configuration- DHCP, DNS, FTP, Telnet, SSH, NFS, Web Server, SQUID Proxy server.

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Knowledge of the role and responsibilities of a Unix system administrator
2. Install and configure the Linux operating system
3. Manage the resources and security of a computer running Linux at a basic level
4. Make effective use of Unix utilities, and scripting languages
5. Configure and manage simple TCP/IP network services on a Linux system.

MCA- Semester IV

Programming in Java Lab

Course Code: MCA457

L-0, T-0, P-4, C-2

1. Developing simple console application in Java.
2. Programs based on loops, arrays, operators and big numbers.
3. Programs based on Classes and Objects.
4. Programs based on Method Overloading, Constructors.
5. Simple application based on static keyword.
6. Programs based on Inheritance.
7. Programs based on Method Overriding, Dynamic Method Dispatch, Abstract Classes.
8. Programs based on Object Wrappers and Autoboxing.
9. Programs based on String Handling.
10. Programs based on Networking.
11. Simple application to demonstrate the working of Packages.
12. Developing a Simple Applet.
13. An applet to demonstrate the working of Mouse Events.
14. Programs based on the usage of all AWT controls.
15. A simple application to demonstrate the working of Frames.
16. A simple swing application.
17. Programs to demonstrate event handling on various swing components.
18. Programs based on applets and multithreading.
19. A simple application to retrieve and insert records in MS-Access database.
20. A simple application to retrieve and insert records in My-SQL database.
21. Use of JAR and JAVADOC utilities.
22. A simple client-server application using RMI.
23. Programs based on Servlets.
24. A simple application using JSP.
25. A web based application that could search a record from the database.

Course Outcome

After the successful completion of the course the student will be able to understand:

1. To familiarize the students with language environment.
2. To implement various concepts related to language.

MCA- Semester IV

SEMINAR II

Course Code: MCA458

L-0, T-0, P-0, C-2

Selection of topic:

All students pursuing M.C.A. shall submit the proposed topic of the seminar in the first week of the semester to the course coordinator. Care should be taken that the topic selected does not directly relate to the subject of the courses being pursued. The course coordinator shall then forward the list to the concerned Seminar Committee. The topics will then be allocated to the students along with the name of the faculty guide.

Preparation of the seminar

1. The student shall meet the guide for the necessary guidance for the seminar work.
2. During the next two to four weeks the student should read the primary literature germane to the seminar topic. Reading selection should continuously be informed to the guide.
3. After necessary collection of data and literature survey, the students must prepare a report. The report shall be arranged in the sequence consisting of the following:-
 - a. Top Sheet of transparent plastic.
 - b. Top cover.
 - c. Preliminary pages.
 - (i) Title page
 - (ii) Certification page.
 - (iii) Acknowledgment.
 - (iv) Abstract.
 - (v) Table of Content.
 - (vi) List of Figures and Tables.
 - d. Chapters (Main Material).
 - e. Appendices, If any.
 - f. Bibliography/ References.
 - g. Back Cover (Blank sheet).
 - h. Back Sheet of Plastic (May be opaque or transparent).

For Guide If you choose not to sign the acceptance certificate , please indicate reasons for the

same from amongst those given below:

- i) The amount of time and effort put in by the student is not sufficient;
- ii) The amount of work put in by the student is not adequate;
- iii) The report does not represent the actual work that was done / expected to be done;
- iv) Any other objection (Please elaborate)

General points for the seminar

1. The report should be typed on A4 sheet. The Paper should be of 70-90 GSM.
2. Each page should have minimum margins as under
 - a. Left 1.5 inches
 - b. Right 0.5 Inches
 - c. Top 1 Inch
 - d. Bottom 1 Inch (Excluding Footer, If any)
3. The printing should be only on one side of the paper
4. The font for normal text should Times New Roman, 12 size for text and 14 size for heading and should be typed in double space. The references may be printed in Italics or in a different font.
5. The Total Report should not exceed 30 pages including top cover and blank pages.
6. One copy completed in all respect as given above is to be submitted to the guide. That will be kept in departmental/University Library.
7. The power point presentation should not exceed 15 minutes which include 5 minutes for discussion/Viva.

Seminar will be evaluated out of total 100 marks. In Internal Evaluation marks will be awarded out of 50 and in external evaluation also marks will be awarded out of 50 on the basis of viva-voce. Internal evaluation will be exercised by the Internal Evaluation Committee of college.

MCA- Semester IV

English Communication and Soft Skills – IV

Course Code: MCA499

L-0, T-0, P-4, C-2

Objectives:

1. To enable the learners to inculcate the skills of technical writing.
 2. To enable the learners to proactively participate in Job Oriented activities.
 3. To enable the learners to be aware of corporate Skills.
-

Course Outcomes: At the end of the semester, the learners will be able to

1. Formulate their CVs along with cover letter for Job.
2. Learn technical communication.
3. Proactively participate in Job Oriented activities. (Like Interview, GD etc.)
4. Be aware of the skills required for corporate world.

Course Contents:

Unit – I: Job Oriented Skills (10 Hours)

- a) Cover Letter
- b) Preparing Resume and Curriculum-Vitae
- c) Writing Joining Report

Unit – II: Technical Communication (12 Hours)

- d) Technical description of engineering objects
- e) Data Interpretation: Tables, Charts, & Graphs
- f) Preparing Agenda & Minutes of the Meeting
- g) Technical Proposal: Types, Significance, Structure & AIDA
- h) Report Writing: Types, Structure & Steps towards Report writing

Unit- III: Interview Skills (10 Hours)

- Branding yourself
- Interview: Types of Interview, Tips for preparing for Interview and Mock Interview
- Group Discussion: Do's and Don'ts of Group Discussion
- Negotiation skills

Unit – IV: Corporate Skills (8 Hours)

- Corporate Expectation
- Service mindset: Selling a product - Ad made shows
- Goal setting
- Team Building & Leadership
- Professional Ethics

Reference Books:

- Raman Meenakshi & Sharma Sangeeta, “*Technical Communication-Principles & Practice*” Oxford University Press, New Delhi.
 - Mohan K. & Sharma R.C., “*Business Correspondence of Report Writing*”, TMH, New Delhi.
 - Chaudhary, Sarla “Basic Concept of Professional Communication” Dhanpat Rai Publication, New Delhi.
 - Kumar Sanjay & Pushplata “*Communication Skills*” Oxford University Press, New Delhi.
 - Agrawal, Malti “*Professional Communication*” Krishana Prakashan Media (P) Ltd. Meerut.
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Evaluation& Assessment: Students will be evaluated on all the four parameters of LSRW

<i>External Exam</i>	<i>Internal Assessment</i>	<i>Total</i>
50	50	100

Internal Assessment: 50

<i>Best 2 out of Three CTs</i>	<i>Attendance</i>	<i>Assignments& presentation using computerized tool</i>	<i>Total</i>
20	10	10+10	50

External Assessment:50

PRACTICAL EXAM*	VIVA	TOTAL
25 Marks	25 Marks	50 Marks

(The external evaluation would be done by an external examiner based on the Practical Exam and viva conducted during the examination. External examiner will be the English faculty from within the university)

*** Practical Exam Paper Structure: (One Hour Duration)**

Question paper should consist of four questions out of which the first question will be objective type of 10 marks. Other three question will be long, each of 05 marks.

