MAHARISHI MARKANDESHWAR UNIVERSITY SADOPUR (AMBALA)

Scheme of Examination

&

Syllabus

Of

Bachelor of Computer Application in Cloud Technology and Information Security [CTIS]

BACHELOR IN COMPUTER APPLICATIONS
CLOUD TECHNOLOGY AND INFORMATION SECURITY

Program Objectives:

This unique program provides dual career options for the students in the fast growing technology sectors of Cloud Technology and Information Security. In addition to all the mandatory subjects of a traditional computer science program, this specialized program offers in-depth practical know-how of the current trend Technology – Cloud and Information Security. These sectors have the potential to grow exponentially and they provide challenging job opportunities for young professionals with the right skill sets.

On the Cloud Technology front, the program will provide students with the fundamental knowledge of all aspects of Cloud Technology. The program focuses on Virtualization Technology, Cloud Technology, Datacenters, Networking and Operating Systems.

On the Information Security front, this program equips the students with the concepts and the technical skills needed to secure Information and also creates awareness to different vulnerabilities, corrective measures and protection. The focus of the program is on the models, tools and techniques for enforcement of Security Policies, with emphasis on Cryptography, Ethical Hacking, Computer Forensics and Virtualization and Cloud Security.

Career Opportunities for Cloud Technology Professionals

Global Scenario

Combined Market of Private and Public Cloud Services - $11 Billion in 2012 Poised to grow to $ 65 to 85$ Billion in 2015
- McKinsey Analysis: Winning in the SMB Cloud: Charting a Path to Success

The global SaaS market is projected to grow from $49B in 2015 to $67B by 2018 at a CAGR of 8.14%

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-Forbes

Cloud applications will account for 90% of worldwide mobile data traffic by 2019 as compared to 81% in 2014

-Forbes

Growth and Forecast

There are currently about 50 million enterprise users of Cloud Office Systems which represent only 8 percent of overall office system users, excluding China and India.

Predicts that a major shift toward cloud office systems will begin by the first half of 2015 and reach 33 % penetration by 2017.

- Gartner Report

Worldwide spending on public IT cloud services will be more than $40 billion in 2014. Expected to approach $100 billion in 2016. Over the 2012–2016 forecast period, public IT cloud services will enjoy a compound annual growth rate (CAGR) of 26.4%, five times that of the IT industry overall

- IDC research

Jobs and Opportunities - Global

Cloud Computing to Create 14 Million New Jobs by 2015. By 2015, business revenues from IT innovation enabled by the cloud could reach US$1.1 trillion a year.

Indian Scenario

Market Size - India

The public cloud services market in India is forecast to grow 36 percent in 2014 to total $443 million, up from $326 million in 2013, according to Gartner, Inc. Infrastructure as a service (IaaS), including cloud computing, storage and print services, continues as the fastest-growing segment of the market in India, growing 22.7 percent in 2013 to $43.1 million, and it is expected to grow 39.6 percent in 2014 to $60.2 million. Infrastructure as a service (IaaS), including cloud compute, storage and print services continued as the fastest-growing segment of the market, growing 42.4 percent in 2012 to $6.1 billion and expected to grow 47.3 percent in 2013 to $9 billion.

Jobs and Opportunities - India

India will create over 2 million jobs in Cloud sector, predicts a study commissioned by Microsoft and conducted by International Data Corporation (IDC).

Career Progression Path - Cloud Technology

Industry	Entry level (0-1 yrs. exp.)	Mid-Level (3-5 yrs exp.)	Advanced level (5 yrs plus exp.)
Average Salary	**Rs.4,00,000 – 5,00,000**	**Rs.4,00,000 – 8,00,000**	**Rs. 8,00,000 +**
Job Role	Cloud Architect		Cloud Consultant
	Cloud Engineer	Sr. Cloud Engineer Manager Cloud Technology	Manager Cloud Technology
	Datacenter Technician	Datacenter Engineer	Datacenter Manager
	Remote Desktop Engineer	Cloud Provisioning Engineer	Datacenter Manager
	Cloud Security Specialist	Security Engineer	Manager Cloud Security

Career Opportunities for Information Security Professionals

Global Scenario

"Cyber Security Need Drives IT Job Growth"

"New research has found that job openings in the field of cyber security have grown by more than 100 percent in the past year. Those openings are only expected to grow in the coming year, jumping an additional 30 percent in 2014. The demands for security workers points to the importance companies are placing on responding to the growth of recent attacks on businesses of all sizes."

- Business News Daily

"The Army is building a new cyber command center at Fort Meade to eventually house 1,500, leading a worldwide cyber corps of 21,000 soldiers and civilians. By 2017, the Air Force will add more than 1,000 uniformed cyber forces to its 6,000 experts now working at the Air Force Space Command. The Navy had 800 cyber security staffers in 2013 and will reach nearly 1,000 by 2017, working toward a mix of 80 percent uniformed personnel and 20 percent civilian employees and contractors. The Marines currently have 300 uniformed personnel, civilians and contractors at work, and plan to increase that number to just fewer than 1,000 by 2017."

- Capital Business

The worldwide cyber security market estimate to range from $77 billion in 2015 to $170 billion by 2020.
According to Gartner Global spending on IT security is set to increase 8.2 percent $77 billion in 2015 to $101 billion by 2018

-Gartner
Indian Scenario

National Cyber Security Policy 2013: As per this Govt. of India policy document, there will be a requirement of 500,000professionals skilled in cyber security in the next 5 years. Also the Ministry of Communication and Information Technology will encourage all organizations, private and public to designate a member of senior management, as Chief Information Security Officer (CISO), responsible for cyber security efforts and initiatives.
"Analysts said that India currently has around 22000 certified cyber security professionals, which is significantly lesser than the requirement of 77000 personnel. The current number is miniscule when compared to the nearly 25 million cyber warriors in China. According to recent data, India would need 4.7 lakh cyber security professionals by 2015 to protect its IT infrastructure".

- The Times of India

Even in the most difficult of economic times, IT security is a full-employment field. With the growing number of threats on the horizon, and the growing awareness of cyber security vulnerabilities and issues inside the enterprise, it is clear that security will be a top priority for the coming year and likely for years to come.

Job Opportunity for Cyber Security Professionals in various departments of different sectors:

- Corporate (Information Security, Compliance, IT&IS Audit, Software Development etc.)
- Banking, Finance and Insurance Sector (IT and Data Security, E-Commerce and Net-banking Security, Compliance, Information Risk Management, IT&IS Audit etc.)
- Defense and Police (R&D, Investigation and Forensics, IT Infrastructure Security etc.)
- Governance (E-Governance, Public Key Infrastructure Management, Forensic Science Labs etc.)
- Legal Department (Cyber Forensics Consultants, Cyber Law Expert, Expert witness etc.)
- Cyber Fraud Consultants / Management (Ethical Hacker, Penetration Testers, Cyber Fraud Detectives)

Career Progression Path – Information Security

Industry	Entry level (0-1 yrs exp.)	Mid-Level (3-5 yrs exp.)	Advanced level (5 yrs plus exp.)
Average Salary	Rs.2,00,000 – 4,00,000	Rs.4,00,000 – 8,00,000	Rs. 8,00,000 +
Job Role	Information Security Executive	Sr. Information Security Officer	Chief Information Security Officer
	Malware Analyst	Sr. Malware Analyst	Manager Anti-Virus Development
	Data center Technician	Data center Engineer	Data center Manager
	Junior Penetration Tester	Penetration Tester	Ethical Hacker
	Database Manager – IT Security	Network and Database Manager- IT Security	Data center Security Engineer
	Junior Cyber Forensic Analyst	Cyber Forensic Analyst	Cyber Forensic Investigator

BCA
FIRST SEMESTER

MAHARISHI MARKANDESHWAR UNIVERSITY

SADOPUR, AMBALA

BACHELOR OF COMPUTER APPLICATION

SCHEME OF EXAMINATION FOR 1ST SEMESTER

Sr. No	Course No.	Subject	Teaching Schedule			Credits	Examination Schedule			
			L	T	P		Theory	Sessional (Internal)	Practical (Viva Voice)	Total
1	HUM -101	English	3	0	0	3	60	40	-	100
2	MTH- 102	Fundamentals of Mathematics	3	0	0	3	60	40	-	100
3	EVS 101	Environmental Studies	4	0	0	4	60	40	-	100
4	BCA -104	Computer Fundamentals and Organization	4	0	0	4	60	40	-	100
5	BCA -105	Programming in C	3	0	0	3	60	40	-	100
6	BCA- 106	Operating System	3	0	0	3	60	40	-	100
7	BCA- 107L	Programming in C – Lab	0	0	4	2	-	50	50	100
8	BCA -108L	Operating System – Lab	0	0	4	2	-	50	50	100
		Total	20	0	8	24	360	340	100	800

M.M. University, Sadopur (Ambala)

BCA -1st Semester
HUM-101   **English**

L	T	P	Credit		
3	0	0	3		

Theory :   60 marks
Sessional: 40 marks
Time: 3Hrs.

Objective: This course introduces the students to the beauty of English Language through some of the great works by R.K.Narayan, O'Henry and other writers. Students will get familiarized with few well-written essays and short stories, which will provide them with intricacies of English literature.

Course Outcome:

After completion of the course the student will be able:

- The students will have a better understanding of English grammar.
- The students will be able to use grammar more effectively in their verbal and written communication

Course Contents:

UNIT I

Essay/Short Story – I

1. Toasted English   R.K.Narayan
2. Gift of the Magi   O'Henry
3. On Education   Einstein

UNIT II

Essay/Short Story – II

1. How to name a Dog   James Thurber
2. The Subtle Art of Story Telling   Utpal Kumar Banerjee
3. God and the Cobbler   R.K. Narayan

UNIT III

Poetry – I

1. The World is too much with us   William Wordsworth
2. La Belle DAME Sans Merci   John Keats
3. Richard Cory   E.A.Robinson

UNIT IV

1. Brahma   Emerson
2. A River   A.K.Ramanujan
3. Nikki Rosa   Nikki Giovanni

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-1st Semester

MTH-102   **Fundamentals of Mathematics**

L	T	P	Credit
3	0	0	3

Theory :   60 marks
Sessional: 40 marks
Time: 3Hrs.

Objective: To develop the skills in the areas of Matrices, Sets, relations and functions, Differentiation and Integration. Mathematics concepts serve as a pre-requisite for post graduate courses, specialized studies and research.

Course Outcome:

After completion of the course the student will be able:

- To understand and the use of basic concepts of Matrices.
- To understand the concept of set relation and functions.
- To understand the several of the differentiations methods and rules of differentiations.
- To gain knowledge of the integrations and rules of integrations.
- To understand the basic 2D Cartesian Co-ordinate system, Straight line.

Course Contents:

UNIT I

Matrices

Types of Matrices, Operations of addition, Scalar Multiplication and Multiplication of Matrices, Determinant of a Square Matrix, Minors and Cofactors, Transpose, adjoint and inverse of a matrix, solving system of linear equations, in two or three variables using inverse of a matrix .

UNIT II

Sets, relations and functions

Definition of Set, Type of Sets, Operations on Sets, Venn diagram, Cartesian Product, Relations, Functions, Types of function, Some elementary functions with their graphs (Exponential, logarithmic, modulus), Limit & continuity of a function (Simple Problems)

UNIT III

Differentiation

Derivative and its meaning, Differentiation of algebraic, trigonometric, exponential & logarithmic functions, Rules of Differentiation, Differentiation by Substitution, Higher Order Differentiation, Maxima and Minima of Simple Functions

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UNIT IV

Integration

Integral as Anti-derivative process, Indefinite Integrals, Rules of Integration, Integration by substitution, Definite Integration, Properties of Definite Integral, Finding areas of Simple Closed Curves .Coordinate Geometry:2D Cartesian Co-ordinate system, Straight line: (Equation & Slope of a line), Circle: Equation of Circle, Equation to Tangent, Conic Sections: Focus, Eccentricity, Directrix, Axis of a conic section, Parabola & Ellipse: (Definitions, equations and shape of curve only).

Books:

1. Mathematics for BCA by G. C. Sharma &Madhu Jain, Oscar Publication

2. Mathematics Vol-2 by R. D. Sharma, Dhalpat Raj & Sons

3. The Elements of Co-ordinate Geometry Part-I by S. L. Loney, Book Palace, New Delhi

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-1ˢᵗ Semester
EVS 101   **Environmental Studies**

L	T	P	Credit		Theory :	60 marks
4	0	0	4		Sessional:	40 marks
					Time:	3Hrs.

Objective: To create awareness on the various environmental pollution aspects and issues. To give a comprehensive insight into natural resources, ecosystem and biodiversity.To educate the ways and means to protect the environment from various types of pollution.To impart some fundamental knowledge on human welfare measures.

Course Outcomes:

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

Course Contents:

Unit I

Multidisciplinary nature of environmental studies: Definition, scope and importance, Need for public awareness
Natural Resources: Renewable and non-renewable resources :
Natural resources and associated problems.
a) Forest resources : Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people.
b) Water resources : Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
c) Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d) Food resources : World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, waterlogging, salinity, case studies.
e) Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies.
f) Land resources : Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
• Role of an individual in conservation of natural resources.
• Equitable use of resources for sustainable lifestyles.

Unit II

Ecosystems
• Concept of an ecosystem
• Structure and function of an ecosystem.

- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem :-
  a. Forest ecosystem
  b. Grassland ecosystem
  c. Desert ecosystem
  d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

  Biodiversity and its conservation:
- Introduction – Definition : genetic, species and ecosystem diversity.
- Biogeographical classification of India
- Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation
- Hot-sports of biodiversity.
- Threats to biodiversity : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity

Unit III

Environmental Pollution: Definition
- Cause, effects and control measures of :-
  a. Air pollution
  b. Water pollution
  c. Soil pollution
  d. Marine pollution
  e. Noise pollution
  f. Thermal pollution
  g. Nuclear hazards
- Solid waste Management : Causes, effects and control measures of urban and industrial wastes.
- Role of an individual in prevention of pollution.
- Pollution case studies.
- Disaster management : floods, earthquake, cyclone and landslides.

  Social Issues and the Environment:
- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rahabilitation of people; its problems and concerns. Case Studies
- Environmental ethics : Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.

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- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness.

Unit IV

Human Population and the Environment:
- Population growth, variation among nations.
- Population explosion – Family Welfare Programme
- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS.
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies.

Field work:
- Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours)

Books:

1. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", PHI Learning education Pvt., Ltd., second edition, ISBN 81-297-0277-0, 2004.
2. Miller T.G. jr., "Environmental Science", Wadsworth publishing co.
3. Townsend C., Harper J and Michael Begon, "Essentials of Ecology", Blackwell science.
4. Bharuchaerach, "The Biodiversity of India", Mapin publishing Pvt. Ltd., Ahmedabad India,
5. Trivedi R.K., "Handbook of Environmental Laws", Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro media.
6. Cunningham, W.P.Cooper, T.H.Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001.
7. Wager K.D., "Environmental Management", W.B. Saunders Co., Philadelphia, USA, 1998.

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

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M.M. University, Sadopur (Ambala)
BCA-1ˢᵗ Semester
BCA-104   Computer Fundamentals and Organization

L   T   P   Credit   Theory :   60 marks
4   0   0   4   Sessional: 40 marks
                                                                Time: 3Hrs.

Objectives: The basic knowledge of how a computer works is very important for any fresh networking or operating system professional. The functional knowledge of a computers working and its main building parts are paramount. The computers of today may come with variety of features but the basic working principles remain the same. Students will explore the fundamentals of organization of a computer and the principles and building units of a computer (its hardware). Also, they will be introduced to the basics of networking and Office

Course Outcome:

After completion of the course the student will be able:

- To understand and the use of basic concepts of Computer components.
- To understand the concept of memory hierarchy and the use of various input-output devices.
- To understand the various computer languages, operating system functions and the application of number systems.
- To gain knowledge of the Office and understand the overview of word processing, spreadsheet and presentation software.
- To understand the basic Computer Networking principles and the applications of WWW, multimedia and the usage of electronic mail.

Course Contents:

UNIT I

General Features of a Computer
General features of a computer, Generation of computers, Personal computer, workstation, mainframe computer and super computers. Computer applications – data processing, information processing, commercial, office automation, industry and engineering, healthcare, education, graphics and multimedia..

UNIT II

Computer Organization
Computer organization, central processing unit, computer memory – primary memory and secondary memory, Secondary storage devices – Magnetic and optical media, Input and output units, OMR, OCR, MICR, scanner, mouse, modem.

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UNIT III

Computer Hardware and Software

Computer hardware and software, Machine language and high level language, Application software, computer program, operating system, Computer virus, antivirus and computer security, Elements of MS DOS and Windows OS Computer arithmetic, Binary, octal and hexadecimal number systems, Algorithm and flowcharts, illustrations, elements of a database and its applications, Basic Gates (DeMorgans theorems, duality theorem, NOR, NAND, XOR, XNOR gates), Boolean expressions and logic diagrams, Types of Boolean expressions

UNIT IV

Office

Word processing and electronic spread sheet, An overview of word processing, spreadsheet and presentation software.

Introduction to Networking

Network of computers, Types of networks, LAN, Intranet and Internet, Internet applications, World Wide Web, E-mail, browsing and searching, search engines, multimedia applications

Books:
1. Alexis Leon and Mathews Leon (1999) : Fundamentals of information Technology, Leon Techworld Pub.
2. Jain, S K (1999) : Information Technology "O" level made simple, BPB Pub
3. Jain V K (2000) "O" Level Personal Computer software, BPB Pub.
4. Rajaraman, V (1999): Fundamentals of Computers, Prentice Hall India
5. Hamacher, Computer Organization McGrawhill
6. Alexis Leon: Computers for everyone. Vikas, UBS
7. Anil Madaan : Illustrated Computer Encyclopedia. Dreamland Pub
8. Sinha. Computer Fundamentals BPB Pub.

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-1ˢᵗ Semester
BCA-105   **Programming in C**

L	T	P	Credit			
3	0	0	3			

Theory :   60 marks
Sessional: 40 marks
Time: 3Hrs.

Objective: Even with the introduction of several high level languages and frameworks, the development of procedural codes is important in several commercial app developments. The object oriented platforms and event driven systems use procedural languages for coding integral command content. C is an important procedural language and was developed initially to write the UNIX/LINUX operating system. UNIX/LINUX operating system, C compiler and all UNIX/LINUX application programs are written in C. C is popular because, it is easy to learn, produces efficient programs, can handle low-level activities, and can be compiled on a variety of platforms. This course focuses on all the basic concepts, syntax and constructs of the C language. For students, who are new to programming, this unit can be considered as the starting point before taking up any other programming oriented units. The students will be implementing the concepts explained here to create simple to complex programs.

Course Outcome:

After completion of the course the student will be able:

- To be able to use the basic concepts of Computer components.
- To be able to design, implement, test, debug and document programs in C.
- To be able to use functions, and functions with parameters passing option.
- To be able to use pointers and arrays, perform pointer arithmetic.
- To be able to understand the advance topics in C like file handling functions and the concept of Standard C library.
- To be able to learn the concept of C preprocessor and its application in program development.

Course Contents:

UNIT I

Overview of Programming:

Introduction to computer based problem solving, Program design and implementation issues-Flowcharts & Algorithms, Top down design & stepwise refinement, **Programming environment** – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters

UNIT II

Fundamentals of C programming:

Overview of C, Data Types, Constants & Variables, Operators & Expressions, **Control constructs**-if then, for, while, **Arrays**- single & multidimensional arrays, **Functions**-fundamentals – general form, function arguments, return value, **Basic I/O**-formatted and Unformatted I/O, **Advanced features**-Type modifiers and storage class specifiers for data types, Bit operators, ? operator, &operator, * operator, Type casting, type conversion.

UNIT III

Advanced programming techniques:

Control constructs- Do while, Switch statement, break and continue, exit() function, go to and label, Scope rules- Local & global variables, scope rules of functions, Functions-parameter passing, call by value and call by reference, calling functions with arrays, argc and argv, recursion- basic concepts, ex-towers of Hanoi

UNIT IV

Dynamic data structures in C:

Pointers- The & and * operator, pointer expression, assignments, arithmetic, comparison, mallocvscalloc, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function retuning pointers, **Structures**- Basics, declaring, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures, **Unions** – Declaration, uses, enumerated data-types, typedef

Additional features:

File Handling – The file pointer, file accessing functions, fopen, fclose, puc, getc, fprintf, C Preprocessor- #define, #include, #undef, Conditional compilation directives, C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions

Books:

1. Let us C by Yashwant Kanetkar, 6th Edition, BPB Publication

2. The C programming Language by Richie and Kenninghan, 2004, BPB Publication

3. Programming in ANSI C by Balaguruswamy, 3rd Edition, 2005, Tata McGraw Hill

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-1st Semester

BCA-106 ## Operating System

L	T	P	Credit		Theory :	60 marks
3	0	0	3		Sessional:	40 marks
					Time:	3Hrs.

Objective: The operating system is the most important program that runs on a computer. Every general-purpose computer must have an operating system to run other programs. Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories on the disk, and controlling peripheral devices such as disk drives and printers. This course covers the concept of operating system and its applications.

Course Outcome:

Students will be able to:

- Grasp a fundamental understanding of goals, components and evolution of operating systems
- Differentiate between System Calls and System Programs along with it types
- Explain the concepts and creation of processes and threads
- Understand the various modes of inter-process communication like message passing buffering
- Learn the scheduling policies of modern operating systems
- Understand critical section problem and various synchronization schemes
- Explain the deadlock avoidance, prevention, detection and recovery.
- Understand Paging, segmentation and virtual memory concepts in modern OSs
- Understand the concepts of data input/output, storage and file management

Course Contents

UNIT I

Introduction to Operating System
Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, System calls, System programs, Virtual Machines. History of UNIX/LINUX, Features & Benefits, Versions of UNIX/LINUX, Features of UNIX/LINUX File System

UNIT II

Process Management – Processes and Threads
Processes: Process concept, Process scheduling, Co-operating processes, Inter process Communication

Threads: Introduction to Threads, Single and Multi-threaded processes

CPU Scheduling: Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real-time Scheduling,

The Structure of UNIX/LINUX Processes: Process States and Transitions - Layout of system memory - Context of a process.

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UNIT III
Process Management – Synchronization and Deadlocks

Process Synchronization: Mutual Exclusion, Critical – section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic Transactions.

Deadlocks: System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT IV
Storage Management

Memory Management: Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging.

Virtual Memory Management: Demand paging, Process creation, Page Replacement Algorithms, Allocation of Frames, Thrashing.

File-System Interface: File concept, Access Methods, Directory structure, File- system Mounting, File sharing, Protection and consistency semantics.

File-System Implementation: File-System structure. Directory Implementation, Allocation Methods, Free-space Management, Efficiency and Performance, Recovery.

Disk Management: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Attachment, stable-storage Implementation

Books:

1. Operating System Concepts and design by Milan Milonkovic, II Edition, McGraw Hill 1992.

2. Operation System Concepts by Tanenbaum, 2nd Edition, Pearson Education.

3. Operating System by Silberschatz / Galvin / Gagne, 6thEdition,WSE (WILEY Publication)

4. Operating System by William Stallings, 4th Edition, Pearson Education.

5. Operating System by H.M.Deitel , 2ndEdition,Pearson Education

6. Operating System by Abraham Silberschatz and peter Baer Galvin, 8th Edition, Pearson Education 1989 (Chapter 1,3.1,3.2,3.3,3.4,3.6,4,5,6 (Except 6.8,6.9), 7, 8,9,10,11,13, (Except 13.6) 19 (Except 19.6),20(Except 20.8, 20.9), 22,23).

7. Operating Systems by Nutt, 3/e Pearson Education 2004

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-1ˢᵗ Semester
BCA-107L   **Programming in C –Lab**

L	T	P	Credit		Practical :	50 marks
0	0	4	2	Sessional:	50 marks	
					Time:	3Hrs.

List of Programs

Part A

1 Printing the reverse of an integer.

2 Printing the odd and even series of N numbers.

3 Get a string and convert the lowercase to uppercase and vice--versa using getchar() and putchar().

4 Input a string and find the number of each of the vowels appear in the string.

5 Accept N words and make it as a sentence by inserting blank spaces and a full stop at the end.

6 Printing the reverse of a string.

Part B

1 Searching an element in an array using pointers.

2 Checking whether the given matrix is an identity matrix or not.

3 Finding the first N terms of Fibonacci series.

4 Declare 3 pointer variables to store a character, a character string and an integer respectively. Input values into these variables. Display the address and the contents of each variable.

5 Define a structure with three members and display the same.

6 Declare a union with three members of type integer, char, string and illustrate the use of union.

7 Recursive program to find the factorial of an integer.

8 Finding the maximum of 4 numbers by defining a macro for the maximum of two numbers.

9 Arranging N numbers in ascending and in descending order using bubble sort.

10 Addition and subtraction of two matrices.

11 Multiplication of two matrices.

12 Converting a hexadecimal number into its binary equivalent.

13 Check whether the given string is a palindrome or not.

14 Demonstration of bitwise operations.

15 Applying binary search to a set of N numbers by using a function.

16 Create a sequential file with three fields: empno, empname, empbasic. Print all the details in a neat format by adding 500 to their basic salary.

BCA-CTIS-MMU

M.M. University, Sadopur (Ambala)
BCA-1st Semester

BCA-108L   **Operating System –Lab**

L	T	P	Credit
0	0	4	2

Practical :   50 marks
Sessional: 50 marks
Time: 3Hrs.

List of Programs

Part A

1. Execute 25 basic commands of UNIX/LINUX.

2. Basics of functionality and modes of VI Editor.

3. WAP that accepts user name and reports if user is logged in.

4. WAP which displays the following menu and executes the option selected by user:

1. ls   2. Pwd   3. ls –l   4. ps –fe

5. WAP to print 10 9 8 7 6 5 4 3 2 1 .

6. WAP that replaces all "*.txt" file names with "*.txt.old" in the current.

7. WAP that echoes itself to stdout, but backwards.

8. WAP that takes a filename as input and checks if it is executable, if not make it executable.

9. WAP to take string as command line argument and reverse it.

10. 1. Create a data file called employee in the format given below:

a. EmpCode   Character
b. EmpName   Character
c. Grade   Character
d. Years of experience   Numeric

e. Basic Pay   Numeric

$vi employee

A001	ARJUN	E1	01	12000.00
A006	Anand	E1	01	12450.00
A010	Rajesh	E2	03	14500.00
A002	Mohan	E2	02	13000.00
A005	John	E2	01	14500.00
A009	Denial Smith	E2	04	17500.00
A004	Williams	E1	01	12000.00

Perform the following functions on the file:

a. Sort the file on EmpCode.

b.Sort the file on

    (i) Decreasing order of basic pay

    (ii) Increasing order of years of experience.

c. Display the number of employees whose details are included in the file.

d. Display all records with 'smith' a part of employee name.

e. Display all records with EmpName starting with 'B'.

f. Display the records on Employees whose grade is E2 and have work experience of 2 to 5 years.

g.Store in 'file 1' the names of all employees whose basic pay is between 10000 and 15000.

h.Display records of all employees who are not in grade E2

BCA
SECOND SEMESTER

MAHARISHI MARKANDESHWAR UNIVERSITY

SADOPUR, AMBALA

BACHELOR OF COMPUTER APPLICATION

SCHEME OF EXAMINATION FOR 2ND SEMESTER

Sr. No	Course No.	Subject	Teaching Schedule			Credits	Examination Schedule			
			L	T	P		Theory	Sessional (Internal)	Practical (Viva Voice)	Total
1	HUM-201	Communication Skills	2	0	2	3	60	40	-	100
2	BCA-203	Introduction to Web Technology	3	0	2	4	60	40	-	100
3	BCA-204	OOPS with C++	3	0	0	3	60	40	-	100
4	BCA-205	Data Structures and Algorithm	3	0	0	3	60	40	-	100
5	BCA-206	System Configuration and Maintenance	4	0	0	4	60	40	-	100
6	BCA-209	Software Engineering	3	0	2	4	60	40	-	100
7	BCA-207L	OOPS with C++ - Lab	0	0	4	2	-	50	50	100
8	BCA-208L	Data Structures and Algorithm – Lab	0	0	4	2	-	50	50	100
		Total	18	0	14	25	360	340	100	800

M.M. University, Sadopur (Ambala)
BCA-2^{ndSemester}

HUM-201   **Communication Skills**

L   T   P   Credit   Theory :   60 marks
2   0   2   3   Sessional: 40 marks
                                                        Time: 3Hrs.

Objective: To impart good communication skills in the students and give them more confidence in both professional and personal life

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

- Communicate freely without any hesitation in English
- Use vocabulary taught for speaking and writing simple sentence for day to day conversation.
- Do simple business communication.
- Do job related correspondence

Course Contents:

UNIT I

Language Skills:

Essential Vocabulary for Business Communication, Common problems with Verbs, Adjectives, Adverbs, Pronouns, Conjunctions, Punctuation, Prefix, Suffix etc.

UNIT II

Concepts and Fundamentals of Communication:

Meaning of communication, Importance of communication in business environment, Scope & Function of Communication in business. Process of communication, Communication models and theories, Verbal and Non-Verbal communication, Formal and Informal communication,
Essentials of good communication, Seven Cs of communication, Barriers of communication.

UNIT III

Business Correspondence:

Objectives, Need & Functionsof Written Communication, Merits & Demerits of Written Communication, Internal & External Business Communication,Planning Business Messages
BCA-CTIS-MMU

Media of Written Communication in Business Official Correspondence – E-mail, Memo, Notice, Minutes, Reports, Styles / Layout, Features / Characteristics / Advantages

Business Letters –Types of Business Letters – Inquiries, Orders,Sales, Acknowledgments , Executions, Complaints, Claims, Adjustments, Circulars, Quotations, Collection letters, Styles / Layout, Features / Characteristics / Advantages

UNIT IV

Job Related Correspondence:

Job application letters - Curriculum Vitae / Resume, Invitation to Interview, Offer of Employment, Recommendation letter,Letter of Acceptance, Letter of Resignation

List of Activities – Introduction to Communication Skills

Sl. No.	Particulars	Purpose	Module covered
01	Work on Vocabulary	To have the knowledge of essential vocabulary	UnitI
02	Correct Grammar	To practice the use of correct Grammar	Unit I
03	Communication Circles	To highlight that there are different levels of sharing information and that you need to decide which level is the most appropriate for any given situation.	Unit II
04	Circle, Square, Triangle or Z	To allow students to share a little about themselves with the group as part of the introductions to one another.	Unit II
05	Colour Block	To emphasize what happens when we are presented with too many contradictory messages at the same time.	Unit II
06	Power of Body Language	To enhance the importance of Non-verbal communication	Unit II
07	Repeat the Question	To illustrate how our expectations concerning communications can sometimes cause us to say the wrong things	Unit II
08	Quick Answers	To illustrate how we sometimes jump to incorrect conclusions because of the way that information is presented to us	Unit II
09	Creative Fairy Tale	To challenge the creativity of students to come up with a solution that would be acceptableto each person involved in the issue	Unit III
10	Communication Shutdowns	To emphasize how certain statements can have a negative effect on any	Unit III

		discussion or furthermeaningful communications that may have otherwise followed	
11	Drafting a Memo/Notice	Identify the need for good writing skills for effective communication at the workplace	Unit III
12	Report Writing	Identify the need for good writing skills for effective communication at the workplace	Unit III
13	Resume Writing	What and how to create an effective resume	Unit IV
14	Correspondence for job	How and what to write while doing correspondence related to job	Unit IV

Books:

1. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill.

2. Chaturvedi P.D. et al, Business Communication; Concepts, Cases, & Applications, Pearson Education.

3. Shirley Taylor, Communication for Business, Pearson Education.

4. Lesiicar and Flatley, BasicBusiness Communication, Tata McGraw-Hill.

5. Courtan L. Bovee et al., Business Communication Today, Pearson Education

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-2nd Semester

BCA-203   **Introduction to Web Technology**

L	T	P	Credit		Theory	: 60 marks
3	0	2	4		Sessional	: 40 marks
					Time	: 3Hrs.

Objective: Web Technology has revolutionized mankind and entirely changed the way we look at things. Banking, Education, Retailing, Manufacturing and Research are some of the things that have undergone major transformations due to influence from web development. By adding more features, increasing the scope and reach of industries, making it available to users irrespective of their geography, web has captivated the human minds. Learning web technology is one of the top priorities for every computer enthusiast in order to better understand its working and scope. Students will understand the fundamental working technology behind web development and HTML. They will be taught concepts like JS, HTML5 thus making them capable of web development.

Course Outcome:

Students will gain the knowledge and skills required to develop Simple Web Applications.

They should be able to

- Explain basic Client-Server web architecture
- Understand working of web protocols like HTTP, TCP/IP, DNS as well as IP and web address resolution schemes such as URIs/URLs and DNS
- Use and recognize commonly used HTTP request and response messages
- Differentiate and create both static and dynamic web applications
- Understand and use HTML/CSS and XML
- Create static web pages using HTML & CSS
- Understand and use PHP for server side scripting
- Create simple dynamic web pages supporting user interaction using HTML, CSS &Java Script.

Course Contents:

UNIT I

Introduction to the Internet   and theWorld Wide Web

Introduction, History of internet, Internet Design Principles, Internet Protocols - FTP, TCP/IP, SMTP, Telnet, etc., Client Server Communication, Web System architecture

Evolution of the Web, Web architectures, Web clients and servers, Static and Dynamic Web Applications, Front end and back end web development. HTML, CSS, JS, XML; HTTP, secure HTTP, etc; URL, Web Services – SOAP, REST.

UNIT II

HTML & CSS

Introduction to Html, Html Document structure, Html Editors, Html element/tag & attributes, Designing simple page - Html tag, Head tag, Body tag; More Html tags - Anchor tag, Image tag, Table tag, List tag, Frame tag, Div tag ; Html forms - Input type, Text area, Select , Button, Images.

Introduction to CSS, Syntax, Selectors ,Embedding CSS to Html, Formatting fonts, Text & background colour, Inline styles, External and Internal Style Sheets, Borders & boxing.

UNIT III

XML and HTML5, CSS3

Introduction to XML, Difference b/w Html & XML, XML editors, XML Elements & Attributes XML DTD, XML Schema, XML Parser, Document Object Model (DOM), XML DOM.

Introduction to HTML5, New features, Local storage, Web Sockets, Server events, Canvas, Audio & Video, Geolocation, Microdata, Drag and Drop. Browser life cycle and browser rendering stages. Service workers.

UNIT IV

PHP Server side scripting

Introduction to PHP, Basic Syntax, Variables, constants and operators, Loops, Arrays and Strings, Environment & environment variables, responding to HTTP requests, Files, Cookies, Sessions, Examples.

Practical website development

Commonly used Web Servers and browsers, Setting up a server and domain name, website types and structures, web authoring tools, Web hosting, website maintenance, generating traffic to your website.

List of Programs:

1.   Hello World Web Page

Students will learn to:

- Create a basic web page using basic HTML features like tags, attributes, elements and page title.