MCA- Semester IV

Cryptography & Network Security

Course Code: MCA408

L-4, T-1, P-0, C-5

Objective: To achieve this secrecy, mankind has relied on a branch of science known as cryptography. The study of this subject will provide an introduction to the fundamental principles of cryptography and its applications on the network security domain, to study various approaches to Encryption techniques, strengths of Traffic Confidentiality, Message Authentication Codes and to be familiar with cryptographic techniques for secure (confidential) communication of two parties over an insecure (public) channel; verification of the authenticity of the source of a message.

Course Contents

Unit-I

Introduction to Security: Attacks, Services & Mechanisms, Security. Conventional Encryption Model, Classical Encryption Techniques, Steganography, Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation. **(Lecture 08)**

Unit-II

Conventional Encryption Algorithms: Triples DES, Blowfish, International Data Encryption Algorithm, RC5, Placement of Encryption Function, Key Distribution, Random Number Generation. **(Lecture 08)**

Unit-III

Public Key Encryption: Public-Key Cryptography: Principles of Public-Key Cryptosystems, RSA Algorithm, Key Management, Fermat's & Euler's Theorem, Primality Test, The Chinese Remainder Theorem. **(Lecture 08)**

Unit-IV

Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Function, Birthday Attacks, Security of Hash Function & MAC, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures, Authentication Protocol, Digital Signature Standard (DSS). **(Lecture 08)**

Unit-V

Network & System Security: Authentication Applications: Kerberos X.509, Directory Authentication Service, Electronic Mail Security, Pretty Good Privacy (PGP), S / Mime, Key Management, Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set), System Security: Intruders, Viruses, Firewall Design Principles, Trusted Systems. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Some of the factors driving the need for network security
2. Classify particular examples of attacks
3. Define the terms vulnerability, threat and attack
4. Identify physical points of vulnerability in simple networks
5. Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack, and explain the characteristics of hybrid systems.

Text Books:

1. William Stallings, “Cryptography and Network Security: Principles and Practice”, Prentice Hall, New Jersey.
2. Atul Kahate, “Cryptography and Network Security”, TMH

Reference Books:

1. Johannes A. Buchmann, “Introduction to cryptography”, Springer- Verlag.

*Latest editions of all the suggested books are recommended.

MCA- Semester IV

Advanced Distributed Operating System

Course Code: MCA419

L-4, T-1, P-0, C-5

Objective: This course covers general issues of design and implementation of advanced modern operating systems. The focus is on issues that are critical to the applications of distributed systems and computer networks, which include interprocess communication, distributed processing, sharing and replication of data and files. This course also gives the concept of logical clock and deadlock concepts in Distributed environment.

Course Contents

Unit-I

Introduction: Overview of an operating system, Limitation of existing systems, advanced operating system- introduction, types, synchronization mechanism. Concept of process, concurrent process- Critical section problem, other synchronization problems- Language mechanisms for synchronization- axiomatic verification of parallel programs- process deadlocks-preliminaries – models of deadlocks , resources, system states. **(Lecture 08)**

Unit-II

Communication in Distributed Systems: Communication primitives in Distributed systems, Remote process communication, Clock synchronization, Lamport's logical Clock, Vector Clock, Termination detection. Distributed Mutual Exclusion - Non Token based Algorithms- Lamport's Algorithm, Token Based Algorithms-Suzuki kasami's Broadcast Algorithms. **(Lecture 08)**

Unit-III

Deadlock in Distributed system: Distributed Deadlock- introduction, detection, prevention, correction. Deadlock Detection algorithms. Agreement protocols – classification, solutions , applications. Distributed transaction- Introduction, Model, Distributed commit issues, commit protocols. **(Lecture 08)**

Unit-IV

Distributed Resource Management: Distributed File systems- Architecture, Mechanism, Design issues, NFS, AFS & Coda, Distributed shared memory - architecture, algorithms, protocols, Distributed scheduling – issues, components, algorithms. **(Lecture 08)**

Unit-V

Recovery and Fault Tolerance: Classification of failure, Basic approach of recovery, Recovery Techniques. Fault Tolerance – Issues , non-blocking commit protocols, voting protocols, dynamic voting protocols. Security in Distributed systems. **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Outline the potential benefits of distributed systems
2. Summarize the major security issues associated with distributed systems along with the range of techniques available for increasing system security
3. Apply standard design principles in the construction of these systems
4. Select appropriate approaches for building a range of distributed systems, including some that employ middleware.

Text Books:

1. Andrew S. Tanenbaum and Maarten van Steen. “Distributed Systems: Principles and Paradigms”, Prentice Hall.
2. Mukesh Singhal and N.G. Shivaratri , “Advanced Concepts in Operating systems ” Tata McGraw – Hill.

Reference Books

1. Abraham Silberschatz , Peter B. Galvin, G Gagne, “Operating System Concepts” , Addison Wesley.
2. Randy Chow and Theodore Johnson. “Distributed Operating Systems & Algorithms”, Addison-Wesley.

*Latest editions of all the suggested books are recommended.

MCA- Semester IV

Big Data Analytics

Course code: MCA420

L-4, T-1, P-0, C-5

Objective

This course provides practical foundation level training that enables immediate and effective participation in big data projects. The course provides grounding in basic and advanced methods to big data technology and tools, including MapReduce and Hadoop and its ecosystem.

Course Content

Unit I

INTRODUCTION TO BIG DATA: Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce. **(Lectures 08)**

Unit-II

INTRODUCTION HADOOP: Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization. **(Lectures 08)**

Unit-III

HADOOP ARCHITECTURE: Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance. **(Lectures 08)**

Unit-IV

HIVE AND HIVEQL, HBASE:Hive Architecture and Installation, Comparison with Traditional Database, HiveQL – Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries, HBase conceptsAdvanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper. **(Lectures 08)**

Unit-V

Big Data Analytics: Introduction to Big data Business Analytics - State of the practice in analytics role of data scientists - Key roles for successful analytic project - Main phases of life cycle - Developing core deliverables for stakeholders. **(Lectures 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Demonstrate knowledge of statistical data analysis techniques used in decision making.
2. Apply principles of Data Science to the analysis of large-scale problems.
3. Familiarity of technologies like Hadoop framework, Hive.

Text Books:

1. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, “Professional Hadoop Solutions”, Wiley, ISBN: 9788126551071, 2015.
2. Chris Eaton, Dirk deroos et al. , “Understanding Big data ”, McGraw Hill, 2012.

Reference Books:

1. Tom White, “HADOOP: The definitive Guide” , O Reilly 2012.
2. Vignesh Prajapati, “Big Data Analytics with R and Haoop”, Packet Publishing 2013.
3. Tom Plunkett, Brian Macdonald et al, “Oracle Big Data Handbook”, Oracle Press, 2014
4. Jy Liebowitz, “Big Data and Business analytics”, CRC press, 2013.
5. Chris Eaton, Dirk Deroos, Tom Deutsch et al., “Understanding Big Data”, McGrawHill, 2012.

*Latest editions of all the suggested books are recommended.

MCA - Semester IV

DATA WAREHOUSE & MINING

Course Code: MCA421

L-4, T-1, P-0, C-5

Objective

Data warehouse is used to manage the old data and mining is used for finding the appropriate information for decision making. The course provides knowledge of Data warehousing and Data mining.

Course Contents

Unit I

Data Warehousing: Understanding data warehouse, features of data warehouse, integrating heterogeneous databases, comparison of data warehouse and operational data, benefits of data warehousing, problems of data warehousing, data warehouse applications, data warehouse types, types of data stored in a data warehouse, extract transform load. **(Lectures 08)**

Unit II

Dimensional Modeling: Dimensional tables, Fact tables, STAR Schema, Characteristics of Star Schema, Keys; Advantages. Updates to the Dimension tables; miscellaneous dimensions; Snowflake schema, Advantage of Snowflake Schema, Aggregate fact tables; Families of STARS, fact constellation. **(Lectures 08)**

Unit III

Data Warehousing Architecture: Operational Data, Store, Detailed, Lightly and Highly summarized, Meta-Data; Archive/Backup; Manager: Load, Warehouse, Query; Architecture models: 2-Tier, 3-Tier and 4-Tier, data warehouse design approaches, data warehouse models. **(Lectures 08)**

Unit IV

OLAP: Definitions, Codd's Rules, Characteristics, Features and functions, Olap system components, Dimensional analysis; Hypercubes; Drill-Down and Roll-Up; Slice-and-Dice or Rotation; OLAP Models. **(Lectures 08)**

Unit V

Data Mining: Definition; Knowledge discovery process (KDP); Applications of data mining, architecture of a typical data mining system, types of data mining system
Major data mining techniques; Cluster detection, Decision trees; Memory-based reasoning; Link analysis; Neural networks; Genetic algorithms; Applications; Benefits. **(Lectures 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Discuss the role of data warehousing and enterprise intelligence in industry and government.
2. Summarize the dominant data warehousing architectures and their support for quality attributes.
3. Compare and contrast the dominant data mining algorithms.
4. Analyse the results generated from the constructed artifact to determine if patterns of clusters were detected in the data sets.
5. Demonstrate an appreciation of the importance of paradigms from the fields of Artificial Intelligence and Machine Learning to data mining.
6. Intelligene and Machine Learning to data mining.

Text Books

1. Paul R. P., *Fundamentals Of Data Warehousing*, John Wiley and Sons.
2. Inmon W. H., *Building the Operational Data Store*, John Wiley and Sons.

References Books

1. Anahony S., *Data Warehousing In the Real World: A Practical Guide for Building DecisionSupport Systems*, John Wiley and Sons.

*Latest editions of all the suggested books are recommended.

MCA- Semester IV

Graph Theory

Course Code: MCA422

L-4, T-1, P-0, C-5

Objective

To familiarize the students with the most fundamental Graph Theory topics and results and to be exposed to the techniques of proofs and analysis.

Course Contents

Unit I

Graphs – Introduction , Isomorphism ,Sub graphs , Walks, Paths, Circuits ,Connectedness ,Components ,Euler graphs ,Hamiltonian paths and circuits , Trees ,Properties of trees ,Distance and centers in tree ,Rooted and binary trees. **(Lectures 08)**

Unit II

Spanning trees ,Fundamental circuits ,Spanning trees in a weighted graph , cut sets ,Properties of cut set ,All cut sets ,Fundamental circuits and cut sets , Connectivity and separability ,Network flows ,1-Isomorphism , 2-Isomorphism , Combinational and geometric graphs , Planer graphs , Different representation of a planer graph. **(Lectures 08)**

Unit III

8 Chromatic number ,Chromatic partitioning , Chromatic polynomial , Matching , Covering ,Four color problem, Directed graphs ,Types of directed graphs ,Digraphs and binary relations , Directed paths and connectedness ,Euler graphs. **(Lectures 08)**

Unit IV

Fundamental principles of counting , Permutations and combinations , Binomial theorem, combinations with repetition ,Combinatorial numbers ,Principle of inclusion and exclusion , Derangements , Arrangements with forbidden positions. **(Lectures 08)**

Unit V

Generating functions , Partitions of integers , Exponential generating function ,Summation operator ,Recurrence relations,First order and second order ,Non-homogeneous recurrence relations , Method of generating functions. **(Lectures 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. To formulate problems in terms of graphs, solve graph theoretic problems.
2. To learn the mathematical manipulation of counting problems.

3. To use generating functions to solve a variety of combinatorial problems.
4. To learn the techniques of proof and analysis.

Text Books

1. Narsingh Deo, "Graph Theory: With Application to Engineering and Computer Science", Prentice Hall of India.
2. Grimaldi R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", Addison Wesley.

Reference Books

1. Clark J. and Holton D.A, "A First Look at Graph Theory", Allied Publishers.
2. Mott J.L., Kandel A. and Baker T.P. "Discrete Mathematics for Computer Scientists and Mathematicians" , Prentice Hall of India.
3. Liu C.L., "Elements of Discrete Mathematics", Mc Graw Hill.
4. Rosen K.H., "Discrete Mathematics and Its Applications", Mc Graw Hill.

*Latest editions of all the suggested books are recommended.

MCA- Semester IV

Discrete Mathematics

Course Code: MCA423

L-4, T-1, P-0, C-5

Objective: This course is designed to introduce students to the techniques, algorithms, and reasoning processes involved in the study of discrete mathematical structures. Students will be introduced to inductive reasoning, elementary and advanced counting techniques, recurrence relations, graphs, trees and combinatorics. Through their study of these topics students will develop a greater understanding of the breadth of mathematics and will acquire a familiarity with concepts, structures and algorithms that are essential to the field of computer science and applied mathematics.

Course Contents

Unit - I

Propositional Calculus: Propositions, Truth tables, Logical Equivalence, Logical implications, Algebra of propositions, Conditional propositions, Bi-conditional statements, Negation of Compound statements, Tautologies and Contradiction, Normal Form, Arguments, Fallacies.

(Lecture 08)

Unit - II

Principle of Counting: The Principle of Inclusion-Exclusion, Mathematical Induction, Addition and Multiplication Rules, Pigeon-Hole Principle, Permutations and Combination. (Lecture 08)

Unit – III

Graphs: Introduction to Graphs, Finite and Infinite Graphs, Incidence and Degree, Isolated Vertex, Pendant Vertex, and Null graph, Hand Shaking Lemma, Regular graph, Complete Graph, Bipartite Graph, Isomorphic and Homeomorphisms of Graphs, Subgraph, Connected and Disconnected graphs, Operations on Graphs, Euler graph, Fleury's Algorithm to find Eulerian Circuit, Hamiltonian graph, Chinese Postman Problem and Travelling-Salesman problem.

(Lecture 08)

Unit - IV

Planar Graph and Coloring of Graphs: Introduction, Planar Graphs, Kuratowski's Graphs, Detection of Planarity, Coloring of Graphs, Chromatic Partitioning, Chromatic Polynomial, Edge Coloring, Vertex Coloring, Four Color Theorem, Five Color Theorem.