- How to install, and configure a web server

BCA-CTIS-MMU

2. My Profile Page

Students will learn how to

- create a more functional web page by making use of headings, paragraphs, lists, images, and links

3. My Profile Page with comments

Students will learn how to

- Use textboxes, check boxes, radio buttons and submit buttons
- Learn how to use PHP to create a dynamic web page

4. My Timetable Page

Students will learn how to

- Create and use tables and forms in their web page

5. Dynamic My Timetable Page

Students will learn how to

- Use PHP conditional operators, loops and strings to create an dynamic timetable

Books:

1. Practical Web Design for Absolute Beginners, Adrian W. West. Apress 2016
2. Introducing Web Development, Jorg Krause. Apress 2017.
3. HTML & CSS: The Complete Reference, Thomas Powell. McGraw Hill, Fifth Edition, 2010
4. Creating a Website: The Missing Manual, 3rd Edition, Mathew Macdonald. O'Reilly
5. Web Technologies - HTML, JavaScript, PHP, Java, JSP, ASP.NET, XML and Ajax Black, Kogen Learning Systems (Dreamtech Press), 5th Edition 2009.
6. HTML, XHTML & CSS Bible, Brian Pfaffenberger, Steven M.Schafer, Charles White, Bill Karow-Wiley Publishing Inc, 2010
7. HTML5 & CSS3 for the Real World, 2 Edition, Alexis Goldstein, Estelle Weyl, Louis Lazaris. Apress 2015.
8. HTML5 & CSS3 for Dummies, Andy Harris. Wiley 2014.
9. Learning PHP A Gentle Introduction to the Web's Most Popular Language, David Sklar. O'Reilly 2016.
10. Build Your Own Database Driven Web Site Using PHP & MySQL, Kevin Yank. Sitepoint , 4th Edition, 2009.

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-2nd Semester

BCA-204   **OOPS with C++**

L	T	P	Credit
3	0	0	3

Theory : 60 marks
Sessional: 40 marks
Time: 3Hrs.

Objective: The main objective is to learn the basic concept and techniques which form the object oriented programming paradigm. Object-oriented programming is a new way of thinking about problem, using models organized around real world concept. The fundamental construct is the object which combines both data-structure and behaviour in a single entity which is in contrast to conventional programming in which data-structure and behaviour are loosely connected.

Course Outcome:

After completion of the course the student will be able to-

- Describe the differences between procedure oriented programming and object oriented programming.
- Define the three key features of the object-oriented programming language: encapsulation (abstraction), inheritance, and polymorphism.
- Declare a class.
- Create objects, array of objects, and pointer to an object of a class.
- Identify the differences between private, public and protected members of a class.
- Describe how to access private, public and protected members of a class.
- Understand the memory allocation of objects and class methods
- Design and use friend functions and friend classes.
- Apply the facilities offered by C++ for Object-Oriented Programming.
- Understand the difference between normal member functions and virtual member functions.
- Identify advantages of using virtual functions.

Course Contents:

UNIT I

Introduction

Evolution of programming methodologies-Procedure oriented versus Object Oriented Programming-characteristics of OOP, Basics of OOP, Merits and Demerits of OOP. **Data Types:** Different data types, operators and expressions in C++, Keywords in C++. **Input and Output:** Comparison of stido.h and iostream.h, cin and cout. **Decision and loop:** Conditional statement - if-else statement, nested if-else statement, switch, break, continue, and goto statements, Looping statements- for loop, while loop, Do-while loop. **Arrays, String and Structures :**   fundamentals-Single dimensional, multi-dimensional arrays, fundamentals of strings, different

methods to accept strings, different string manipulations, array of strings, Basics of structures-declaring and defining structure- Accessing structure members, array of structures, Unions difference between structures and Unions, Enumerated data types-declaration and their usage

UNIT II

Class: Definition-defining the class, defining data members and member functions, Access specifier-private, public, protected, objects as function arguments, returning objects from the function, scope resolution operator, member function defined outside the class, difference between class and structure, array as class member data, Array of objects. **Functions in C++ :**   Function definition, function declaration, Built-in functions, user defined functions, calling the function, passing parameter-actual and formal, different methods of calling the function call by value, call by reference using reference as parameter and pointer as parameter, overload function-different types of arguments-different number of arguments, inline function, default argument, storage classes-automatic, external, static, register. **Constructor and Destructor:** Constructors-constructor with argument, constructor without arguments, constructor with default arguments, Dynamic constructor, constructor overloading, copy constructor, destructors, Manipulating private data members.

UNIT III

Operator overloading: Defining operator overloading, overloading unary operator, overloading binary operator, manipulation of string using overloaded operator, rules for overloading operator. Data   conversion: conversion between Basic types, conversion between objects & Basic types, conversion between objects of different classes. **Inheritance:** Base Class & derived class, defining derived classes, protected access specifier, public inheritance and private inheritance-member accessibility, constructors and destructors in derived classes, Level of inheritance-single inheritance, multiple inheritance, multi-level inheritance, hierarchical inheritance, hybrid inheritance.**Pointer:** Pointer declaration and Access, Pointer to void, pointer and arrays, pointer constant and pointer variable, pointer and functions, pointer, call by pointer arrays, array of pointers to string, printer sort, memory management-new and delete, pointer to object-referencing members using pointers, self-containing class, this pointer, returning values using this pointer. **Virtual function:** Normal member functions accessed with pointers, virtual member function access, late binding, pure virtual function, abstract class, virtual base class

UNIT IV

Friend functions and static function: Purpose, defining friend functions, friend classes, static function, accessing static function numbering positive objects.

Templates and Exception Handling: Introduction to templates, class templates, function templates, Member function templates, Template arguments, Exception handling. **Console IO Operator :**C++ stream and C++ stream classes, unformatted I/O operators, formatted I/O operators-manipulators-user defined manipulators. **Files :** Class for file stream operators, opening and closing a file, file nodes, writing an object to disk, reading an object from disk, binary versus character files, I/O with multiple object, stream class, file pointer-specifying the position, specifying the object, tellg() function, seekg() function. Command line arguments.

Books:

1. E. Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill. Publications
2. Strousstrup: The C++ Programming Language, Pearson Edition, 3rd Edition
3. Lafore Robert: Object Oriented Programming in Turbo C++, Galgotia Publications
4. Lippman: C++ Primer, 3/e Pearson Education
5. C++ completer reference by Herbert Schildt, Tata McGraw Hill Publications.
6. Let us C++ by YeshwanthKanetkar

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-2nd Semester

BCA-205   **Data Structures & Algorithms**

L	T	P	Credit	
3	0	0	3	

Theory: 60 marks
Sessional: 40 marks
Time:3Hrs.

Objective: A data structure is a particular way of storing and organizing data in a computer so that it can be used efficiently. Different kinds of data structures are suited to different kinds of applications and some are highly specialized to specific tasks. This course covers the basic concepts of different data structures which are the basic building blocks of Programming and problem solving.

Course Outcome:

Upon completion of the course the student will be able to:

- Understand and implement the both array based and linked-list based data structures, including singly, doubly, and circular linked-lists.
- Understand and implement the Stack data structure and stack operations.
- Understand and implement the both array based circular queue and linked-list based queue implementations.
- Understand and implement general tree data structures, including binary tree, both array based and reference based implementations.
- Understand and implement binary search trees.

Course Contents:

UNIT I

Introduction to Data structures
Definition, Classification of data structures: primitive and non primitive, Elementary data organization, Time and space complexity of an algorithm (Examples), String processing. Dynamic memory allocation and pointers: Definition of dynamic memory allocation, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through its pointer, Meaning of static and dynamic memory allocation, Memory allocation functions: malloc(), calloc(), free() and realloc(). Recursion: Definition, Recursion in C (advantages), Writing Recursive programs – Binomial coefficient, Fibonacci, GCD.

UNIT II

Searching and Sorting

Basic Search Techniques: Sequential search: Iterative and Recursive methods, Binary search: Iterative and Recursive methods, Comparison between sequential and binary search. Sort: General background and definition, Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort

UNIT III

Stack and Queue

Stack – Definition, Array representation of stack, Operations on stack: Infix, prefix and postfix notations, Conversion of an arithmetic expression from Infix to postfix, Applications of stacks. Queue: Definition, Array representation of queue, Types of queue: Simple queue, Circular queue, Double ended queue (deque) , Priority queue , Operations on all types of Queue

Linked List

Definition, Components of linked list, Representation of linked list, Advantages and Disadvantages of linked list. Types of linked list: Singly linked list, doubly linked list, Circular linked list, Operations on singly linked list: creation, insertion, deletion, search and display.

Unit IV

Tree Graphs and their Applications:

Definition : Tree, Binary tree, Complete binary tree, Binary search tree, Heap Tree terminology: Root, Node, Degree of a node and tree, Terminal nodes, Non-terminal nodes, Siblings, Level, Edge, Path, depth, Parent node, ancestors of a node. Binary tree: Array representation of tree, Creation of binary tree. Traversal of Binary Tree: Preorder, Inorder and postorder. Graphs, Application of Graphs, Depth First search, Breadth First search.

Books:
1. Weiss, Data Structures and Algorithm Analysis in C, II Edition, Pearson Education, 2001
2. Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill
3. Robert Kruse Data Structures and program designing using 'C'
4. Trembley and Sorenson Data Structures
5. E. Balaguruswamy Programming in ANSI C.
6. Bandyopadhyay, Data Structures Using C Pearson Education, 1999
7. Tenenbaum, Data Structures Using C. Pearson Education, 200
8. Kamthane: Introduction to Data Structures in C. Pearson Education 2005.
9. Hanumanthappa M., Practical approach to Data Structures, Laxmi Publications, Fire Wall media 2006
10. Langsam, AusensteinMaoshe& M. Tanenbaum Aaron Data Structures using C and C++ Pearson Education

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-2nd Semester

BCA-206   **System Configuration & Maintenance**

L T P Credits   Theory : 60 marks
4   0 0   4   Sessional: 40 marks
                                                           Time: 3 Hrs.

Objective: This course provides the students with an overall view of the hardware and peripheral devices. It explains the characteristics, functions and working of these hardware components. Basics of how to configure and maintain a system is explained here with hands-on exposure.

Course Outcomes:

After completion of this course students will be able to:

- Identify different parts, ports, slots, cable and connectors in a desktop personal computer.
- Understanding of Motherboard and its interfacing components. Disassemble and assemble desktop.
- Disk formatting, partitioning and Disk operating system commands
- Install, upgrade and configure Windows operating systems.
- Install and configure computer drivers and system components.
- Identify, install and manage network connections Configuring IP address and Domain name system
- Installation of printer and scanner software.
- Troubleshooting and Managing Systems

Course Contents:

UNIT I

Hardware

Identify basic computer hardware , Mother boards Form factor, Processor speed/cores: Single/Dual/Quad core, Intel based / Cell based/AMD based, GHz vs. MHz, Processor cache size, Common Processor Sockets, Bus speed (as they relate to motherboards, memory, etc), RAM: DDR, DDR2, DDR3, DIMMS vs. SODIMMS, Hard drives: RPMs, Cache size, Flash based vs. traditional hard drives, SATA, SCSI, IDE, Internal vs. external, Identify different computing devices: Desktop, Server, Portable: Laptop, PDA, Smartphone, Netbook. Local vs. network shares.

UNIT II

Peripheral Devices

Explain the characteristics and functions of core input devices: Keyboard, Mouse, Tablet (touch screen), Numeric keypad, Gamepad, Identify the proper use of the following devices: Monitors: Adjust monitor settings (brightness, contrast, etc), Types of monitors, Explain the characteristics and functions of internal and external storage devices: CD/CD-RW Drive, DVD/DVD-RW Drive, Blu-Ray Disk Drive, USB storage (solid state vs. magnetic disk), Multi-card reader and writer, Hard drives, Mobile media devices (e.g. MP3 player or PDAs), Explain the characteristics and functions of peripheral devices: Digital camera, Web camera, Speaker, Tuner, Microphone, Printer / scanner; Computer Cases and Cabinets (desktop, tower, laptop, custom cases)

UNIT III

Connectors and Ports

Identify differences between connector types: DVI, VGA, HDMI, USB, PS/2, FireWire, Bluetooth and Wireless, Serial, Network connectors, PCMCIA, Express Card, 3.5mm audio jack, Power connectors, Keyboard (keyboard layout: regionalization), Mouse (touchpad, optical, trackball), Printer (USB, wireless, networked)

System Configuration and Maintenance

System configuration: configure Basic Input Output System (BIOS) eg date/time, power management, Voltage and power requirements, Protecting BIOS, **Software maintenance**: upgrade software e.g. virus definition files, patches/updates, scheduling maintenance tasks, utility software e.g. defragmentation, clean-up, back-up, system profilers, other third party utility software e.g. compression utilities, spyware/malware removal, security, install latest antivirus/security updates, update user profiles, configure desktop, icon size, font size, color, background, customize menu, file management, files and folders, setting file/folder sharing permissions, peripheral devices, printer, scanner, camera, communication devices, **Hardware maintenance**: upgrade hardware, install and configure new peripherals eg printers, scanners, install and configure additional or replacement devices eg hard drive, memory, graphics, sound, optical media, network, cleaning equipment.

UNITIV

Operating Systems - Features and Requirements Microsoft Windows Operating Systems: From Windows XP to Windows 8, Features: 32-Bit Vs. 64-Bit, Aero, Gadgets, User Account Control, Bit-Locker, System Restore, Administrative Tools, Firewall, Security Center, File Structure And Paths, Compatibility Tools and Windows Upgrade OS Advisor, Boot Methods: (USB, CD-ROM, DVD, PXE),Type of Installations: Creating
BCA-CTIS-MMU

Image: Unattended Installation, Upgrade from Windows 7 to windows 8 Clean Install, Repair Installation, Multiboot, Remote Network Installation and Image Deployment, **Partitioning:** Dynamic, Basic, Primary, Extended and Logical, File System Types Formatting: FAT, FAT32, NTFS and CDFS, File management: manage files/folders permissions, NTFS security configuration. back-up procedures, Usage of Appropriate Operating System Features and Tools: Administrative, Computer management, General, Disk Management and Command Line Utilities Tools, Control Panel Utilities: Common for all Windows OS, Unique to Windows Vista and Unique to Windows 7 and Unique to Windows 8, **Performing Preventive Maintenance Procedures Using Appropriate Tools**: Best Practices, Security Settings: User and Groups, Administrator, Power User, Guest and Standard User, Basics of Client-Side Virtualization: Purpose of Virtual Machines, Resource Requirements, Emulator Requirements, Security Requirements and Network Requirements, **Non-Windows Operating System**: Unix-based operating system, Mac operating system, type of file systems, Disk Management and Command Line Utilities Tools, portioning, user accounts creation and configuration, file permissions and privileges.

Books:

- PC Hardware in a Nutshell by Barbara Fritchman Thompson, Robert Bruce Thompson - O'Reilly, 2nd Edition, 2010
- Fundamental of Computer Organization and Maintenance by Mostafa AB-EL-BARR abdHesham EL-REWNI, John Wiley and Sons, 2006
- Fundamentals of Computer Organization by Albert Zomaya, 2010

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-2ⁿᵈSemester

BCA-209   **Software Engineering**

L	T	P	Credit		
3	0	2	4		

Theory : 60 marks
Sessional   : 40 marks
Time   : 3Hrs

Objective- Software engineering incorporates various accepted methodologies to design software. This course gives a detailed description of the entire process of developing a software project and also the issues associated after development. This course covers the introductory concepts of software engineering and its design, development and maintenance.

Course Outcome:

Upon completion of the course the student will be able to:

- Acquire strong fundamental knowledge in science, mathematics, fundamentals of computer science, software engineering and multidisciplinary engineering to begin in practice as a software engineer.

- Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.

- Deliver quality software products by possessing the leadership skills as an individual or contributing to the team development and demonstrating effective and modern working strategies by applying both communication and negotiation management skill.

- Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development.

Course Contents:

UNIT I

Software Product and Process

Introduction – S/W Engineering Paradigm – Verification – Validation – Life Cycle Models – System Engineering – Computer Based System – Business Process Engineering, Overview – Product Engineering Overview.

UNIT II

Software Requirements

Functional and Non-Functional – Software Document – Requirement Engineering Process – Feasibility Studies – Software Prototyping – Prototyping in the Software Process – Data – Functional and Behavioural Models – Structured Analysis and Data Dictionary.

Methods available.

UNIT III

Analysis, Design Concepts and Principles

Systems Engineering - Analysis Concepts - Design Process And Concepts – Modular Design – Design Heuristic – Architectural Design – Data Design – User Interface Design – Real Time Software Design – System Design – Real Time Executives – Data Acquisition System – Monitoring And Control System.

UNIT IV

Testing

Taxonomy Of Software Testing – Types Of S/W Test – Black Box Testing – Testing Boundary Conditions – Structural Testing – Test Coverage Criteria Based On Data Flow Mechanisms – Regression Testing – Unit Testing – Integration Testing – Validation Testing – System Testing And Debugging – Software Implementation Techniques

Software Project Management

Measures And Measurements – ZIPF's Law – Software Cost Estimation – Function Point Models – COCOMO Model – Delphi Method – Scheduling – Earned Value Analysis – Error Tracking – Software Configuration Management – Program Evolution Dynamics – Software Maintenance – Project Planning – Project Scheduling– Risk Management – CASE Tools

Books:

1. Ian Sommerville, "Software engineering", Seventh Edition, Pearson Education Asia, 2007

2. Roger S. Pressman, "Software Engineering – A practitioner's Approach", Sixth Edition, McGraw-Hill International Edition, 2005

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-2ndSemester

BCA-207L   **OOPs with C++ –Lab**

L	T	P	Credit			
0	0	4	2	Practical :	50 marks	
				Sessional:	50 marks	
				Time:	3Hrs.	

List of Programs

Write a C++ Program

1. To implement the structure.

2. To Add two time variables using constructor and destructor.

3. For function overloading.

4. For operator overloading.

5. For implementation of inheritance

6. To add two complex no using friend function.

7. For pure virtual function.

8. To create file and store the information and fetch the information.

M.M. University, Sadopur (Ambala)
BCA-2ⁿᵈ Semester

BCA-208L   **Data Structures and Algorithm –Lab**

L	T	P	Credit		Practical :	50 marks
0	0	4	2		Sessional:	50 marks
					Time:	3Hrs.