Trees: Definition, Properties of trees, Spanning tree, Minimal Spanning tree, Kruskal's and Prim's Algorithms to find Minimal Spanning tree. (Lecture 08)

Unit - V

Combinatorics: Generating function, Recurrence Relations- Homogeneous solution, particular solution, Solving Recurrence Relations using the Characteristic Polynomial and Generating function **(Lecture 08)**

Course Outcome

After the successful completion of the course the student will be able to understand:

1. Identify and apply basic concepts of set theory, arithmetic, logic, proof techniques, binary relations, graphs and trees
2. Produce convincing arguments, conceive and/or analyse basic mathematical proofs and discriminate between valid and unreliable arguments.
3. Apply the knowledge and skills obtained to investigate and solve a variety of discrete mathematical problems.

Text Books:

1. J. P. Tremblay and R Manohar, “Discrete Mathematics”,TMH
2. K Rosen, “Discrete Mathematics”,TMH
3. Seymour Lipschutz and Marc Lipson, “Discrete Mathematics”, Schaum Outlineseries – Tata McGraw Hill.
4. Narsingh Deo, “Graph Theory with Applications to Engineering and Computer Science”, Prentice Hall of India.

Reference Books:

1. Liu C.L., “Elements of Discrete Mathematics”
2. Neville Dean, “Essence of Discrete Mathematics Prentice Hall”
3. Swapan Kumar Sarkar “Discrete Mathematics”, -S Chand

*Latest editions of all the suggested books are recommended.

MCA- Semester V

Dot Net Framework with C#

Course Code: MCA502

L-4, T-1, P-0, C-5

Objective: The student after completing this course should have gained: the ability to effectively use visual studio .NET, understanding of the goals and objectives of the .NET Framework. .NET is a revolutionary concept on how software should be developed and deployed, working knowledge of the C# programming language, understanding of how to use forms to develop GUI programs under .NET, knowledge of some of the tools available in the .NET Framework class library (FCL). The student will gain improved object-oriented programming skill through practice and insights gained by studying a new programming language.

Course Content

Unit—I

Architecture of the .Net Framework Development Platform: Compiling Source Code into Managed Code, Metadata, Intermediate Language (IL), Common Language Runtime Services, Common Type System, Common Language Specification The .Net Framework Class Library, Just-In-Time Compilation, Unified Classes.

C# Basics: Data Types, Literals and Variables, Operator, Program Control Statements, Class and Object, Arrays and Strings,

A Closer Look at Methods and Classes: C# Access Modifiers, Use ref and out parameter, Variable number of Arguments, Concept of Return Object and Array. Method Overloading, Overloading Constructors, Optional Arguments, Named Arguments, Recursion, Understanding Static. **(Lecture 08)**

Unit—II

Operator Overloading, Indexers and Properties, **Inheritance** : Member Access using Protected Access, Calling Base Class Constructor, Name Hiding, Virtual Methods and Overriding, Abstract Classes, Using sealed to Prevent Inheritance, Boxing and Unboxing. Interfaces, Exception Handling. Using I/O. **(Lecture 08)**

Unit-III

Delegates and Events, Namespaces and Assemblies, Reflection, Unsafe Code, Networking and Socket. **Multithreading** : Thread Class, Determining when a Thread Ends, Thread Priorities, Synchronization, Thread Communication using Wait(), Pulse() and PulseAll(), Using the Mutex and a Semaphore. Collections. Windows Forms (IDE Environment) **(Lecture 08)**

Unit—IV

Advanced Features Using C#: Windows Services, Web Services.

Introduction to ADO.Net: Connected v/s. Disconnected Data Access. ADO.Net Architecture, Connection Object, SQL Command Object, Data Adapter, Data Reader, DataSet.

Asp.net Web Form Controls. State Management, Grid View Control, Validation Controls. Concepts of Paging, Database connectivity with authentication and authorization. **(Lecture 08)**

Unit—V

Advanced Features Using C#: Distributed Application in C#, Graphical Device interface with C#, Enumeration.

AJAX: Introduction to AJAX, Using Asp.Net Ajax Controls, Implement Web forms by using Asp.Net Ajax, ASP.NET application using Ajax control toolkit.

LINQ :LINQ Fundamental, LINQ to Object, LINQ to XML, LINQ to SQL **(Lecture 08)**

Course Outcome

After completion of this course students are expected to have understanding of:

1. Knowledge of .Net Architecture and basics of C# programming language.
2. Understanding of Inheritance and Operator overloading in C#.Net
3. Knowledge of Multi threading programming
4. Handling database with C#
5. Knowledge of web programming using ASP.Net with AJAX and LINQ

Text books:

1. Wiley,” Beginning Visual C# 2008”, Wrox
2. “.Net professional framework 4.0”, Wrox
3. “Black Book .Net Framework 4.0”. DreamTech
4. “C# 4.0 Complete Reference”, by Herbert Schildt
5. “Professional ASP.NET 4.5 in C# and VB” by Bill Evjen, Scott Hanselman, Devin Rader, Wrox

Reference Books:

1. C#.Net Developers Guide- Greg Hack, Jason Werry, SaurabhNandu. (SyngRes)
Wrox Press Professional C# 4th Edition – Simon Robinson, Jay Glynn

*Latest editions of all the suggested books are recommended.

MCA- Semester V

Software Engineering and Project Management

Course Code: MCA520

L-4, T-1, P-0, C-5

Objective: To develop methods and procedures for software development that can scale up for large systems and that can be used consistently to produce high-quality software at low cost and with a small cycle of time and to help students to develop skills that will enable them to construct software of high quality software that is reliable, and that is reasonably easy to understand, modify and maintain.

Course Contents

Unit - I

Introduction: Introduction to software engineering, Importance of software, The evolving role of software, Principle of Software engineering, Software Characteristics, Software Components, Software Applications, Software Crisis, Reasons of Software Crisis, SDLC.

Software Process Models: Water Fall Model, The Incremental Model, RAD, Evolutionary Prototyping, Spiral Model.

Requirement Engineering: Requirement Gathering, and Analysis, SRS, IEEE Standards for Requirement Specification. **(Lecture 08)**

Unit - II

Software-Design: Design principles, problem partitioning, abstraction, and top down and bottom up design, Structured approach, functional versus object oriented approach, design specifications and verification, Cohesion, Coupling, Functional independence, Structured Analysis, DFD, Data Dictionary, Developing DFDs and Structure Chart.

Coding: Characteristics of Coding, Programming Style, Code Review, Code Walkthrough, Code Inspections. **(Lecture 08)**

Unit - III

Testing: Testing Principles, Levels of testing, Stress testing, Regression Testing, Functional testing(Black Box Testing), Structural Testing(White Box Testing), Test Plan, Test Case Specification, Software Testing Strategies, Verification & validation, Unit testing, Integration Testing, Alpha & Beta Testing, System Testing and Debugging

Agile Methodology: Agile Manifesto and Principles, Agile Management Practices, Risk Management and the Customer in Agile Methods, Agile Engineering Practices, Tailoring and Improving Agile Methods, Challenges in Adopting Agile Methods, Agile Methods and Software Process Frameworks. **(Lecture 08)**

Unit - IV

Software Project Management: Project Planning, Project Size estimation, Project Estimation Technique, Cost Estimation, COCOMO Model, Project Scheduling, Staffing, Putnam Model, Organization and Team Structure, Risk Management, Software configuration Management. **(Lecture 08)**

Unit - V

Software Maintenance: Software Maintenance Process Model, Types of Maintenance, software Reverse Engineering, Estimation of Maintenance Cost.

Software Reliability & Quality Assurance: Reliability issues, Reliability metrics, Reliability growth modelling, Software quality, Quality Assurance, ISO 9000 certification for software industry, SEI capability maturity model, comparison between ISO & SEI CMM, CASE and its Scope, Architecture of CASE environment, Characteristics of Case Tools. **(Lecture 08)**

Course Outcome

After completion of this course students will have understanding of:

1. Introduction to Software engineering and various models of software development.
2. Software design aspects.
3. Software testing strategies
4. Software project management
5. Maintenance and Quality Aspects of software project.

Text Books:

1. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
2. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International
3. Pressman, Roger S., “Software Engineering: A Practitioner’s Approach”, McGraw Hill

Reference Books:

1. Pankaj Jalote, Software Engineering, Wiley
2. Ian Sommerville, Software Engineering, Addison Wesley.

*Latest editions of all the suggested books are recommended.

MCA - Semester V

Android Programming

Course Code: MCA 523

L-4, T-1, P-0, C-5

Objective: The objective of this course module is to provide the sound knowledge of Android Development. It helps the students to develop various apps using Android for different types of mobile devices and tablets.

Course Contents

Unit - I

Overview: What is Android, Features of Android, Setting up Android Environment, Android Architecture, Application Framework. Application components (activities, services, Broadcast receivers, content providers). First sample application, Anatomy of Android application, Main activity file, Manifest file, Strings file, R file, Layout file, Running the application. **(Lecture 08)**

Unit - II

Emulator-Android Virtual Device, Organizing and accessing the resources, Fragments, Intents & Filters, Basic UI Design, Form widgets, Text Fields, UI Controls, UI Layouts. **(Lecture 08)**

Unit - III

Event Handling: Event Listeners and Handlers, Event Listeners Registration. Preferences, Menus, Custom Components, Tabs and Tab Activity **(Lecture 08)**

Unit – IV

Styles and Themes, Drag and Drop, Content Provider (SQLite Programming, SQLiteOpenHelper, SQLiteDatabase, Cursors). **(Lecture 08)**

Unit - V

Location Based Services, Sending Emails, Sending SMS **(Lecture 08)**

Course Outcome

After completion of this course students will have understanding of:

1. Android Framework for Application Development
2. Emulators to be used
3. Event handling in android
4. Basics of styles and themes in Android

Text Books:

1. Carmen Delessio., *Sams Teach Yourself Android Application Development in 24 Hours*, SAMS
2. Reto Meier, *Wrox Professional Android Application Development*, Paperback

Reference Books:

1. Jonathan Simon, *Head First Android Development*, O'Reilly

*Latest editions of all the suggested books are recommended.

MCA- Semester V

English Communication & Soft Skills – V

Course Code: MCA549

L-3, T-0, P-2, C-4

Objective: To enhance students' soft skills and personality by inculcating values in them for suitable employability.

Course Content:

Unit -1 Soft Skills and Personality Development (06 hours)

- a) Introduction to Soft Skills
- b) Classification of Soft Skills
- c) Manners and Etiquettes
- d) Traits of Leadership

Classroom Activity: (02 Hours)

Listening: Involving the students listen lectures on the above topics delivered by their teacher

Speaking: Enabling the students speak on the above topics

Writing: Making the students write on the given topics

Unit -2 Technical Vocabulary and Presentation (06 hours)

- a) Abbreviations and Technical terms of Computer Science
- b) Writing Paragraph on Eminent Personalities in the field of Computer Science and Information Technology: Charles Babbage, Dennis Ritchie, Larry Page, Tim Berners Lee, Larry Ellison, Bill Gates, Michael Dell, Philip Don Estridge, Charles Ranlett Flint, Martin Cooper, Steve Jobs and Mark Elliot Zuckerberg.
- c) Speech on Eminent Personalities in the field of Computer Science and Information Technology: Sundar Pichai, N. R. Narayana Murthy, Azim Premji, Nandan Nilekani, Sam Pitroda and Pranav Mistry.
- d) Presentation on the Profile of Leading Companies of Information Technology: Microsoft Corporation, Oracle Corporation, IBM (International Business Machines), SAP, Symantec Corporation, EMC and Hewlett Packard Enterprise
- e) Writing Scientific and Technical Paper

Classroom Activity: (06 Hours)

Listening: Involving the students listen lectures on the above topics delivered by their teacher

Speaking: Enabling the students speak on the above topics

Writing: Making the students write on the given topics

Unit -3 Values and Ethics (06 hours)

- a) Values and Ethics
- b) Different Attitudes to Work
- c) Ethics at Work Place
- d) Professional Ethos and Code of Professional Ethics

Classroom Activity: (04 Hours)

Listening: Involving the students listen lectures on the above topics delivered by their teacher

Speaking: Enabling the students speak on the above topics

Writing: Making the students write on the given topics

Unit -4 Job Interview Strategies**(02 hours)**

- a) Body Language
- b) Debate on current issues and Leading Companies of Information Technology
- c) Group Discussion
- d) Preparing Relevant Probable Questions for Interview
- e) Mock Interview

Classroom Activity: (08 Hours)

Listening: Involving the students listen lectures on theoretical part delivered by their teacher

Speaking: Enabling the students speak effectively during group discussion and mock interview

Writing: Making the students write important points during group discussion

Text Books:

1. Mitra Barun K., *Personality Development and Soft Skills*, O.U.P., New Delhi. 2012.
2. Onkar R.M., *Personality Development and Career Management: A Pragmatic Perspective*, S. Chand & Co. Ltd., New Delhi. 2011.
3. Mishra Sunita & Muraliksishra C., *Communication Skills for Engineers*, Pearson Education, New Delhi.

Reference Books:

1. Raman Meenakshi & Sharma Sangeeta, *Technical Communication-Principles & Practices*, O.U.P. New Delhi. 2008.
2. Chhabra T N, *Business Communication*, Sun India Pub. New Delhi.
3. Sehgal M.K. & Khetrapal Vandana, *Business Communication*, Excel Books, New Delhi.
4. Newstron John W., *Organizational Behaviour: Human Behaviour at work*- Tata McGraw Hill.
5. Luthans fred, *Organizational Behaviour*-Tata McGraw Hill.
6. Sanjay Kumar & Pushp Lata, *Communication Skills*, Oxford University Press.
7. Govindarajan M., *Engineering Ethics*, Prentice Hall (India), New Delhi

Learning Outcome:

1. Students will be able to communicate effectively.
2. They will be able to develop their personality and soft skills.
3. They will be able to face interview confidently.
4. They will be able to participate actively in group discussion.
5. They will be able to inculcate values and ethics in their life.
6. They will be able to develop their competence for suitable job in a good organisation.

Evaluation& Assessment: Students will be evaluated on all the four parameters of LSRW

<i>External Exam</i>	<i>Internal Assessment</i>	<i>Total</i>
50	50	100

Internal Assessment: 50

<i>Best 2 out of Three CTs</i>	<i>Attendance</i>	<i>Assignments& presentation using computerized tool</i>	<i>Total</i>
20	10	10+10	50

External Assessment:50

PRACTICAL EXAM*	VIVA	TOTAL
25 Marks	25 Marks	50 Marks

(The external evaluation would be done by an external examiner based on the Practical Exam and viva conducted during the examination. External examiner will be the English faculty from within the university)

*** Practical Exam Paper Structure: (One Hour Duration)**

Question paper should consist of four questions out of which the first question will be objective type of 10 marks. Other three question will be long, each of 05 marks.