List of Programs

Part A

1. Use a recursive function to find GCD of two numbers.

2. Use a recursive function to find the Fibonacci series.

3. Use pointers to find the length of a string and to concatenate two strings.

4. Use pointers to copy a string and to extract a substring from a given a string.

5. Use a recursive function for the towers of Hanoi with three discs.

6. Insert an integer into a given position in an array.

7. Deleting an integer from an array.

8. Write a program to create a linked list and to display it.

9. Write a program to sort N numbers using insertion sort.

10. Write a program to sort N numbers using selection sort.

Part B

1. Inserting a node into a singly linked list.

2. Deleting a node from a singly linked list.

3. Pointer implementation of stacks.

4. Pointer implementation of queues.

5. Creating a binary search tree and traversing it using in order, preorder and post order.

6. Sort N numbers using merge sort.

BCA
THIRD SEMESTER

MAHARISHI MARKANDESHWAR UNIVERSITY

SADOPUR, AMBALA

BACHELOR OF COMPUTER APPLICATION

SCHEME OF EXAMINATION FOR 3RD SEMESTER

Sr. No	Course No.	Subject	Teaching Schedule			Credits	Examination Schedule			
			L	T	P		Theory	Sessional (Internal)	Practical (Viva Voice)	Total
1	BCA-301	Reasoning and Thinking	2	0	2	3	60	40	-	100
2	BCA-302	Computer Networks	4	0	0	4	60	40	-	100
3	BCA-303	Programming in Java	3	0	0	3	60	40	-	100
4	BCA-304	RDBMS	3	0	0	3	60	40	-	100
5	BCA-306	Information Security Fundamentals	4	0	0	4	60	40	-	100
6	BCA-309	Principles of Virtualization	4	0	0	4	60	40	-	100
7	BCA-307L	Programming in Java – Lab	0	0	4	2	-	50	50	100
8	BCA-308L	RDBMS – Lab	0	0	4	2	-	50	50	100
		Total	20	0	10	25	360	340	100	800

M.M. University, Sadopur (Ambala)
BCA-3rd Semester

BCA-301   **Reasoning & Thinking**

L   T   P   Credit   Theory : 60 marks
2   0   2   3   Sessional: 40 marks
                                                             Time   : 3Hrs

Objective:

t is the objective of the students to introduce to the students, concepts like Reasoning and thinking which are very important for any individual. In every aspect and walk of life and assists them in taking the right decisions, approach every problem with diligence and perform action accordingly.

Course Outcome

At the end of the course, students will be able to:

- By the end of this course, students will be able to use their logical reasoning and thinking skills more effectively; hence making them ready to clear written aptitude tests in industries and get placed easily.

Course Contents:

UNIT I

Verbal ability

Synonyms**,** Antonyms and One word substitutes

UNIT II

Basic quantitative aptitude

Speed, Time and Distance, Time and Work, Linear Equations, Progressions (Sequences & Series), Permutation and Combination, Probability,

UNIT III

Functions:

Functions, Set Theory, Number Systems, LCM and HCF, Percentages, Collection and Scrutiny of data: Primary data, questionnaire and schedule; secondary data, their major sources including some government publication

UNIT IV

Logical Reasoning - I

Number and Letter Series, Calendars, Clocks, Cubes, Venn Diagrams, Binary Logic, Seating Arrangement, Logical Sequence, Logical Matching, Logical Connectives, Syllogism

Books:

1. Richard I Levin, David S. Rubin: Statistics for Management, Pearson Prentice Hall Education Inc. Ltd, NewDelhi, 5th Ed. 2007
2. Bajpai, N. Business Statistics, Pearson, 2010
3. Sharma J.K., Business Statistics, Pearson Education India, 2010.

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt any five questions selecting at least one from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-3rd Semester
BCA-302   **Computer Networks**

L   T   P   Credit   Theory   : 60 marks
4   0   0   4   Sessional: 40 marks
                                             Time   : 3 hrs

Objective: It is important for networking professionals to have a sound grounding in the basics of networking and with the networking technology being developed thick and fast, the professionals need to be updated of them at all times. The focus of this unit is providing a background to the basics of networking and its underlying principles. The learners taking this unit will explore the fundamentals of networking, the principle and purpose behind layered models, devices used in networks and their wireless connectivity and the ways to troubleshoot network related issues. The unit underpins the principles of networking and enables the learners to work towards taking up vendor certifications in the networking domain. This course enables learners to understand computer networking concepts, how they work, how they operate and the protocols, standards and the models associated with networking technology and their troubleshooting mechanisms.

Course Outcome

- Discuss the evolution of Computer Networks.
- Evaluate the different standard organizations related to computer networks.
- Understand the Concept of protocols at different layers.
- Compare features of TCP/IP Model with reference to the OSI Model.
- Examine reassembly and fragmentation with respect to a data packet in hand.
- Inspect the different switching technologies for LAN.
- Understand the Concept of WAN switching.
- Understand the basics of network utility and network troubleshooting.

Course Contents:

UNIT I

Networking Fundamentals

Basics of Network & Networking, Advantages of Networking, Types of Networks, Network Terms- Host, Workstations, Server, Client, Node, Types of Network Architecture- Peer-to-Peer & Client/Server, Workgroup Vs. Domain. Network Topologies, Types of Topologies, Logical and physical topologies, selecting the Right Topology, Types of Transmission Media, Communication Modes, Wiring Standards and Cabling- straight through cable, crossover cable, rollover cable, media connectors (Fibre optic, Coaxial, and TP etc.) Introduction of OSI model, Seven layers of OSI model, Functions of the seven layers, Introduction of TCP/IP Model, TCP, UDP, IP, ICMP, ARP/RARP, Comparison between OSI model & TCP/IP model. Overview of Ethernet Addresses

UNIT II

Basics of Network Devices

Network Devices- NIC- functions of NIC, installing NIC, Hub, Switch, Bridge, Router, Gateways, And Other Networking Devices, Repeater, CSU/DSU, and modem, Data Link Layer: Ethernet, Ethernet standards, Ethernet Components, Point-to-Point Protocol(PPP),PPP standards, Address Resolution Protocol, Message format, transactions, Wireless Networking: Wireless Technology, Benefits of Wireless Technology, Types of Wireless

Networks: Ad-hoc mode, Infrastructure mode, Wireless network Components: Wireless Access Points, Wireless NICs, wireless LAN standards: IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, wireless LAN modulation techniques, wireless security Protocols: WEP,WPA, 802.1X, Installing a wireless LAN

UNIT III

Basics of Network, Transport and Application Layers

Network Layer: Internet Protocol (IP), IP standards, versions, functions, IPv4 addressing, IPv4 address Classes, IPv4 address types, Subnet Mask, Default Gateway, Public & Private IP Address, methods of assigning IP address, IPv6 address, types, assignment, Data encapsulation, The IPv4 Datagram Format, The IPv6 Datagram Format, Internet Control Message Protocol (ICMP), ICMPv4, ICMPv6, Internet Group Management Protocol (IGMP),Introduction to Routing and Switching concepts, Transport Layer: Transmission Control Protocol(TCP), User Datagram Protocol (UDP), Overview of Ports & Sockets, Application Layer: DHCP, DNS, HTTP/HTTPS, FTP, TFTP, SFTP, Telnet, Email: SMTP, POP3/IMAP, NTP

WAN Technology

What Is a WAN?, WAN Switching, WAN Switching techniques Circuit Switching, Packet Switching etc., Connecting to the Internet : PSTN, ISDN, DSL, CATV, Satellite-Based Services, Last Mile Fiber, Cellular Technologies, Connecting LANs : Leased Lines, SONET/SDH, Packet Switching, Remote Access: Dial-up

Remote Access, Virtual Private Networking, SSL VPN, Remote Terminal Emulation, Network security: Authentication and Authorization, Tunneling and Encryption Protocols, IPSec, SSL and TLS, Firewall, Other Security Appliances, Security Threats

UNIT IV

Network Operating Systems and Troubleshooting Network

Network Operating Systems: Microsoft Operating Systems, Novell NetWare, UNIX and Linux Operating Systems, Macintosh Networking, Trouble Shooting Networks: Command-Line interface Tools, Network and Internet Troubleshooting, Basic Network Troubleshooting : Troubleshooting Model, identify the affected area, probable cause, implement a solution, test the result, recognize the potential effects of the solution, document the solution, Using Network Utilities: ping, traceroute, tracert, ipconfig, arp, nslookup, netstat, nbtstat, Hardware trouble shooting tools, system monitoring tools

Books:

1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011

2. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013

3. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008

4. CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-3rd Semester

BCA-303 **Programming in Java**

L T P Credit Theory : 60 marks
3 0 0 3 Sessional: 40 marks
Time: 3Hrs

Objective: Object oriented programming is the most proven technique for developing reliable programs. It helps in increased productivity, reusability of code, decrease in the development time, and reduces cost of production to an extent. The cost of maintaining such systems have also considerably decreased. There are many languages which used the object oriented concepts and techniques. Some of them are C++, Java, Smalltalk, Objective-C, etc. Java is a purely object oriented language. Systems/applications created using java programming language reduces the need for developing and maintain complex and space consuming applications. Java has a lot of advantages of being simple, robust, platform independent, etc. Nowadays java is also found in the mobile phones. This unit focuses on the concepts of object oriented programming language and the different constructs for creating applications in java. This course provides students with an understanding of the object oriented concepts which helps in the field of programming, management of data, etc. and of Java programming which helps to explore the object oriented nature of the language and the multi-platform versatility offered by it.

Course Outcome:

At the end of this Subject Syllabus, student will able to understand-

- History and Need of Object Oriented Concepts.
- Concepts of Class and Object in Java Programming.
- Packages and Thread Programming in JAVA
- Creating application in JAVA based on Database.

Course Contents:

UNIT I

Introduction

History, Overview of Java, Object Oriented Programming, A simple Program, Two control statements - if statement, for loop, using Blocks of codes, Lexical issues - White space, identifiers, Literals, comments, separators, Java Key words. Data types: Integers, Floating point, characters, Boolean, A closer look at Literals, Variables, Type conversion and casting, Automatic type promotion in Expressions Arrays. **Operators:** Arithmetic operators, The Bit wise operators, Relational Operators, Boolean Logical operators, Assignment Operator,

Operator Precedence. Control Statements: Selection Statements - if, Switch: Iteration Statements - While, Do-while, for Nested loops, Jump statements.

UNIT II

Classes:

Class Fundamentals, Declaring objects, Assigning object reference variables, Methods, constructors, "this" keyword, finalize ( ) method A stack class, Over loading methods, using objects as parameters, Argument passing, Returning objects, Recursion, Access control, Introducing final, understanding static, Introducing Nested and Inner classes, Using command line arguments. Inheritance: Inheritance basics, Using super, method overriding, Dynamic method Dispatch, using abstract classes, using final with Inheritance.

UNIT III

Packages

Definition, Access protection importing packages, Interfaces: Definition implementing interfaces. Exception Handling: Fundamental, Exception types, Using try and catch, Multiple catch clauses, Nested try Statements, throw, throws, finally, Java's Built - in exception, using Exceptions.

UNIT IV

Multithreaded Programming

The Java thread model, The main thread, Creating a thread, Creating multiple thread, Creating a thread, Creating multiple threads, Using isalive() and Join(), Thread - Priorities, Synchronization, Inter thread communication, suspending, resuming and stopping threads, using multi threading. 1/0 basics, Reading control input, writing control output, Reading and Writing files, Applet Fundamentals, the AWT package, AWT Event handling concepts The transient and volatile modifiers, using instance of using assert.

Books:

1. The complete reference Java –2: V Edition By Herbert Schildt Pub. TMH.
2. SAMS teach yourself Java – 2: 3rd Edition by Rogers Cedenhead and Leura Lemay Pub. Pearson Education.

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-3rd Semester

BCA-304 **RDBMS**

L	T	P	Credit	
3	0	0	3	

Theory : 60 marks
Sessional: 40 marks
Time: 3Hrs

Objective: The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information from a DBMS.

Course Outcome:

- Understand the Purpose of Database System
- Understand the relational model
- Describe Integrity Constraints
- Describe SQL fundamentals and work on different SQL Queries
- Understand Functional Dependencies
- Describe the concepts of transaction
- Understand ACID properties

Course Contents:

UNIT I

Introduction

Purpose of Database System -– Views of data – Data Models – Database Languages –– Database System Architecture – Database users and Administrator – Entity– Relationship model (E-R model) – E-R Diagrams -- Introduction to relational databases

UNIT II

Relational Model

The relational Model – The catalog- Types– Keys - Relational Algebra – Domain Relational Calculus – Tuple Relational Calculus - Fundamental operations – Additional Operations- SQL fundamentals, Oracle data types, Data Constraints, Column level & table Level Constraints, working with Tables, Defining different constraints on the table, Defining Integrity Constraints in the ALTER TABLE Command, Select Command, Logical Operator,

Range Searching, Pattern Matching, Oracle Function, Grouping data from Tables in SQL, Manipulation Data in SQL. Joining Multiple Tables (Equi Joins), Joining a Table to itself (self Joins), Sub queries Union, intersect & Minus Clause, Creating view, Renaming the Column of a view, Granting Permissions, - Updating, Selection, Destroying view Creating Indexes, Creating and managing User, Integrity – Triggers - Security – Advanced SQL features –Embedded SQL– Dynamic SQL- Missing Information– Views – Introduction to Distributed Databases and Client/Server Databases

UNIT III

Database Design

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form-Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form

UNIT IV

Transactions

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery – Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery –Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking – Intent Locking – Deadlock- Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency.

Books:

1. 1.Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Fifth Edition, Tata McGraw Hill, 2006

2. RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fourth Edition, Pearson/Addision Wesley, 2007.

3. Raghu Ramakrishnan, "Database Management Systems", Third Edition, McGraw Hill, 2003.

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-3rd Semester

BCA-306   **Information Security Fundamentals**

L	T	P	Credit		Theory	: 60 marks
4	0	0	4		Sessional	: 40 marks
					Time	:3Hrs

Objective- The course primarily covers the Types of Threats, Vulnerabilities, Risks and various terminologies in Information Security. It explains the formation of Security policy at various levels inside the Organization and provides the definition Procedures, Standard and Guidelines. The units emphasize the need of Performing Asset Classification and Declassification, Retention and Disposal of Information Asset also it identifies the various levels of Authorization for access Viz., Owner, Custodian and User. The course covers the different types of Access Controls and Physical security measures to safeguard the Assets and conclusively, it deals with the Digital Rights Management also covering the concepts of Common Authentication protocols and Real world Protocols. This course enables the students to understand the concepts of IT security, Threats, Vulnerabilities, Impact and control measures. To get familiarized with Asset management along with the objective to create awareness in Digital Rights management.

Course Outcome:

At the end of the course, the student will be able to:-

- Understand the Concept and need of Information Security
- Define the Server Security, Concept and need of Firewalls
- Understand the Concept of Internet Security
- Describe the various attacks and preventive measure
- Understand vulnerability assessment
- Understand the Cyber laws
- Describe model for Risk Assessment

Course Contents:

UNIT I

Introduction to Information Security

Definition of Information Security, Evolution of Information Security; Basics Principles of Information Security; Critical Concepts of Information Security; Components of the Information System; Balancing Information Security and Access; Implementing IT Security, The system Development Life cycle, Security professional in the organization.

BCA-CTIS-MMU

UNIT II

The Need for IT Security

Business Needs-Protecting the functionality, Enabling the safe operations, Protecting the data, safe guarding the technology assets; Threats-compromises to Intellectual property, deliberate software attacks, Espionage and trespass, sabotage and vandalism; Attacks-Malicious Codes, Back Doors, Denial of Service and Distributed Denial of Service, Spoofing, sniffing, Spam, Social Engineering.

UNIT III

Risk Management

Definition of risk management, risk identification, and risk control, Identifying and Accessing Risk, Assessing risk based on probability of occurrence and likely impact, the fundamental aspects of documenting risk via the process of risk assessment, the various risk mitigation strategy options, the categories that can be used to classify controls.

UNIT IV

Network Infrastructure Security and Connectivity

Understanding Infrastructure Security- Device Based Security, Media-Based Security, Monitoring and Diagnosing; Monitoring Network- Firewall, Intrusion Detection System, Intrusion Prevention system; OS and Network Hardening, Application Hardening; Physical and Network Security- Policies, Standards and Guidelines.

Books:

1. Information Security Risk Analysis - Thomas R. Peltier, Third Edition,Pub: Auerbach, 2012

2. Operating System Concepts, 8th Edition by Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Pub: John Wiley & sons, Inc., 2009.

3. Information security: Principles and Practice - Mark Stamp, 2nd Edition, Pub: John Wiley & Sons, Inc., 2011

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-3rd Semester

BCA-309   **Principles of Virtualization**

L   T   P   Credit   Theory   : 60 marks
4   0   0   4   Sessional: 40 marks
                                                   Time   : 3Hrs

Objective- Virtualization is the single most effective way to reduce IT expenses while boosting efficiency and agility in organizations. This unit explores the implementation and usage of VMWare Virtualization, its installation process and the working of Windows Server hyper V.

Course Outcome:

At the end of this Subject Syllabus, student will able to understand-

- Need of Virtualization and Various Virtualization Techniques.
- Applying System Settings to implement Virtualization.
- Configuration of various applications used for Virtualization.
- Creating Virtual machines and client settings.