MCA- Semester V

Web Development using PHP

Course Code: MCA519

L-3 , T-1, P-0 C-4

Objective: This subject encompasses the recent trends and technology of web application development and web designing, to provide an insight of web development using PHP.

Course Content

Unit I

Introduction to HTML, HTML fonts Styles, Links, Images Tables Static V/S Dynamic Websites HTML, attributes, Headings Paragraphs, Formatting Lists, Colors Forms Links on a same page, Tags DHTML Introduction Marquee Tag Effects. CSS Introduction, CSS Id & Class Styling Backgrounds, Fonts, Links, CSS Border, Margin, Cell padding. HTML5 Intro HTML5 Elements , Style , Media ,Video Audio Plug-ins HTML. **(Lecture 08)**

Unit II

Introduction to JavaScript – Control Structures, DOM, Client Validations (Null and Password Validations), Javascript events. JQUERY library, Scrolling effects, Images and Forms Integration ,Fading practical, Animation effect practical. **(Lecture 08)**

Unit III

PHP installation and Introduction, Loops, String Functions in PHP,PHP Email Function ,PHP Basics, Variables, Arrays in PHP with Attributes Date & Time, Image Uploading, File handling in PHP ,Functions in PHP, Errors handling in PHP. **(Lecture 08)**

Unit IV

Introduction to MySQL database, Create tables, fields, Alter table, Insert, Update and where condition, Delete, Select, Limits, Distinct, Joins, Order by, Group by, Union, Import and Export Database. Introduction to Ajax, XML HTTP Request, XHR Object, XHR Response, XHR Ready State, Fetching text from source, Ajax polls, AJAX PHP, Ajax Database. **(Lecture 08)**

Unit V

Advance PHP-Sending Emails using Classes, Class, Object, Inheritance, Inheritance types, Object cloning, Constructor and Destructor, Access specifiers, Scope resolution operator, Class constant, This operator, Abstract class and interface. **(Lecture 08)**

Course Outcome:

After completion of this course students will have understanding of

1. Server-side web-based programming and the CGI environment.
2. Web-based scripting languages, their advantages and problems.
3. Searching and pattern matching using regular expressions.
4. Implementation of a small web-based server-side application.

5. Some current technical and research issues in this field.

Text Books:

1. Kogent Learning Solutions Inc ,“Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, Black Book: HTML, Javascript, PHP, Java, Jsp, XML and Ajax, Black Book ”, Dreamtech Press ,2009 Edition.
2. Robin Nixon ,“Learning PHP, MySQL & JavaScript with j Query, CSS & HTML5”, Shroff Publishers & Distributers Private Limited - Mumbai; Fourth edition,2015.
3. Vikram Vaswani,“PHP- A Beginners Guide”, McGraw Hill Education ,2008 Edition.

Reference Books:

1. Ivan Bayross, “Web Technologies Part II”, BPB Publications.
2. Larry Ullman ,“Php and MYSQL for Dynamic Web Sites”, Pearson Education, 4 edition ,2014.

*Latest editions of all the suggested books are recommended.

MCA- Semester V

Python

Course code: MCA524

L- 3, T-1, P-0, C-4

Objective: Python is a useful scripting language for developers and describes how to design and program Python applications. To learn how to use lists, tuples, and dictionaries in Python programs. It also define structure and components of a Python program. To learn how to write loops and decision statements in Python.

Course Content

Unit - I

Introduction History, Features, Setting up path, Working with Python, Basic Syntax ,Variable and Data Types , Operator Conditional Statements If ,If- else ,Nested if-else Looping For, While ,Nested loops Control Statements Break, Continue ,Pass **(Lecture 08)**

Unit - II

String Manipulation Accessing Strings ,Basic Operations ,String slices ,Function and Methods Lists Introduction ,Accessing list ,Operations ,Working with lists ,Function and Methods Tuple Introduction ,Accessing tuples ,Operations ,Working ,Functions and Methods **(Lecture 08)**

Unit - III

Dictionaries Introduction, Accessing values in dictionaries ,Working with dictionaries ,Properties ,Functions Functions Defining a function , Calling a function, Types of functions ,Function Arguments ,Anonymous functions ,Global and local variables **(Lecture 08)**

Unit - IV

Modules Importing module ,Math module ,Random module ,Packages ,Composition Input-Output Printing on screen ,Reading data from keyboard ,Opening and closing file ,Reading and writing files ,Functions **(Lecture 08)**

Unit - V

Exception Handling Exception ,Exception Handling ,Except clause ,Try ? finally clause ,User Defined Exceptions

OOPs concept Class and object , Attributes ,Inheritance ,Overloading ,Overriding ,Data hiding **(Lecture 08)**

Course Outcome

After successful completion of this course, students will be able to:

1. To understand why Python is a useful scripting language for developers..
2. To learn how to use lists, tuples, and dictionaries in Python programs.
3. To learn how to use indexing and slicing to access data in Python programs.
4. To define the structure and components of a Python program.
5. To learn how to write loops and decision statements in Python.
6. To learn how to write functions and pass arguments in Python.
7. To learn how to build and package Python modules for reusability.
8. To learn how to read and write files in Python.
9. To learn how to design object-oriented programs with Python classes.

Text Books

1. Learning Python by Mark Lutz, David Ascher Shop O'Reilly - O'Reilly Media
2. Beginning Python Magnus Lie Hetland , Goodreads
3. Python Programming for the Absolute Beginner third edition Ross Dawson Goodreads

Reference Books

1. Learn Python the Hard Way, Zed A. Shaw , Goodreads
2. Python Essential Reference, David M. Beazley, Addison Wesley

*Latest editions of all the suggested books are recommended.

MCA- Semester V

Web Development using PHP Lab

Course code: MCA555

L-0 , T-0, P-4 C-2

Objective

The objective of this lab is to develop logical and conceptual skills of web development by developing programs using HTML, JavaScript, XML etc

Students are required to perform programs related to:

1. Using various HTML Tags
2. Rendering tags in different browsers.
3. Combining JavaScript with HTML – Form Validation, User Input, Form Submission etc
4. Creating CSS to combine with javascripts
5. Creating rounded table corners using div tags & css.
6. Using AJAX
7. Using XMLHttpRequest objects within a Javascript code
8. AJAX based form validation
9. Loading a html page within a div tag using AJAX
10. Dynamic Data Loading using AJAX on a form
11. Creating Auto-suggest Text field using AJAX
12. Using XML, creating DTD's, combining XML with CSS, validating XML
13. Creating a simple ASP Page to submit data to the server.
14. Using JQuery plugins on a HTML page
15. Programming on PHP control structures.
16. Database connectivity of PHP page.
17. Programming based upon Advanced PHP.
18. Program based on AJAX in PHP.

Course Outcome

After completion of this course students will have an understanding of

1. Server-side web-based programming and the CGI environment.
2. Web-based scripting languages, their advantages and problems.
3. Searching and pattern matching using regular expressions.
4. Implementation of a small web-based server-side application.
5. Some current technical and research issues in this field.