Course Contents:

UNIT I

Basics of Virtualization

Understanding Virtualization, Need of Virtualization and Virtualization Technologies: Server Virtualization, Storage Virtualization, I/O Virtualization, Network Virtualization, Client Virtualization, Application virtualization, Desktop virtualization, Understanding Virtualization Uses: Studying Server Consolidation, Development and Test Environments , Helping with Disaster Recovery

UNIT II

Deploying and Managing an Enterprise Desktop Virtualization Environment

configure the BIOS to support hardware virtualization; Install and configure Windows Virtual PC: installing Windows Virtual PC on various platforms (32-bit, 64-bit), creating and managing virtual hard disks, configuring virtual machine resources including network resources, preparing host machines; create, deploy, and maintain images

UNIT III

Deploying and Managing a Presentation Virtualization Environment

Prepare and manage remote applications: configuring application sharing, package applications for deployment by using RemoteApp, installing and configuring the RD Session Host Role Service on the server.

UNIT IV

Accessing Published Applications

Access published applications: configuring Remote Desktop Web Access, configuring role-based application provisioning, configuring Remote Desktop client connections. Configure client settings to access virtualized desktops: configuring client settings

Understanding Virtualization Software

List of virtualization Software available .Vmware- introduction to Vsphere, ESXi, VCenterServerandVsphere client. Creating Virtual Machine.. Introduction to HYPER-V role. Create Virtual Machines. Create Hyper-v virtual networking, Use virtual Machine Snapshots. Monitor the performance of a Hyper-v server, Citrix XENDesktop fundamentals

Books:

1. Virtualization with Microsoft Virtual Server 2005 by TwanGrotenhuis, RogierDittner, Aaron Tiensivu, Ken Majors, Geoffrey Green, David Rule, Andy Jones, Matthijs ten Seldam, Syngress Publications, 2006
2. Virtualization--the complete cornerstone guide to virtualization best practices, Ivanka Menken, Gerard Blokdijk, Lightning Source Incorporated, 2008
3. Virtualization: From the Desktop to the Enterprise, Chris Wolf, Erick M. Halter, EBook, 2005
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Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-3rdSemester

BCA-307L   **Programming in Java –Lab**

L	T	P	Credit		Practical :	50 marks
0	0	4	2		Sessional:	50 marks
					Time:	3Hrs.

List of Programs

Part A

1.   Write a program to check whether two strings are equal or not.

2.   Write a program to display reverse string.

3.   Write a program to find the sum of digits of a given number.

4.   Write a program to display a multiplication table.

5.   Write a program to display all prime numbers between 1 to 1t000.

6.   Write a program to insert element in existing array.

7.   Write a program to sort existing array.

8.   Write a program to create object for Tree Set and Stack and use all methods.

9.   Write a program to check all math class functions.

10. Write a program to execute any Windows 95 application (Like notepad, calculator etc)

11. Write a program to find out total memory, free memory and free memory after executing garbage Collector (gc).

Part B

12. Write a program to copy a file to another file using Java to package classes. Get the file names at run time and if the target file is existed then ask confirmation to overwrite and take necessary actions.

13. Write a program to get file name at runtime and display number f lines and words in that file.

14. Write a program to list files in the current working directory depending upon a given pattern.

15. Create a text field that allows only numeric value and in specified length.

16. Create a Frame with 2 labels, at runtime display x and y command-ordinate of mouse pointer in the labels.

M.M. University, Sadopur (Ambala)
BCA-3rdSemester

BCA-308L **RDBMS–Lab**

L T P Credit
0 0 4 2

Practical : 50 marks
Sessional: 50 marks
Time: 3Hrs.

List of Programs

1. SQL Commands

    a. Data Definition Language commands,

    b. Data Manipulation Language commands,

    c. Data Control Language commands and

    d. Transaction Control Language commands

2. Select Statements with all clauses/options

3. Nested Queries

4. Join Queries

5. Views

6. High level programming language extensions (Control structures, Procedures and Functions)

7. Database Design and implementation (Mini Project)

BCA
FOURTH SEMESTER

MAHARISHI MARKANDESHWAR UNIVERSITY

SADOPUR, AMBALA

BACHELOR OF COMPUTER APPLICATION

SCHEME OF EXAMINATION FOR 4TH SEMESTER

Sr. No	Course No.	Subject	Teaching Schedule			Credits	Examination Schedule			
			L	T	P		Theory	Sessional (Internal)	Practical (Viva Voice)	Total
1	BCA-402	Installation and Configuration of Server	3	0	0	3	60	40	-	100
2	BCA-403	Network Security	3	0	0	3	60	40	-	100
3	BCA-411	Fundamentals of storage	4	0	0	4	60	40	-	100
4		Departmental Elective -1	3	0	0	3	60	40	-	100
5		Departmental Elective-2	3	0	0	3	*/**	*/**	-	100
6	BCA-409L	Installation and Configuration of Server - Lab	0	0	4	2	-	50	50	100
7	BCA-410L	Network Security – Lab	0	0	4	2	-	50	50	100
8		Open Elective	2	0	0	2	60	40	-	100
		Total	**18**	**0**	**8**	**22**	360*/400**	340*/300**	100	800

BCA-CTIS-MMU

DEPARTMENTAL ELECTIVE –1(ANY ONE)	
BCA-404A	Cloud Technology
BCA-404B	Data Centre
BCA-404C	Database Security
DEPARTMENTAL ELECTIVE –2(ANY ONE)	
*BCA-405A	Network Administration
*BCA-405B	Network and Security Protocols
**MOOCS-401(X)	Subject will be decided as per the suggestions as and when provided by UGC/HRD **Note: X** in course code denotes options from list of MOOCs courses

* Marks distribution of these courses is:
  Theory-60   Sessional-40

**These courses are online courses and marks distribution for these is:
  Theory-100 Sessional

M.M. University, Sadopur (Ambala)
BCA-4th Semester
BCA- 402   **Installation and configuration server**

L T P Credits   Theory : 60 marks
3   0   0   3   Sessional: 40 marks
                                                       Time: 3 Hrs.

Objective:
Windows Server 2012 R2 Foundation is an operating system that enables core IT resources, such as file and print sharing, remote access, and security. It provides a network foundation from which you can centrally manage settings on your computers that are based on the Windows® operating system, and upon which you can run the most popular business applications. This course explores the method to install, upgrade, and deploy the Windows Server. Also, the learners will have the functional knowledge of configuring core network services and the active directory of Windows Server. This course provides the knowledge and skills necessary to plan and implement a Windows Server 2012 and Windows Server 2012 R2 environment. It incorporates both the planning of the server infrastructure and key aspects of the implementation, management and maintenance of Active Directory and Network Infrastructure. It covers the most important job tasks for Server Administrators who are responsible for the planning, operations, and day-to-day maintenance of Windows Server 2012 and Windows Server 2012 R2 servers in the enterprise.

Course Outcome:

At the end of this Subject Syllabus, student will able to understand-

- Installation and configuration of Server 2012.
- Configuration and management of Storage .
- Apply File Access Management Techniques .
- Configure various services for the Remote Access.

Course Contents:

UNIT I
Installing and Configuring Servers

Selecting a Windows Server 2012
Edition, Supporting Server Role, Supporting Server Virtualization, Server Licensing.

Installing Windows Server 2012:
System Requirement, Performing a Clean Installation, Installing Third-Party Drivers, Working with Installation Partitions, Using Server Core, Server Core Defaults, Server Core Capabilities, Using the

Minimal Server Interface, Upgrade paths, Preparing to Upgrade Installation, Installing Windows Server Migration Tools.

Configuring Servers:
Completing Post-Installation Tasks and GUI Tools, Converting Between GUI and Server, Configuring NIC Teaming, Using Roles, Features, and Services, Using Roles Manager, Adding Roles and Features, Deploying Roles to VHDs, Configuring Services.

UNIT II

Configuring Local Storage

Planning Server Storage,Determining the Number of Servers Needed, Estimating Storage Requirements, Selecting a Storage Technology, Selecting a Physical Disk Technology, Using External Drive Arrays, Planning for Storage Fault Tolerance, Using Disk Mirroring, Using RAID, Using Storages Spaces, Understanding Windows Disk setting, selecting a Partition style, understanding disk and Volume Types,

Choosing a Volume Size, Understanding File System, Working with Disks, Adding a New Physical Disk, Creating and Mounting VHDs, Storage Pool, Virtual Disks, Simple Volume, Creating a Striped, Spanned, Mirrored, or RAID-5 Volume, Extending and Shrinking Volumes and Disks.

UNIT III

Configuring File and Share Access

Designing a File-Sharing Strategy, Arranging Shares, Controlling Access, Mapping Drives, Creating Folder Shares, Assigning Permissions, Understanding the windows Permission Architecture and Basic, Advanced Permissions, Allowing and Denying Permissions, Inheriting Permissions, Understanding Effective Access, Setting Share Permissions, Understanding NTFS Authorization, Assigning Basic NTFS Permissions, Understanding Resource Ownership, Combining Share and NTFS Permissions.

UNIT IV
Configuring Print, Document Services, Servers for Remote Management.

Understanding the Windows Print Architecture aqznd Printing, Server Printing Flexibility, sharing a Printer Drivers and Managing Printer Drivers, Using Remote Access Easy Print, Configuring Printer Security, Adding Printer Servers, Deploying Printers with Group Policy, Adding Server and Workgroup Servers, Calibrating Server Manager Performance, Configuring WinRM and Windows Firewall, Creating Server Groups, Using Remote Server Administration Tools, Using Windows PowerShell Web Access, Installing Windows PowerShell Web Access, Configuring the Windows PowerShell Web Access Gateway, Configuring a Test Installation, Customizing a Gateway Installation, Creating Authorization Rules, Working with Remote Servers

BCA-CTIS-MMU

Creating and Configuring Virtual Machine Settings and Storage

Virtualization Architectures, Hyper-V Implementations and Licensing, Hyper-V Hardware Limitations and Server, Installing Hyper-V, Using Hyper-V Manager, Creating a VM, Installing an Operating System, Configuring Guest Integration Services, Allocating Memory, Using Dynamic Memory, working with Virtual Disks, Understanding Virtual Disk Formats, Creating Virtual Disks, Creating a New Virtual Disk, Adding Virtual Disks to Virtual Machines, Creating Differencing Disks, Configuring Pass-Through Disks, Modifying Virtual Disks, Creating Snapshots, Connecting to a SAN, Connecting Virtual Machines to a SAN.

Books:

1. Windows Server 2012: A Handbook for Professionals by Aditya Raj (Author)
2. MCSA 70-410 Cert Guide R2: Installing and Configuring Windows Server 2012 (Certification Guide) Hardcover – Import, 12 Sep 2014 by Don Poulton (Author), David Camardella (Author)
3. Installing and Configuring Widows Server 2012 by Craig Zacker
4. Mastering Windows Server 2012 R2 by Mark Minasi, Kevin Greene, Christian Booth, Robert Butler.

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt any five questions selecting at least one from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-4th Semester

BCA-403   **Network Security**

L   T   P   Credit   Theory : 60 marks
3   0   0   3   Sessional: 40 marks
                                                                Time: 3Hrs

Objective: The power of computers can be witnessed when multiple computers are connected to form a network and start sharing information amongst them. But when this happens, the entire network becomes an open source and exposed to threats due to many users who log into these networks and their environments. Therefore it becomes important to learn about Network Security, in order to safeguard our networks from hackers and damages. Learning network concepts therefore becomes significant and no study of computers is complete without them.

Course Outcome:

At the end of this course, student will able to understand-

- State the importance of need and maintain Network Security
- Outline the impact of Network Security threats to people ,technology and application
- Classify the steps to overcome the network security threats.
- Illustrate the use and implementation of Virtual Private Network How Network Intrusion Detection system helps for securing a Network.
- Recognize the Intrusion Detections System as a measure used for detecting Network Intrusions.
- The Intrusion prevention system concepts and implenemtaion.
- The concept and techniques for security Monitoring.
- Interpret the security management case studies.

Course Contents:
UNIT I

Introduction to Network Security

Perimeter Security – Overview of Network Security, Access Control, Device Security, Security features on Switches, Firewall, Types of firewall, Access Management, Multifactor Authentication, Wireless LAN (WLAN) Security and Network Admission Control (NAC)

UNIT II

Threats, Vulnerabilities and Attacks :Threat; Vulnerabilities; Attacks – Application Attack, Network Attack and Mitigating & Deterring Attacks; Network Security – Security through network devices, Security through Network Technologies and Security through Network Design Elements, Administering a Secure Network

UNIT III

Network Security Management

Secure Socket Layer (SSL) – Introduction to SSL, Open SSL basics, Problems with SSL, Cryptography, Message Digits Algorithms, Digital Signature and Public Key Infrastructure (PKI); Data Privacy – IPsec VPN, Dynamic Multipoint VPN (DMVPN), Group Encrypted Transport VPN (GET VPN), Secure Sockets Layer VPN (SSL VPN) and Multiprotocol Label Switching VPN (MPLS VPN).

UNIT IV

Network Security Controls

Network Intrusion Prevention – Overview of Intrusion Prevention System (IPS), Intrusion Detection System (IDS),Deploying IPS and IPS high Availability; host Intrusion Prevention; Anomaly Detection and Mitigation

Network Management

Security Monitoring and correlation; Security Management - Security and Policy Management and Security Framework and Regulatory Compliance; Best Practices Framework, Case Studies.

Books:

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole
2. Network Security Bible by Eric Cole

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-4th Semester

BCA-411   **Fundamentals of Storage**

L   T   P   Credit   Theory   : 60 marks
4   0   0   4   Sessional: 40 marks
                                                           Time   : 3Hrs

Objective: Data is all around us, in different forms and amounts. As we are steeping into revolutionizing world of advanced computing like cloud computing, data storage has also undergone many transformations in terms of techniques and hardware used for the same. This makes it significant for a computer student to learn different aspects of data storage. In this course, students will learn fundamentals of data storage, covering topics like demands on data, how storage techniques have evolved over a period of time and vital information about storage topologies like DAS, NAS and SAN, along with their comparison features. The second unit deals with different hardware required for storage like adapters, connectors, cables and their individual features. Different storage protocols used like ATA, SATA, SPI and its sub-categories will be taught to students in the following units. Topics storage security and storage infrastructure are addressed in the final unit.

Course Outcome:

At the end of this Subject Syllabus, student will able to understand-

- Concepts of Data Storage in Computing Environment
- Management of Data/Info Storage
- How to Recover the Data and Backup concepts
- Various Storage Devices used for Info Storage

Course Contents:

UNIT I

Introduction to Information storage and Management

Information Storage: Data – Types of Data –Information - Storage , Evolution of Storage Technology and Architecture, Data Center Infrastructure - Core elements- Key Requirements for Data Center Elements -Managing Storage Infrastructure, Key Challenges in Managing Information, Information Lifecycle - Information Lifecycle Management - ILM Implementation -ILM Benefits ,Summary

UNIT II

Storage System Environment

Components of a Storage System Environment – Host –Connectivity – Storage, Disk Drive Components –Platter – Spindle - Read/Write Head - Actuator Arm Assembly - Controller - Physical Disk Structure - Zoned Bit Recording - Logical Block Addressing , Disk Drive Performance -1 Disk Service Time , Fundamental Laws Governing Disk Performance , Logical Components of the Host - Operating System - Device Driver -Volume Manager - File System – Application , Application Requirements and Disk Performance, Summary

UNIT III

Backup and Recovery

Backup Purpose -Disaster Recovery - Operational Backup –Archival, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods , Backup Process, Backup and Restore Operations, Backup Topologies - Serverless Backup , Backup Technologies -Backup to Tape - Physical Tape Library - Backup to Disk - Virtual Tape Library

UNIT IV

Local Replication

Source and Target -Uses of Local Replicas, Data Consistency - Consistency of a Replicated File System - Consistency of a Replicated Database , Local Replication Technologies - Host-Based Local Replication - Storage Array-Based Replication , Res tore and Restart Considerations - Tracking Changes to Source and Target , Creating Multiple Replicas, Management Interface.

Managing the storage Infrastructure

Monitoring *the* Storage Infrastructure -Parameters Monitored - Components Monitored - Monitoring Examples - Alerts, Storage Management Activities - Availability management - Capacity management - Performance management - Security Management - Reporting- Storage Management Examples, Storage Infrastructure Management Challenges

Books:

1. Storage Networks: The Complete Reference, Robert Spalding, Tata McGraw Hill Publication, 2003

2. Information Storage and Management: Storing, Managing, and Protecting Digital Information, EMC Education Services, Wiley; 1 edition (April 6, 2009)

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University,Sadopur (Ambala)
BCA-4th Semester
BCA- 404A   Departmental Elective 1-Cloud technology

L	T	P	Credit
3	0	0	3

Theory : 60 marks
Sessional: 40 marks
Time:3Hrs

Objective: Cloud computing is a colloquial expression used to describe a variety of different computing concepts that involve a large number of computers involves a large number of computers that are connected through a real-time communication network. In science, cloud computing is a synonym for distributed computing over a network and means the ability to run a program on many connected computers at the same time. This course covers basic concepts of cloud types, services and security etc

Course Outcome:

Students will be able to:

- Differentiate and demonstrate the various types of clouds and their working
- Explain the various delivery models of cloud computing
- Explain the various merits and vulnerabilities of cloud
- Summarize the need for migration on cloud and identify the economic considerations involved
- Illustrate the various risk involved and identify the risk techniques & how to cope them
- Identify the role of Industry Standards Organizations and Groups associated with Cloud Computing
- Demonstrate the importance of IT governance in cloud computing
- Illustrate the various Jurisdictional Issues Raised by Virtualization and Data Location
- Understand the importance of government regulations and identify the process to be automated with respect to cloud.
- Explain the comparative study of cost involved in computing at data center and at cloud.

Course Contents:

UNIT I

Introduction to Cloud Computing

Introduction to Cloud Computing, History and Evolution of Cloud Computing, Types of clouds, Private Public and hybrid clouds, Cloud Computing architecture, Cloud computing infrastructure, Merits of Cloud computing, , Cloud computing delivery models and services (IaaS, PaaS, SaaS), obstacles for cloud technology, Cloud vulnerabilities, Cloud challenges, Practical applications of cloud computing.

UNIT II
Cloud Computing Companies and Migrating to Cloud

Web-based business services, Delivering Business Processes from the Cloud: Business process examples, Broad Approaches to Migrating into the Cloud, The Seven-Step Model of Migration into a Cloud, Efficient Steps for migrating to cloud., Risks: Measuring and assessment of risks, Company concerns Risk Mitigation methodology for Cloud computing, Case Studies

UNIT III
Cloud Cost Management and Selection of Cloud Provider

Assessing the Cloud: software Evaluation, System Testing, Seasonal or peak loading, Cost cutting and cost-benefit analysis, selecting the right scalable application. Considerations for selecting cloud solution. Understanding Best Practices used in selection of Cloud service and providers, Clouding the Standards and Best Practices Issue: Interoperability, Portability, Integration, Security, Standards Organizations and Groups associated with Cloud Computing, Commercial and Business Consideration

UNIT IV
Governance in the Cloud

Industry Standards Organizations and Groups associated with Cloud Computing, Need for IT governance in cloud computing, Cloud Governance Solution: Access Controls, Financial Controls, Key Management and Encryption, Logging and Auditing, API integration. Legal Issues: Data Privacy and Security Issues, Cloud Contracting models, Jurisdictional Issues Raised by Virtualization and Data Location, Legal issues in Commercial and Business Considerations

Ten Cloud do's and do not's

Don't be reactive, do consider the cloud a financial issue, don't go alone, do think about your architecture, don't neglect governance, don't forget about business purpose, do make security the centerpiece of your strategy, don't apply the cloud to everything, don't forget about Service Management, do start with a pilot project.

Books:
1. Cloud Computing: Principles and Paradigms, RajkumarBuyya, James Broberg, Andrzej M. Goscinski,, John Wiley and Sons Publications, 2011
2. Brief Guide to Cloud Computing, Christopher Barnett, Constable & Robinson Limited, 2010
3. Handbook on Cloud Computing, BorivojeFurht, Armando Escalante, Springer, 2010

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks

M.M. University, Sadopur (Ambala)
BCA-4th Semester

BCA-404B   **Departmental Elective 1-Data Centre**

L	T	P	Credit	
3	0	0	3	

Theory: 60 marks
Sessional: 40 marks
Time   :3Hrs

Objective: This course covers the significance, setting-up and Services provided by data centers. Datacenter fundamentals helps students to understand the basic concepts of Datacenter architecture, network infrastructure in a Datacenter, server frames fault tolerance, Datacenter availability, network implementation and disaster recovery.

Course Outcome:

At the end of this Subject Syllabus, student will able to understand-
- Need and Importance of Data Centre
- Requirements to design Data Centre
- Importance of various Server accordingly
- Concepts of Business Continuity and Disaster Recovery Fundamentals.

Course Contents:

UNIT I

Overview of Data Centers

Datacenters Defined, Datacenter Goals, Datacenter Facilities, Roles Datacenters in the Enterprise, Roles of Datacenters in the Service Provider Environment, Application Architecture Models. The Client/Server Model and Its Evolution, The n-Tier Model, Multitier Architecture Application Environment, DataCentre Architecture

UNIT II

Data Centre Requirements

DataCentre Prerequisites, Required Physical Area for Equipment and Unoccupied Space, Required Power to Run All the Devices, Required Cooling and HVAC, Required Weight, Required Network Bandwidth, Budget Constraints, Selecting a Geographic Location, Safe from Natural Hazards, Safe from Man-Made Disasters, Availability of Local Technical Talent, Abundant and Inexpensive Utilities Such as Power and Water, Selecting an Existing Building (Retrofitting), tier standard

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UNIT III

DataCentre Design

Characteristics of an Outstanding Design, Guidelines for Planning a Data Centre, Data Centre Structures, No-Raised or Raised Floor, Aisles, Ramp, Compulsory Local Building Codes, Raised Floor Design and Deployment, Plenum, Floor Tiles, Equipment Weight and Tile Strength, Electrical Wireways, Cable Trays, Design and Plan against Vandalism

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UNIT IV

Introduction to Server Farms

Types of server farms and data centre, internet server farm, intranet server farm, extranet server farm , internet datacentre, corporate datacentre, software defined datacentre, datacentre topologies, Aggregation Layer, Access Layer, Front-End Segment, Application Segment, Back-End Segment, Storage Layer, DataCentre Transport Layer, DataCentre Services, IP Infrastructure Services, Application Services, Security Services, Storage Services

Books:

1. IP Storage Networking by : Gary Oreinstein, Addison Wesley Professional

2. Information Storage and Management, G. Somasundaram – Alok Srivastava, Wiley

3. Administering Data-Centers, KailashJayswal, Wiley

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-4th Semester

BCA-404C   **Departmental Elective 1-Database Security**

L	T	P	Credit	
3	0	0	3	

Theory   : 60 marks
Sessional : 40 marks
Time   : 3Hrs

Objective: Every program and every application that we use, connect with data or information in some way or the other and this data is stored in a systematic manner in a database, which is chosen depending on the requirements of the software and the users. As data forms a very crucial part of IT and is prone to security threats and attacks, it becomes important to protect the data using technology. This course will teach students, methods to protect databases.

Course outcomes:

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

- Data Model, DBMS and DBMS Architecture
- Concepts of Database Security related to NoSQL
- Concepts of NoSQL like ACID properties applicability on NoSQL Database
- Concept of Keys and tuples

Course Contents:

UNIT I

The Database and DBMS Architecture

Introduction to Database & DBMS Architecture, Hierarchical Database Management Systems, Network Database Management Systems, Relational Database Management Systems, Object-Oriented Database Management Systems, End-User Database Management Systems, Spreadsheets

UNIT II

Concepts of Database Security

Concept of Least Privilege in User ID for databases. Concept of NoSQL databases Differences from classical DBMS concepts with NoSQL, Advantages of NoSQL like Elastic Scaling, Big Data, Goodbye DBAs', Economics/Cost, Flexible Data models.

UNIT III

Concepts of NoSQL

Non/ partial applicability of ACID (Atomicity, Consistency, Isolation, Durability) guarantees in NoSQL databases as compared to traditional RDBMS databases. Horizontal scalability benefits of NoSQL Databases compared to

BCA-CTIS-MMU

traditional Databases, Protecting Database - Understanding permissions, Creating and using database roles, using schemas for security, configuring cross-database security

UNIT IV

Concepts of Key Value & Tuple Store Databases

Concept of UnSQL or Unstructured Query Language, Concept of Key Value & Tuple Store Databases, Concept of Graph Databases, Concept of Multi-model Databases, Code and Data Encryption- Using service and database master keys, creating and using symmetric and asymmetric keys, creating and storing hash values, Authenticating stored procedure by signature.

SQL Server &Concepts

Concept of Object Databases, Concept of Grid & Cloud Databases, Concept of XML databases, Concept of Multidimensional and Multi-value Databases. SQL Auditing – Using the profiler to audit SQL server access, using DML trigger for auditing data modification, Using DDL triggers for auditing structure modification, configuring SQL server auditing.

Books:
1. Database security by SilvanaCastano, 2nd Edition, Pub: Addison-Wesley Professional , 2008
2. Microsoft SQL server 2012 Security Cookbook by Rudi Bruchez, Pub: PACKIT publishing, 2012
3. Handbook of database security: Applications and Trends Michael Gertz, SushilJajodia, Pub: Springer, Lib. Of congress. 2008
4. Implementing database security and auditing: a guide for DBAs, ...Ron Ben-Natan, Pub: Elsevier, 2005

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-4th Semester

BCA-405A   Departmental Elective 2-Network Administration

L	T	P	Credit	Theory : 60 marks
3	0	0	3	Sessional: 40 marks
				Time : 3Hrs

Objective- This course introduces the architecture, functions, and components of the Internet and computer networks, the principles and structure of IP addressing and subnetting, the fundamentals of Ethernet, the architecture, components and operations of routers, routing protocols and switches in a network. Topics include TCP/IP, Ethernet, IPv4, routers, switches. As we cover these topics, the students will learn how the internals of the Internet work to support the Web and other networked applications. After completing the course the students will develop a detailed understanding of how to configure, implement and troubleshoot widely-used networking technologies

Course Outcome:

At the end of this course, student will able to understand-
- The role of TCP/IP and OSI Layers
- Concepts of IPv4 and Routing concepts.
- The working of Switch device in Networking.
- Designing the LAN and Switch Configuration.
- The concept of IP Addressing and Subnetting.
- Working of Router device.
- Advanced Concepts of IPv4
- Concepts of Routing Protocols.
- Importance of Network Address Translation.

Course Contents:

UNIT I

Networking Fundamentals:

The TCP/IP and OSI Networking Models, Fundamentals of Ethernet LANs, Fundamentals of WANs, Fundamentals of IPv4 Addressing and Routing, Fundamentals of TCP/IP Transport and Applications, **Ethernet LANs and Switches:** Building Ethernet LANs with Switches, Cisco LAN Switches, Configuring Ethernet Switching.

UNIT II

IP Version 4 Addressing and Subnetting: Perspectives on IPv4 Subnetting, AnalyzingClassfull IPv4 Networks, Analyzing Subnet Masks, Analyzing Existing Subnets, **Implementing IP Version 4:** Operating Cisco Routers, Configuring IPv4 Addresses and Routes, Implementing Ethernet Virtual LANs, Troubleshooting Ethernet LANs, Spanning Tree Protocol Concepts, Troubleshooting LAN Switching.

UNIT III

LAN Routing: Configure IPv4 Routing, Configure and Verify Host Connectivity, Advanced IPv4 Addressing Concepts, Describe the boot process of Cisco IOS routers; Operation status of a serial interface; Manage Cisco IOS files; Routing and Routing Protocols; OSPF (multi-area); EIGRP (single AS); Passive Interface

UNIT IV

UIPv4 Services and IP Version 6: Basic IPv4 Access Control Lists, Advanced IPv4 ACLs and Device Security, Network Address Translation, Recognize high availability (FHRP); Describe SNMP v2 and v3, IPV6 addressing.

Books:
1. CCNA Cisco Certified Network Associate: Study Guide (With CD) 7th Edition (Paperback), Wiley India, 2011

2. CCENT/CCNA ICND1 640-822 Official Cert Guide 3 Edition (Paperback), Pearson, 2013

3. Routing Protocols and Concepts CCNA Exploration Companion Guide (With CD) (Paperback), Pearson, 2008

4. CCNA Exploration Course Booklet : Routing Protocols and Concepts, Version 4.0 (Paperback), Pearson, 2010

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-4th Semester

BCA-405B   **Departmental Elective 2 -Network and Security Protocols**

L   T   P   Credit   Theory: 60 marks
3   0   0   3   Sessional: 40 marks
                                                                        Time: 3Hrs

Objective: The power of computers can be witnessed when multiple computers are connected to form a network and start sharing information amongst them. But when this happens, the entire network becomes an open source and exposed to threats due to many users who log into these networks and their environments.

Course Outcomes:

After completion of this course students will be able to understand:

- Various security protocols concerning different Network layers and related issues.
- Protocols at Application, Transport, Network and Data Link Layer

Course Contents:

UNIT I

Open Systems Interconnection (OSI) Model

Introduction to the 7 layers of the OSI model, concept of the OSI model, the Application Layer, the Presentation Layer, the Session Layer, the Transport Layer, the Network Layer, the Data Link Layer &the Physical layer

UNIT II

Security Protocols - Application Layer

Introduction to Protocol concepts, Important Protocols, File Transfer Protocol, Socket Secure (SOCKS), Secure Shell (SSH), Remote Terminal Control Protocol (Telnet), Transport Layer Security/Secure Sockets Layer (TLS/SSL), Extensible Messaging & Presence Protocol (XMPP), Wireless Application Protocol (WAP) & Internet Relay Chat (IRC)

UNIT III

Transport Layer

Introduction to Transport Layer, TCP/IP, User Datagram Protocol (UDP), Real-time Transport Protocol (RTP), Datagram Congestion Control Protocol (DCCP), Stream Control Transmission Protocol (SCTP), Resource reservation Protocol (RSVP)&Explicit Congestion Notification (ECN)

UNIT IV

Network Layer

Introduction to Network Layer**,** Internet Protocol Version 4 (IP4), Internet Protocol Version 6 (IP6), Internet Protocol Security (IPSEC), Internet Control Message Protocol (ICMP) & Internet Group Management Protocol (IGMP)

Data Link Layer: Introduction to Data Link Layer, the Address Resolution Protocol (ARP), the Open Shortest Path First (OSPF), the Neighbor Discovery Protocol (NDP),theTunneling Protocol (Tunnels) &the Point to Point Protocol (PPP).

Books:

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole

2. Network Security Bible by Eric Cole

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-4th Semester

BCA-401(X)   **Departmental Elective 2 –MOOCs Course**

L   T   P Credit   Theory: 100 marks
3   0   0   3   Sessional: --

Time: 3Hrs

Course contents will be provided as per suggestions by UGC/HRD

M.M. University, Sadopur (Ambala)
BCA-4thSemester

BCA-409L   **Installation and Configuration of Server –Lab**

L   T   P   Credit   Practical :   50 marks
0   0   4   2   Sessional: 50 marks
                                                          Time: 3Hrs.

1. Installation windows Server 2012.

2. Configuration for Windows Server.

3. Configuration Local Storage for Windows Server.

4. Configuration File and Share Access for Windows Server.

5. Configuration Print and Document Services for Windows Server.

6. Configuration windows server for Remote Management.

7. Creating Virtual Machine in Windows Server.

8. Configuration and Setting Virtual Machine.

M.M. University, Sadopur (Ambala)
BCA-4thSemester

BCA-410L   **Network Security –Lab**

L	T	P	Credit			
0	0	4	2	Practical :	50 marks	
				Sessional:	50 marks	
				Time:	3Hrs.	

List of Programs

1.   Firewall Configuration

2.   VPN Configuration

3.   IDS Configuration

4.   Router Security

5.   Traffic Monitoring using WireShark

7.   Traffic Monitoring

8.   Network Security risk assessment

10.   Network security policies and standards

12.   VLANs & Wireless LANs

14.   Defence in Depth & DMZs

16.   Network Security for BYODs

BCA
FIFTH SEMESTER

MAHARISHI MARKANDESHWAR UNIVERSITY

SADOPUR, AMBALA

BACHELOR OF COMPUTER APPLICATION

SCHEME OF EXAMINATION FOR 5TH SEMESTER

| Sr. No | Course No. | Subject | Teaching Schedule | | | Credits | Examination Schedule | | | |
			L	T	P		Theory	Sessional (Internal)	Practical (Viva Voice)	Total
1	BCA-502	Cloud Computing Solution	3	0	0	3	60	40	-	100
2	BCA-503	Ethical Hacking	3	0	0	3	60	40	-	100
3	BCA-511	Cryptography	3	0	2	4	60	40	-	100
4		Departmental Elective-3	3	0	0	3	60	40	-	100
5		Departmental Elective-4	3	0	0	3	*/**	*/**	-	100
6	BCA-509L	Cloud Computing Solution –Lab	0	0	4	2	-	50	50	100
7	BCA-510L	Ethical Hacking – Lab	0	0	4	2	-	50	50	100
8		Open Elective	2	0	0	2	60	40	-	100
		Total	**17**	**0**	**10**	**22**	360*/400**	340*/300**	100	800

DEPARTMENTAL ELECTIVE-3 (ANY ONE)	
BCA-504A	Cyber Forensics
BCA-504B	Cloud Web Service
BCA-504C	COBIT VALIT and Risk IT
DEPARTMENTAL ELECTIVE-4 (ANY ONE)	
*BCA-505A	Introduction to IoT
*BCA-505B	Mobile Wireless and VOIP Security
**MOOCS-501(X)	Subject will be decided as per the suggestions as and when provided by UGC/HRD **Note:X** in course code denotes options from list of MOOCs courses

* Marks distribution of these courses is:
   Theory-60   Sessional-40

**These courses are online courses and marks distribution for these is:
   Theory-100 Sessional --

M.M. University, Sadopur (Ambala)
BCA-5th Semester

BCA- 502   **Cloud Computing Solution**

L   T   P   Credit   Theory: 60 marks
3   0   0   3   Sessional: 40 marks
                                                         Time: 3Hrs

Objectives Understanding & working on various cloud services provided by Microsoft Azure .The Services mainly into computing storage & web application

Course Outcome

- Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.
- Design different workflows according to requirements and apply map reduce programming model.
- Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms
- Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds
- Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application
- Broadly educate to know the impact of engineering on legal and societal issues involved in addressing the security issues of cloud computing.

Course Contents:

UNIT I

Introduction

Introduction to MS. Azure, **Virtual Machines:** Creating Virtual Machines, Difference Between Basic and Standard VMs, Logging in to a VM and Working, Attaching an empty Hard Disk to VM, Hosting a Website in VM , Configuring End Points, Scaling up and Down, Creating a custom Image from VM, Creating a VM from a custom Image, Shut down VM without Getting Billed, VM Pricing

UNIT II

Managing Infrastructure in Azure

Managing Infrastructure in Azure: Azure Virtual Networks, Highly Available Azure Virtual Machines,

Virtual Machine Configuration Management, Customizing Azure Virtual MachineNetworking.

Load Balancing: Creating Cloud Services, Adding Virtual Machines to a Cluster, Configuring Load Balancer

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UNIT III

Windows Azure

Azure Storage: What is a Storage Account, Advantages, Tables, blobs, queues and drives, Azure Appfabric: Connectivity and Access control **Automation:** Introduction Windows Power Shell ,Creation of Runbooks, Uploading a Shell Script, Authoring a Shell Script

UNIT IV

SQL Azure

SQL Azure: Creating a SQL Server, Creating a SQL DB, Creating Tables, Adding Data to the Tables, View Connection Strings, Security Configurations, Migrating on premise DB to SQL Azure.