MCA- Semester V

Python Lab

Course code: MCA556

L-0 , T-0, P-4 C-2

Objective

The objective of this lab is to make students have understanding about developing codes using Python programming.

All programs listed below must be performed:

1. Write a Python program to calculate the length of a string.
2. Write a Python program to count the number of characters (character frequency) in a string.
3. Write a Python program to get a string made of the first 2 and the last 2 chars from a given a string. If the string length is less than 2, return instead of the empty string.
4. Write a Python program to get a string from a given string where all occurrences of its first char have been changed to '\$', except the first char itself.
5. Write a Python program to get a single string from two given strings, separated by a space and swap the first two characters of each string.
6. Write a Python program to sum all the items in a list.
7. Write a Python program to multiplies all the items in a list.
8. Write a Python program to get the largest number from a list.
9. Write a Python program to get the smallest number from a list.
10. Write a Python script to sort (ascending and descending) a dictionary by value
11. Write a Python script to add a key to a dictionary
12. Write a Python program to create a tuple
13. Write a Python program to create a tuple with different data types.
14. Write a Python program to create a tuple with numbers and print one item.
15. Write a Python program to unpack a tuple in several variables.
16. Write a Python program to add an item in a tuple

Course Outcome

After completion of this course students will have an understanding of

1. Executing programs related to strings.
2. Executing programs related to lists.
3. Executing programs related to tuple.

MCA- Semester V

Dot Net Framework with C# Lab

Course Code: MCA557

L- 0, T-0, P-4, C-2

Objective

The objective of this lab is to make students understanding and logical skill to develop codes in C#.

Students are required to perform programs related to:

1. The use of sequence, conditional and iteration construct.
2. Various operators like logical, arithmetical, relational, etc.
3. Overloading of various operators.
4. Use of Static Member functions, optional arguments.
5. Use of destructor and various types of constructor.
6. Various forms of Inheritance.
7. Use of Interface in multiple inheritance, virtual and override concept, delegates.
8. File operation.
9. Create windows based application with connected and disconnected architecture.
10. Simple web application using ASP Net.
11. Use of Active X controls.
12. Create web application using ASP.Net with Ajax and Ajax Control Toolkits provided by Microsoft.
13. Create Window application using ASP.Net with Ajax and Ajax Control Toolkits provided by Microsoft.

Note: Students are advised to develop a small project illustrating the handling of database and screens in order to fully understand the C#.

Course Outcome:

After completion of this course students will have understanding of:

1. Ability to perform solutions to basic problems.
2. Use of constructor and destructors
3. Implementing inheritance concept
4. File management operations.
5. Web and Window based applications development.

MCA- Semester V

Android Programming Lab

Course Code: MCA558

L- 0, T-0, P-4, C-2

Objective

The objective of Android programming lab is to make students able to develop android codes so that they can acquire the skill to create Mobile Apps.

Students are required to perform programs related to:

1. Creating Applications with Multiple Activities and a Simple Menu using ListView
2. Creating Activities For Menu Items and Parsing XML Files
3. Writing Multi-Threaded Applications
4. Using WebView and Using the Network
5. Graphics Support in Android
6. Preferences and Content Providers
7. Location Services and Google Maps in Android

Course Outcome:

After completion of this course students will have understanding of:

1. To create simple applications
2. To use graphics support in android
3. To write mutli- threaded applications
4. To develop simple android applications

MCA- Semester V

Minor Project

Course code: MCA554

L- 0, T-0, P-4, C-2

Course Contents

The student will undertake a mini project in this semester. They will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars and progress reports. For mini project he/she will do “**in house development**”.

Minor Project will be evaluated out of total 100 marks. In Internal Evaluation marks will be awarded out of 50 and in external evaluation also marks will be awarded out of 50 on the basis of viva-voce. Internal evaluation will be exercised by the Project Committee of college.

Course Outcome

After completion of this course, students will be able to develop Window ,Web based or Mobile based applications to specific set of problem and their solutions.

MCA- Semester V

Neural Networks

Course code: MCA513

L-3 , T-1, P-0 C-4

Objectives: Introduce fundamental concepts of neural networks and study several network models in detail. After taking this course, the student will be ready to understand the structure, design, and training of various types of neural networks and will be ready to apply them to the solution of problems in a variety of domains.

Course Contents

Unit – I

Neural Networks: Overview of biological Neuro-system, Mathematical Model of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, Single unit mapping and the perception. **(Lecture 08)**

Unit – II

Types of Artificial Neural Networks: Single layer feed forward networks, Multilayer feed forward networks, back propagation method. **(Lecture 08)**

Unit – III

Concepts of Principle Component Analysis (PCA), Self Organizing Maps (SOM), Learning Vector, Quantization (LVQ) and Adaptive Resonance Networks. **(Lecture 08)**

Unit – IV

Hopfield Networks, Associative Memories, Radial Basis Function (RBF) Networks. **(Lecture 08)**

Unit – V

Applications of Artificial Neural Networks: Regression, applications to function approximation, Classification, Blind Source Separation. **(Lecture 08)**

Course Outcome

After completion of this course, students will have an understanding of

1. Describe the relation between real brains and simple artificial neural network models.
2. Explain and contrast the types of artificial neural networks.
3. Discuss the main factors involved in achieving good learning and generalization performance in neural network systems.
4. Identify the main implementation issues for common neural network systems.
5. Evaluate the practical considerations in applying neural networks to real classification and regression problems.

Text Book:

1. Haykin S., “Neural Networks-A Comprehensive Foundations”, Prentice-Hall International, New Jersey, 1999.

Reference Books:

1. Anderson J.A., “An Introduction to Neural Networks”, PHI, 1999.
2. Hertz J, Krogh A, R.G. Palmer, “Introduction to the Theory of Neural Computation”, Addison-Wesley, California, 1991.

*Latest editions of all the suggested books are recommended.

MCA- Semester V

Soft Computing

Course code: MCA514

L- 3, T-1, P-0 C-4

Objectives: Introduce fundamental concepts of neural networks and study several network models in detail. After taking this course, the student will be ready to understand the structure, design, and training of various types of neural networks and will be ready to apply them to the solution of problems in a variety of domains.

Course Contents

Unit – I

Introduction to soft computing. Intelligent systems, Knowledge-based systems, Knowledge representation and processing. Applications of computational intelligence. **(Lecture 08)**

Unit – II

Neural Networks: Overview of biological Neuro-system, Mathematical Model of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, Derivation of Back Propagation Algorithm, Hopfield Network, Applications of Neural Networks. Comparative study of Artificial Intelligence and ANN . **(Lecture 08)**

Unit – III Fuzzy Logic: Crisp set and Fuzzy set, Basic concepts of fuzzy sets, membership functions. Basic operations on fuzzy sets, Properties of fuzzy sets, Fuzzy relations. Propositional logic and Predicate logic, fuzzy If – Then rules, fuzzy mapping rules and fuzzy implication functions, Applications of Fuzzy Logic. **(Lecture 08)**

Unit – IV Genetic Algorithms: Basic concepts of genetic algorithms, how are genetic algorithms different from traditional algorithms, Comparative study of Genetic Algorithm and traditional algorithm, encoding, genetic modeling. Genetic modeling: Inheritance operator, cross over, inversion & deletion, mutation operator, Bitwise operator, Generational Cycle, Convergence of Genetic Algorithm, Applications & advances in GA. **(Lecture 08)**

Unit – V Hybrid Systems: Integration of neural networks, fuzzy logic and genetic algorithms. Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum. **(Lecture 08)**

Course Outcomes

After learning this course, the students should be able:

1. Learned the neural network functions and its applications.
2. Explain the fuzzy set theory

3. Apply derivative based and derivative free optimization
4. Learned genetic algorithms
5. Learned neuro fuzzy inference systems and its architecture and different algorithms.