Websites

Websites: Creating a Website, Setting deployment credentials, Choosing a platform, Setting up Default page for website, Scaling ,Auto Scaling by Time, Auto Scaling by Metric, Difference between Free, Shared, Basic and Standard websites, Creating a website using Visual studio

Books:

1. 1. Cloud Computing Bible, Barrie Sosinsky, Wiley-India, 2010

2. Cloud Computing: Principles and Paradigms, Editors: Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Wiley, 2011

3. Windows Azure Step By step by Roberto Brunetti.

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-5th Semester

BCA-503   **Ethical Hacking**

L   T   P   Credit   Theory   : 60 marks
3   0   0   3   Sessional : 40 marks
                                                         Time   : 3Hrs

Objective: The course primarily covers the Ethical hacking methodology and its different stages which include the Foot printing, Scanning, Enumeration and System hacking techniques and a broad knowledge about white box and black box testing. The Unit describes a wide range of attacks that can cause adverse negative effects on IT systems that include Denial of service, Session hijacking and severe vulnerabilities that can be seen in Web Applications. The Unit also covers hacking attacks caused in other Operating System environment like Linux and the secret techniques to Evade Firewalls. The Unit not only captures valuable information on vulnerabilities and threats but also covers an effective way of report making methodology that can helps the top level management to take immediate decisions on mitigating the threats. The course enables students to better understand the Ethical hacking concepts and various phases of hacking along with the objective of providing an in-depth knowledge on Web Application vulnerabilities and exploitation techniques. To familiarize them with the wide range of attacks in a Networking environment and to enable him/her to prepare a well-defined vulnerability reporting procedure along with the remediation techniques.

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Course Outcome:

At the end of this Subject Syllabus, student will able to understand-

- Various Hacking Methodology
- To find Vulnerability over the network and websites
- Importance of Firewalls and various security measures
- Report writing and Mitigation concepts

Course Contents:
UNIT I
Introduction to Ethical Hacking

Hacking Methodology, Process of Malicious Hacking, Foot printing and Scanning: Footprinting, Scanning. Enumeration: Enumeration. System Hacking and Trojans: System Hacking, Trojans and Black Box Vs White Box Techniques

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UNIT II

Hacking Methodology

Denial of Service, Sniffers, Session Hijacking and Hacking Web Servers: Session Hijacking, Hacking Web Servers. Web Application Vulnerabilities and Web Techniques Based Password Cracking: Web Application Vulnerabilities, Web Based Password Cracking Techniques

UNIT III

Web and Network Hacking

SQL Injection, Hacking Wireless Networking, Viruses, Worms and Physical Security: Viruses and Worms, Physical Security. Linux Hacking: Linux Hacking. Evading IDS and Firewalls: Evading IDS and Firewalls

UNIT IV

Report writing & Mitigation

Introduction to Report Writing & Mitigation, requirements for low level reporting & high level reporting of Penetration testing results, Demonstration of vulnerabilities and Mitigation of issues identified including tracking

Books:

- The CEH Prep Guide: The Comprehensive Guide to Certified Ethical Hacking, by Ronald L. Krutz (Author), Russell Dean Vines, Wiley Publications, First Edition

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-5th Semester

BCA-511   **Cryptography**

L   T   P   Credit   Theory : 60 marks
3   0   2   4   Sessional: 40 marks
                                                 Time : 3Hrs

Objective: Security is ubiquitous. With the advent of e-commerce and electronic transactions, the need for development of secured systems has grown tremendously. Cryptography is the study of building ciphers to ensure the confidentiality and integrity of information. Along with it is the activity of analyzing the strength of a cipher by subjecting it to several forms attack. This course covers the basic concepts of Cryptography, certain cryptographic algorithms and its applications.

Course Outcome:

At the end of this course, student will able to understand-

- The need and principles of Cryptography.
- Role of Digital Signature for Authentication.
- The various Algorithms for the implementation of cryptographic principles .
- Concept and Need of Elliptical Curve Cryptography and Quantum Cryptography.
- The management for Key Distribution to make communication secure.
- The various methods used for distributing Key in a secure manner.
- Role of Certificate Authorities in Key Distribution.
- The concepts and role of PKI for Cryptography functionality.

Course Contents:

UNIT I

Introduction to Cryptography

The Confidentiality, Integrity & Availability (CIA) Triad, Cryptographic concepts, methodologies &practices, Symmetric& Asymmetric cryptography, public& private keys, Cryptographic algorithms and uses, Construction& use of Digital signatures

.

UNIT II

Types of Algorithms

The basic functionality of hash/crypto algorithms (DES, RSA, SHA, MD5, HMAC, DSA) and effects on key length concepts in Elliptical Curve Cryptography & Quantum Cryptography

UNIT III

Key Management

The basic functions involved in key management including creation, distribution, verification, revocation and destruction, storage, recovery and life span and how these functions affect cryptographic integrity

UNIT IV

Application of Cryptography

Major key distribution methods and algorithms including Kerberos, ISAKMP etc., Vulnerabilities to cryptographic functions, the Use and functions of Certifying Authorities (CAs),Public Key Infrastructure (PKI) and System architecture requirements for implementing cryptographic functions

Books:

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole

2. Cryptography and Security by C K Shyamala, N Harini and Dr T R Padmanabhan – Wiley Publications, First Edition

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

List of Programs:

1. **Write a C/C++/Java program to implement simple substitution Cipher.**
2. **Write a C/C++/Java program to implement ceaser Cipher.**
3. **Write a C/C++/Java program to implement Transposition Cipher.**
4. **Write a C/C++/Java program to implement Play Fair Cipher.**
5. **Write a C/C++/Java program to encrypt and decrypt using RSA Algorithm.**
6. **Write a C/C++/Java program to implement DES Algorithm.**
7. **Write a C/C++/Java program to implement AES Algorithm.**
8. **Write a C/C++/Java program to generate Message Digest using MD5.**

M.M. University, Sadopur (Ambala)
BCA-5ᵗʰ Semester
BCA- 504A   Departmental Elective 3-Cyber Forensics

L	T	P	Credit
3	0	0	3

Theory   : 60 marks
Sessional : 40 marks
Time   : 3Hrs

Objective: Cyber Forensics deals with the development of tools and software to gather evidences from computers, without corrupting the information contained. A relatively new field, it is quickly gaining momentum as the complexities in the crimes are on the rise and it has become imperative to treat each cybercrime with diligence. Students are taught about different forms of cybercrime and its implications and duties of professionals employed at different levels towards analyzing and controlling cybercrime. Methods to recover data from storage devices are covered in following chapters. Different forensic techniques and cyber laws are also dealt in detail.

Course Outcome:

At the end of this Subject Syllabus, student will able to understand-

- Types of Cyber Crime and Importance of Cyber Forensic.
- Various Storage Mediums and Data Recovery methods
- Various types of Forensics Technique such as Windows and Linux forensic
- Features of Cyber Law accordingly.

Course Contents:

UNIT I

Computer Forensics

Introduction to Computer Forensics, Forms of Cyber Crime, First Responder Procedure- Non-technical staff, Technical Staff, Forensics Expert and Computer Investigation procedure.

UNIT II

Storage Devices & Data Recover Methods

Storage Devices- Magnetic Medium, Non-magnetic medium and Optical Medium. Working of Storage devices-Platter, Head assembly, spindle motor. Data Acquisition, Data deletion and data recovery method and techniques

UNTI III

Forensics Techniques

Windows forensic, Linux Forensics, Mobile Forensics, Steganography, Application Password cracking-Brute force, Dictionary attack, Rainbow attack. Email Tacking – Header option of SMTP, POP3, IMAP

UNIT IV

Cyber Law

Corporate espionage, Evidence handling procedure, Chain of custody, Main features of Indian IT Act 2008 (Amendment) .

Books:

- Guide to Computer Forensics and Investigations by Nelson

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-5th Semester

BCA-504B   **Departmental Elective 3–Cloud Web Services**

L	T	P	Credit		Theory : 60 marks
3	0	0	3		Sessional : 40 marks
					Time : 3Hrs

Objective: Cloud services facilitate access to server infrastructure which is managed by the provider, which includes data storage and access, security and scalability and updates. Cloud Providers are organizations that offer these services to the clients and is the most preferred method for medium and small organizations to opt for these services in order to avoid the cost overhead and operational costs. This course aims at providing the students an insight into the operations of cloud and introduce them to different cloud providers available.

Course Outcomes:

After completion of this course, students should:

- Understand Cloud delivery and deployment models

- Understand AWS, its need and orchestration options

- Have in depth knowledge about EC2

- Understand security issues and solutions in cloud environment

- Understand about VPC

Course Contents:
UNIT I
Introduction to Cloud Computing And Amazon Web Services

Introduction to Cloud Computing, Cloud Service Delivery Models (IAAS, PAAS, SAAS), Cloud Deployment Models (Private, Public, Hybrid And Community), Cloud Computing Security, Case Study

Introduction to Amazon Web Services, Why Amazon? Use Cases, AWS Storage Options, AWS Compute Options, AWS Database Options, AWS Workflow Automation And Orchestration Options, AWS Systems Management And Monitoring Options, AWS Virtual Private Cloud Introduction, Pricing Concepts

UNIT II

Introduction to EC2

Introduction To EC2, Instance Types And Uses, Autoscaling Instances, Amazon Machine Images (AMIS), Modifying Existing Images, Creating New Images Off Of Running Instances, Converting

BCA-CTIS-MMU

An Instance Store AMI To An EBS AMI, Instances Backed By Storage Types, Creating A Web Server Using Ec2, Elastics Block Storage (EBS), Elastic IPS, Route 53 DNS System, Cloudfront SNS Pricing

UNIT III
S3, Cloudwatch, Elastic Beanstalk and Security

Introduction To S3, Buckets And Objects, Security, Creating A Web Server Using S3 Endpoints, Introduction To Cloudwatch, Creating Alarm Notifications, Autoscaling Instances, Deploying Scalable Application On AWS, Selecting And Launching An Application Environment, Provisioning Application Resources with Cloud formation.

Describe Amazon Dynamo, Understand key aspects of Amazon RDS, Launch an Amazon RDS instance, Identify what is Cloud Formation, Describe Amazon Cloud Watch metrics and alarms, Describe Amazon Identity and Access Management (IAM). Security In AWS, IAM (Identity And Access Management), Access Control Lists (ACLs). Securing Data at Rest And In Motion, Security Groups

UNIT IV
AWS Storage, Elasticity and AWS Networking

Amazon Storage, S3 Storage Basics, Managing Voluminous Information with EBS, Glacier Storage Service, AWS Networking: Networking Basics, VLAN Basics, Basics of AWS VLANs, AWS Network IP Addressing and Mapping

VIRTUAL PRIVATE CLOUD (VPC)

Load Balancers And Availability Zones, Elastic Network Interfaces (ENI), Setting Up VPC And Internet Gateway, Setting Up a Security Group, Launching And EC2 Instance And Assigning An ENI, Setting Up A VPN, Setting Up A Customer Gateway For VPN, Setting Up Dedicated Hardware For VPC, Scenario 1:VPC With A Public Subnet Only (Standalone Web), Scenario 2: VPC with Public And Private Subnets (3 Tier App), Scenario 3:VPC With Public And Private Subnets And Hardware VPN Access (Web On The Cloud, Database and App On Prem) Scenario 4: VPC With A Private Subnet Only And Hardware VPN Access. (Extension of Your Corporate Network), Case Study

Books:
- Learning Node.js for Mobile Application Development, Stefan Buttigieg, MiloradJevdjenic. Packt Publishing 2015.
- Learning AngularJS: A Guide to AngularJS Development, Ken Willaimson. O'Reilly 2015.
- RESTful Java Web Services, Jose Sandoval. Packt Publishing 2009.
- Professional NoSQL, Shashank Tiwari. Wrox 2011.
- NoSQL for Dummies, Adam Fowler. Wiley 2015.
- NoSQL with MongoDB in 24 Hours, MaqsoodAlam, AalokMuley, ChaitanyaKadaru .Sams Teach Yourself- 2013.
- Teach yourself NoSQL with MongoDB, Brad Dayley. SAMS 2015

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-5th Semester
BCA-504C   **Departmental Elective 3 –COBIT VALIT and Risk IT**

L	T	P	Credit		Theory : 60 marks
3	0	0	3		Sessional: 40 marks
					Time : 3Hrs

Objective: (COBIT) is a framework created for supporting toolset by which managers could bridge the gap between control requirements, technical issues and business risks.

Val IT is a governance framework used to create business value from IT investments. At the root of Val IT is a set of guiding principles, processes and best practices to support and help executive management and boards at an enterprise level.

The objective of RiskIT is to provide an end-to-end, comprehensive perspective of all risks pertaining to use of IT and deals with thorough treatment of risk management. Its principles can be customized to suit the environment in your organization and is definitely an encouraging aspect for individuals to contribute their skills to the growth of the organization

Course Outcome:

At the end of the course student will be able to –

- Explain how security is integrated with IT governance.

- Justify the need for using standard frameworks in establishing a robust information security governance program.

- Identify risk factors and risk management.

Course Contents:

UNIT I

Introduction to COBIT

COBIT 5 – Its importance and relevance - 5 Principles of COBIT

a) Meeting Stakeholders needs

b) Covering the Enterprise End-to-End

c) Applying a Single Integrated Framework

    d)   Enabling a Holistic approach

    e)   Separating the Governance from the Management

Enablers of COBIT

    a)   Processes

    b)   Organizational Structures

    c)   Culture, Ethics & Behaviour

    d)   Principles, Policies & Frameworks

    e)   Information

    f)   Services Infrastructure Applications

    g)   People, Skills & Competencies

UNIT II

Risk IT – its Importance and Relevance, Interlinkages between Risk IT with COBIT & Val IT

Three domains of Risk IT with their sub processes

Risk Governance

    a)   Establish and Maintain a Common Risk view

    b)   Integrate with Enterprise Risk Management (ERM)

    c)   Make Risk-aware Business Decisions

Risk Evaluation

    a)   Collect data

    b)   Analyze Risk

    c)   Maintain Risk Profile

Risk Response

    a)   Articulate Risk

    b)   Manage Risk

    c)   React to Events

UNIT III

VAL IT and its importance

Val IT, its importance and relevance

Key Val IT terms, Principles and Domains

UNIT IV

AWS Storage, Elasticity and AWS Networking

Introduction to Information Security Governance (ISG)

Importance of ISG, Benefits of ISG, monitoring ISG through metrics

Applying COBIT 5 principles and Risk IT IN Information Security Governance

Overview of COBIT 5, Principles and Processes for ISG, applying Risk IT in ISG, separating Governance and management in ISG

Books:

1.   ISACA Publications on COBIT, ISACA Knowledge Centre
2.   ISACA Publications on ValIT and Risk IT, ISACA Knowledge Centre

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-5th Semester
BCA-505A   Departmental Elective 4 –Introduction to IoT (IIoT)

L	T	P	Credit		Theory : 60 marks
3	0	0	3		Sessional: 40 marks
					Time : 3Hrs

Course Objectives:

- Vision and Concept of IoT.
- Understand IoT Market perspective.
- Data and Knowledge Management and use of Devices in IoT Technology.
- Understand State of the Art – IoT Architecture.
- Learn the fundamental concepts of how and why Cloud systems works
- Learn Security issues under IoT Umbrella
- Learn Application area of IoT

Course Outcomes:

After completion of this subject student will able to understand:

- Key concepts of Internet of things and Internet of Everything
- The architecture view and strategy of deploying things using cloud
- How cloud plays an important role in IoT Infrastructure
- What are the real time applications and what is future scope related to same.

UNIT I

Introduction to IoT   **(6 hours)**
Definition and chrematistics of IoT, Physical Design IoT, IoT Protocols, Logical Design IoT, IoT Functional Block, IoT Communication Models, IoT Communication API.

IoT Enabling Technologies   **(6 hours)**

Wireless Sensor Network, Cloud Computing, Big data Analytics, Communication Protocol, Embedded System, IoT Level and Deployment Templates,

UNIT II

IoT Architecture   **(6 hours)**

IoT Architecture-State of the Art – Introduction, State of the art, **Architecture Reference Model-** Introduction, Reference Model, and architecture.

IoT and M2M, IoT System Management (6 hours)

Introduction to M2M, Difference Between Iot and M2M, Software Defined Networking, Network Function Virtualization , Need of IoT System Management, Simple Network Management Protocol, Network Operator Requirements.

UNIT III

Domain Specific IoT (5 hours)

Home Automation, Smart Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.

IoT – Privacy, Security, and Governance (6 hours)

Purpose and Requirement, Process Specification, Domain Model Specification, Information Model Specification, Service Specification, IoT Level Specification, functional View Specification, Operational View Specification, Device and Component Integration, Application Development.

UNIT IV

IoT Platform Design Methodology (5 hours)

Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT-Data-Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security

IoT Applications (5 hours)

Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.

Text Books:
1. Vijay Madisetti and ArshdeepBahga, **"Internet of Things (A Hands-on-Approach)",** 1stEdition, PVT, 2014.

Reference Books:

1. Francis daCosta, **"Rethinking the Internet of Things: A Scalable Approach to Connecting Everything",** 1st Edition, Apress Publications, 2013

2. Anthony T.Velte, Toby J.Velte, Robert Elsenpeter, "**Cloud Computing: A Practical Approach**", Tata McGraw Hill Edition, Fourth Reprint, 2010.

3. Kris Jamsa, "**Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and more**", Jones & Bartlett Learning Company LLC, 2013.

4. "Internet of Things Applications - From Research and Innovation to Market Deployment " by

5. By OvidiuVermesan& Peter Friess, ISBN:987-87-93102-94-1, River Publishers

6. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "**Professional Hadoop Solutions**", Wiley, ISBN: 9788126551071, 2015.