Text Books:

1. Fakhreddine O. Karray, Clarence De Silva, “Soft Computing and Intelligent Systems Design: Theory, Tools and Applications”, Pearson Education, New Delhi.
2. Jyh-Shing Roger Jang, Chuen-Tsai Sun, Eiji Mizutani, “Neuro-Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence”, 1996, PHI Learning Pvt. Ltd. New Delhi.
3. Anderson J.A. “An Introduction to Neural Networks”, PHI, 1999 .
4. G. J. Klir & B. Yuan, “Fuzzy Sets & Fuzzy Logic”, PHI, 1995.
5. Melanie Mitchell, “An Introduction to Genetic Algorithm”, PHI, 1998

Reference Books:

1. S. N. Sivanadam, S. N. Deepa, “Principles of Soft Computing”, First Edition,2008, Wiley India Pvt. Ltd. New Delhi.
2. “Neural Networks– A Comprehensive Foundations”, Prentice-Hall International, New Jersey, 1999.
3. Frank Hoffmann,M.Köppen, F. Klawonn, R. Roy, “Soft Computing: Methodologies and applications”, 2006, Springer, New Delhi.

*Latest editions of all the suggested books are recommended.

MCA- Semester V

Fuzzy Logic

Course code: MCA515

L- 3, T-1, P-0 C-4

Objective: The main objective of this course is to provide the student with the basic understanding of fuzzy logic fundamentals and various applications of Fuzzy logic in today's life.

Course Contents

Unit – I

Overview of Crisp sets and fuzzy sets : Basic concepts of crisp sets and fuzzy sets, Basic types of fuzzy sets, Fuzzy sets verses crisp sets, Representation and extension principle for fuzzy sets. **(Lecture 08)**

Unit – II

Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations, Membership Function, α -cuts, Properties of α -cuts. **(Lecture 08)**

Unit – III

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations **(Lecture 08)**

Unit – IV

Fuzzy Relations: Crisp & Fuzzy Relations, Binary Fuzzy Relations, Binary Relations on single set, Equivalence. **(Lecture 08)**

Unit – V

Possibility Theory: Fuzzy Measures, Possibility versus Probability Theory. Applications of Fuzzy Logic. **(Lecture 08)**

Course Outcomes:

After completion of this course the students should be able:

1. To understand concept of fuzzy logic.
2. To do programming of fuzzy logic.
3. To design and utilization of fuzzy logic controller for various industrial applications.
4. To implement the fuzzy based logic in the domain of research.

Text Books:

1. G.J.Klir & T.A. Folyger, "Fuzzy Sets, Uncertainty & Information", PHI, 1988.
2. G.J.Klir & B.Yuan, "Fuzzy sets & Fuzzy logic," PHI, 1995.

Reference Books:

1. John Yen, Reza Langari, “Fuzzy Logic Intelligence, Control and Information”, Pearson Education, 2006.
2. Ross, “Fuzzy Logic with Engineering Applications”, 2nd Edition, John Wiley, 2004.
3. H. Zimmermann, “Fuzzy Set Theory and its applications”, 2nd Edition, Allied Publishers, 1996.

*Latest editions of all the suggested books are recommended.

MCA- Semester V

Cloud Computing

Course code: MCA522

L- 3, T-1, P-0 C-4

Objective:

The purpose of this course is to provide the basic and advanced concepts of cloud. The main objective of this course is to teach the students what is cloud and how to use the cloud is computing. This course offers the students theoretical knowledge of cloud computing.

Course Contents

Unit I

Cloud Computing: Existing usage of cloud computing; New paradigm in the cloud; Applications.

Cloud Computing Architectural Framework: Cloud: Benefits, Vocabulary, Business scenarios, Essential characteristics, Deployment models, Service models, Multi-tenancy, Approaches to create a barrier between the tenants. **(Lectures 08)**

Unit II

Vendor Lock-in and Efforts at Standardization: Need of migration; Preventing vendor lock-in; Comparison chart.

Data Center Operations: The anatomy of cloud infrastructure, Data Center Operations, Security challenge, implements “Five Principal Characteristics of Cloud Computing, Data center Security Recommendations. Introducing Identity Services, Enterprise Architecture with IDaaS , IDaaS Security Recommendations, data Security in Cloud, technologies for data security. **(Lectures 08)**

Unit III

Governance and Enterprise Risk Management: Information security governance processes, Governance and enterprise risk management in Cloud Computing, Governance Recommendations, Enterprise Risk Management Recommendations, Information Risk Management Recommendations and Third Party Management Recommendations **(Lectures 08)**

Unit IV

Cloud Reliability, Fault Tolerance and Response Time: Business continuity management: System reliability, Case studies on designing for reliability; Concept of fault tolerance; Response time.

Internet Cloud Security: Introduction; Potential threats; Security as a service by cloud providers; Fraud theory and Intellectual property.

Information Lifecycle Management: Key challenges regarding data lifecycle security, Data Security Recommendations by Cloud Computing **(Lectures 08)**

Unit V

Traditional Security, Business Continuity, and Disaster Recovery: Risk of insider abuse,

Security baseline, Customers actions, Contract, Documentation, Recovery Time Objectives (RTOs), Customers responsibility **Case Studies** : Amazon's cloud services (AWS);
(Lectures 08)

Course Outcome

After learning this course, the students should be able:

1. Current cloud computing technologies, including technologies for different cloud services.
2. Large data processing in the cloud
3. Resource management in the cloud and risk management.
4. Analyze the components of cloud computing showing how business agility in an organization can be created.
5. Critically analyze case studies to derive the best practice model to apply when developing and deploying cloud based applications and security parameters.

Text Books:

1. David, E.Y. Sarna, *Implementing and Developing Cloud Computing Applications*, CRC Press.
2. Dimitris, N. Chorafas, *Cloud Computing Strategies*, CRC Press.
3. Rajkumar Buyya, James Broberg, Andrzej M. Goscinsk, *Cloud Computing: Principles and Paradigms*, Wiley Publications

Reference Books:

1 Mather, T., *Cloud Security and Privacy: An Enterprise Perspective On Risks And Compliance*, O'Reilly

*Latest editions of all the suggested books are recommended.

MCA - Semester VI

Internship Program

Course Code: MCA602

L-0, T-0, P-24, C-12

The student will undertake an Internship program of 12 weeks in this semester. They will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The students will have to present the progress report of the work through seminars and progress reports. For Internship program he/she can go for “**an IT company or in-house development**”.

Internship Program will be evaluated out of total 100 marks. In Internal Evaluation marks will be awarded out of 50 and in external evaluation also marks will be awarded out of 50 on the basis of viva-voce. Internal evaluation will be exercised by the Project Committee of college.

Course Outcome

After completion of this course students will gain industrial experience of developing software or web based applications to solve real time problems of customers.