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-5th Semester

BCA-505B   Departmental Elective 4- Mobile Wireless and VOIP Security

L	T	P	Credit		Theory : 60 marks
3	0	0	3		Sessional: 40 marks
					Time : 3Hrs

Objective: Basic understanding of security in wireless world is very important for any IT Security Professional. As organizations are increasingly adapting VoIP for converged messaging, call centres and interactive multimedia collaboration, implementing security principles is vital for maintaining confidentiality and privacy. This course covers the basics of mobile communication, security in wireless communication, VoIP security and mobile forensics.

Course Outcome:

On successful completion of this course the student will be able to

- Understand systems, protocols & mechanisms needed to support mobility in mobile phones & computers
- Study important concepts at each layer of the protocol stack and understand VOIP
- Explore the operation and implications of new or recent technologies such as broadband, wireless and voice and data integration.
- Understand the Mobile Forensics & Data Extraction.

Course Contents:

UNIT I

Introduction to Mobile communication

Mobile & Telecommunication protocols and their vulnerabilities, Gain knowledge of managerial, technical and procedural controls to address Mobile & Telecommunication vulnerabilities

UNIT II

Wireless Security

Wireless protocols and their vulnerabilities, Gain knowledge of managerial, technical and procedural controls to address Wireless vulnerabilities

UNIT III

Voice over Internet Protocol (VOIP) Security

VOIP concepts, protocols and vulnerabilities, Gain knowledge of managerial, technical and procedural controls to address VOIP vulnerabilities

UNIT IV

Mobile Forensics & Data Extraction

Mobile forensics process including seizure, data acquisition types like Physical, Logical, Manual, External & Internal memory, storage, analysis using tools & techniques

Books:

1. Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole

2. Network Security Bible by Eric Cole – Second Edition

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-5th Semester

BCA-501(X)   **Departmental Elective 4 –MOOCs Course**

L   T   P   Credit   Theory: 100 marks
3   0   0   3   Sessional: --
                                                   Time: 3Hrs

Course contents will be provided as per suggestions by UGC/HRD

M.M. University, Sadopur (Ambala)
BCA-5thSemester

BCA-509L   **Cloud Computing Solution –Lab**

L   T   P   Credit   Practical :   50 marks
0   0   4   2   Sessional: 50 marks
                                                               Time: 3Hrs.

1. Perform SQL queries in Azure

2. Consider a scenario and list and create a report on various services offered at the windows azure Platform

3. Study Evaluate and make a report on Azure pricing

4. Integrate an on premise DB to Azure

5. Creating a website using Windows Azure and document the process

6. Create and Deploying a VM in Azure document the process

7. Create users and set user roles. Working with Identity and Access Management and document the process

8. Create a SQL server in Azure and list the steps involved.

9. Provisioning storage to a VM using windows azure

10. Create a backup in windows azure and document the steps involved.

11. Recover deleted data on windows azure platform

M.M. University, Sadopur (Ambala)
BCA-5th Semester

BCA-510L   **Ethical Hacking –Lab**

L   T   P   Credit   Practical :   50 marks
0   0   4   2   Sessional: 50 marks
                                                                       Time: 3Hrs.

List of Programs

1. Passive Reconnaissance using "Who is" and Online tools

2. Active Reconnaissance using "Sampad" and web site details

3. Full Scan, Half Open Scan and Stealth scan using "nmap"

4. UDP and Ping Scanning using "Advance Lan Scanner" and "Superscan"

5. Packet crafting using "Packet creator" tools

6. Exploiting NetBIOS vulnerability

7. Password Revelation from browsers and social networking application

8. Creating and Analyzing spoofed emails

9. Creating and Analyzing Trojans

10. OS password cracking

BCA
SIXTH SEMESTER

MAHARISHI MARKANDESHWAR UNIVERSITY

SADOPUR, AMBALA

BACHELOR OF COMPUTER APPLICATION

SCHEME OF EXAMINATION FOR 6TH SEMESTER

Sr. No	Course No.	Subject	L	T	P	Credits	Theory	Sessional (Internal)	Practical (Viva Voice)	Total
			Teaching Schedule				Examination Schedule			
1	BCA-601	ITIL	3	0	0	3	60	40	-	100
2		Departmental Elective -5	3	0	0	3	60	40	-	100
3	BCA-603P	Major Project/ Internship	0	0	24	12	-	100	200	300
		Total	**6**	**0**	**24**	**18**	120	180	200	500

DEPARTMENTAL ELECTIVES (ANY ONE)

BCA-602A	Cloud Security
BCA-602B	Application, Web Security and SDLC
BCA-602C	Openstack Cloud

BCA-CTIS-MMU

M.M. University,Sadopur (Ambala)
BCA-6th Semester

BCA-601   **ITIL**

L   T   P   Credit   Theory : 60 marks
3   0   0   3   Sessional: 40 marks
                                                             Time: 3Hrs

Objective: ITIL-compatible tools offer better integration, interaction and compatibility with your global partners, and in addition, sticking to strict ITIL standards from a single vendor can help process integrations go seamlessly and ensure all parties are speaking the same technical language.

It is always an advantage to understand what types of ITIL tools your global partners are working with and how they rate them. ITIL frameworks provide a homogenous IT environment and eases interactions with other global companies using similar preapproved tools. Managing staff, providing services to customers and creating efficiencies for less money can be daunting tasks for any IT organization.

Course Outcome:
On successful completion of this module the student will be able to

- Identify the components of the ITIL Library
- Understand the Service Design Lifecycle Stage
- Evaluate Change Management and deployment Process
- Identify the various Service Operation Functions
- Understand the continual Service Improvement processes

Course Contents:
UNIT I
ITIL Overview and Service Strategy

ITIL History, Components of the ITIL Library, IT Service Management, Organizing for IT Service Management, Technology and Architecture, Overview of HPSM and OTRS as service management tool, Service Strategy: Service Strategy Lifecycle Stage, Service Portfolio Management, the Demand Management Process, the IT Financial Management Process, Introduction to ISO 20000 Standards

UNIT II
Service Design
Service Design Lifecycle Stage, The Service Catalog Management Process, The Service Level Management Process, The Availability Management Process, The Capacity Management Process, The Information Security, Management Process, The IT Service Continuity, Management Process, The Supplier Management Process   .

Service Transition

Service Transition Lifecycle Stage, the Change Management Process, the Release and Deployment Management Process, the Service Asset and Configuration Management Process, Knowledge Management

UNIT III

Service Operation

Service Operation Functions : Service Operation Lifecycle Stage, The Service Desk Function, The Technical Management Function, The Application Management Function, The IT Operations Management Function Service Operation Processes :The Event Management Process, The Incident Management Process, The Request Fulfilment Process, The Access Management Process, The Problem Management Process

UNIT IV

Continual Service Improvement

Continual Service Improvement principles - CSI and organizational change, Ownership, Role definitions , External and internal drivers , Service Level Management , The Deming Cycle, Service measurement ,Knowledge Management, Benchmarks , Governance ,Frameworks, models, standards and quality systems. Continual Service Improvement processes: 7step improvement process, Service reporting, Service management, return on in investment for CSI, business questions for CSI, Service level management

Books:

- Introduction to ITIL, Jan van Bon Stationery Office Books, The Stationery Office, 2010
- HP operation Manual from HP, 2010
- A Guide to Service Desk Concepts Donna Knapp From Cengage Learning, 2010
- The Shortcut Guide to Virtualization and Service Automation, Greg Shield Real-time Publishers, 2008
- Service automation and dynamic provisioning techniques in IP/MPLS environments - Christian Jacquenet, Gilles Bourdon, Mohamed Boucadair John Wiley and Sons, 2008

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-6th Semester

BCA-602A   **Departmental Elective 5 - Cloud security**

L   T   P   Credit   Theory : 60 marks
3   0   0   3   Sessional: 40 marks
                                                          Time: 3Hrs

Objective: As cloud computing security to escalate in importance and evolve, it is important that enterprises understand how to best handle the paradigm change in business operations that the cloud presents. This level of understanding will enable enterprises to maximize the benefits that cloud platforms offer, while simultaneously addressing the cloud's unique and emerging threats and vulnerabilities.

Course Outcome:

On successful completion of this module the learner will be able to

- Compare modern security concepts as they are applied to cloud computing.
- Assess the security of virtual systems.
- Evaluate the security issues related to multi-tenancy.
- Appraise compliance issues that arise from cloud computing.

Course Contents:

UNIT I

Introduction to Cloud Security

Cloud Services, Cloud Services Implementation, Biggest cloud vendors and their location, The effects on security of the cloud distributed across various locations on the globe, Current state of cloud security, Security policies to be implemented while dealing with security on the cloud

UNIT-II

Tackling Cloud Security

Benefits of implementing cloud security in private cloud ,Evidence detection feasibility in case of cybercrime on the cloud, Issues of e – Discovery in the cloud, Conducting forensics on the cloud, Open source security issues and tackling mechanism.

UNIT III

Security Levels & Issues

Infrastructure Security, Network level security, Host level security, Application level security, Data security and Storage, Data privacy and security Issues

UNIT IV

Access Management

Jurisdictional issues raised by Data location, Identity & Access Management, Access Control, Trust, Reputation, Risk, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations.

Commercial Clouds

Open Source & Commercial Clouds: Eucalyptus, Microsoft Azure, Amazon EC2

Books:
   1. Cloud Computing, Michael Miller, Pearson Education, New Delhi, 2009

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-6th Semester

BCA-602B   Departmental Elective 5 –Application, Web security and SDLC

L   T   P   Credit   Theory : 60 marks
3   0   0   3   Sessional: 40 marks
                                                                      Time:3Hrs

Objective: To develop software in a consistent and efficient way with a demonstrable & standards compliant security quality, in line with the organizational risks...

Course Outcome:

After completion of the course the student will be able to-

- explain how security is integrated into software development
- articulate the importance of security principles in protecting web applications from vulnerabilities, exploits and attacks

Course Contents:

UNIT I

Phases in Software Development Life Cycle

System Development & Management of Development, Life-Cycle Phases including Project Initiation, Functional Design analysis & Planning, System Design specifications, Software development, Installation and Implementation, Operational Maintenance and Disposal, Separation of duties in the application development lifecycle in the development, testing and Production environments

UNIT-II

Introduction to Web Security and its Application

Different environments demand different security, Environment versus Application controls, Complexity of Functionality, Data Types, formats and Length, Implementation and Default Issues, Failure states, common web security vulnerabilities, OWASP top 10 threats and counter measures

UNIT III

Features of Java and its Security

Enterprise Java Beans, Expert Systems and Knowledge-Based Systems, Artificial Neural Networks, Object code versus Machine code, Features of Java, Java Security, Active X and Component Object Model (COM), Security issues resulting from Logic Bombs, Malware & Trojan Horses and their impact on Applications

UNIT IV

Web attacks and trends

Introduction to Web Attacks & Trends, URL Interpretation attacks, Input Validation attacks, SQL Injection attacks, Impersonation attacks & Buffer Overflow attacks, their effects and the technical & managerial controls to be put in place to address such attacks

Web commerce Security

Overview of e-commerce and m-commerce; important concepts; attacks; countermeasures

Books:

- Information Systems Security: Security Management, Metrics, Frameworks and Best Practices by Nina Godbole

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
BCA-6th Semester

BCA-602C   **Departmental Elective 5 –Openstack Cloud**

L   T   P   Credit   Theory : 60 marks
3   0   0   3   Sessional: 40 marks
                                                        Time: 3Hrs

Objective:

Course Contents:

(To be developed)

M.M. University, Sadopur (Ambala)
BCA-6th Semester

BCA-603P   **Major Project /Internship**

L   T   P Credit   Practical:200 marks
0   0   24   12   Sessional: 100 marks
                                              Time: 3hrs

The students will undertake a project as part of their final semester. The students can do independent projects or can take up projects in groups of two or more depending on the complexity of the project. The maximum group size will be four and in case of team projects there should be a clear delineation of the responsibilities and work done by each project member. The projects must be approved by the mentor assigned to the student. The mentors will counsel the students for choosing the topic for the projects and together they will come up with the objectives and the process of the project. From there, the student takes over and works on the project.

If the student chooses to undertake an industry project, then the topic should be informed to the mentor, and the student should appear for intermediate valuations. Prior to undertaking this project the students undergo a bridge course.

Bridge Course:

The bridge course ensures that all the students have the correct prerequisite knowledge before their industry interface. The purpose of a bridge course is to prepare for a healthy interaction with industry and to meet their expectations. It would be difficult to establish standards without appropriate backgrounds and therefore to bridge this gap, students are put through a week mandatory classroom participation where faculty and other experts will give adequate inputs in application based subjects, IT and soft skills.

The Project:

Each student will be allotted a Faculty Guide and an Industry Guide during the internship/project work. Students need to maintain a Project Diary and update the project progress, work reports in the project diary. Every student must submit a detailed project report as per the provided template. In the case of team projects, a single copy of these items must be submitted but each team member will be required to submit an individual report detailing their own contribution to the project.

Each student/group should be allotted a supervisor and periodic internal review shall be conducted which is evaluated by panel of examiners.

Project Evaluation Guidelines:

The Project evaluator(s) verify and validate the information presented in the project report.

The break-up of marks would be as follows:

1. Internal Evaluation
2. External Assessment
3. Viva Voce

Internal Evaluation:

Internal Evaluator of project needs to evaluate Internal Project work based on the following criteria:

- Project Scope , Objectives and Deliverables
- Research Work, Understanding of concepts
- Output of Results and Proper Documentation
- Interim Reports and Presentations– Twice during the course of the project

External Evaluation:

The Project evaluator(s) perform the External Assessment based on the following criteria.

- Understanding of the Project Concept
- Delivery Skill
- The Final Project Report
- Originality and Novelty

The Final Project Report Details:

- The report should have an excel sheet that documents the work of every project member

Viva Voce

- Handling questions
- Clarity and **Communication** Skill

Marking Scheme:

1. **Internal Evaluation:** 35% of Total Marks
2. **External Evaluation:** 50% of Total Marks
3. **Viva Voce:** 15 % of Total Marks

For e.g., If the total mark for the project is 100, then

❖ Internal Evaluation = 35 marks

The break-up of marks is shown below:-

- Interim Evaluation 1: 10 marks
- Interim Evaluation 2: 10 marks
- Understanding of concepts: 5 marks
- Programming technique: 5 marks
- Execution of code : 5 marks

❖ External Evaluation = 50 marks

The break-up of marks is shown below:-

- Project Report: 15 marks
- Explanation of project working: 10 marks
- Execution of code: 10 marks – (if done in industry, a stand-alone module can be reprogrammed and submitted. Error rectification etc. can be included by the evaluator)
- Participation in coding: 15 marks

❖ Viva Voce = 15 marks

The break-up of marks is shown below: -

- Questions related to project: 10 marks
- Questions related to technology: 5 marks

The Project evaluator(s) verifies and validates the information presented in the project report.

M.M. University, Sadopur (Ambala)

LIST OF OPEN ELECTIVES

EVEN SEMESTER	
BCA(OE)-01	Employability Skills
BCA(OE)-02	Computer Fundamentals and Organization
BCA(OE)-03	Programming in C
ODD SEMESTER	
BCA(OE)-04	Professional Skills
BCA(OE)-05	Information Security Fundamentals
BCA(OE)-06	ITIL

M.M. University, Sadopur (Ambala)
Department of Computer Science and Engineering

BCA(OE)-01   **Employability Skills**

L   T   P   Credit   Theory : 60 marks
2   0   0   2   Sessional: 40 marks
                                                           Time: 3Hrs

Objective: To be qualified for employment and to work in a corporate sector demands not only the technical knowledge and experience but interpersonal skills like speaking skills, professional etiquettes and so on. In this course, students will be taught how to develop these skills and apply them in our everyday interactions with people, both in our personal and professional lives.

Course Outcome:

At the end of this Subject Syllabus, student will able to understand-

- Various Speaking Skills like group discussion etc
- Various Professional etiquette and Manners
- To prepare the presentations accordingly.
- How to prepare for the Interview

Course Contents:

UNIT I

Speaking skills
Group Discussions; Importance of Group Discussions; Difference between Group Discussion, Panel Discussion and Debate; Format of GD as used in national level recruitment boards, Rules, ambience and normal practices, Dos and Don'ts in Group Discussions, Traits Evaluated in GDs; Etiquette & Mannerisms; Professional Presentations & Personal Grooming

UNIT II

Etiquette and Mannerism
Introduction; Professional etiquette – Etiquette at meetings, Dining, Involuntary Awkward Actions; Technology Etiquette – Phone, Email, Social Media, Video Conferencing, Web interview

UNIT III

Professional Presentations
Nature of Oral Presentation; Planning a Presentation, Preparing the Presentation; Delivering the Presentation

UNIT IV

Resume & Job Application

Introduction; What is a Resume; What is a Curriculum Vitae; What is a scannable resume; How to develop an impressive resume; Different formats of Resume; Job application or cover letter

Job Interviews

Definition of interview; Background information; Types of interviews; Preparatory steps for Job interviews; Interview Skill tips; Changes in the interview process, Frequently asked questions during interviews

Books:

1. Objective English: 3 rd Edition, Edgar Thorpe and Showick Thorpe, Pearson Publishers, 2010 print.
2. Presentation skills. The essential guide for students, Patsy McCarthy& Caroline Hatcher, Sage publications, 2002.
3. Soft Skills – An integrated approach to Maximise Personality, Gajendra Singh Chauhan &Sangeeta Sharma, Wiley Publications
4. Material prepared by the Department.

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
Department of Computer Science and Engineering
BCA(OE)-02   Computer Fundamentals and Organization

L	T	P	Credit			
2	0	0	2			

Theory :   60 marks
Sessional: 40 marks
Time: 3Hrs.

Objectives: The basic knowledge of how a computer works is very important for any fresh networking or operating system professional. The functional knowledge of a computers working and its main building parts are paramount. The computers of today may come with variety of features but the basic working principles remain the same. Students will explore the fundamentals of organization of a computer and the principles and building units of a computer (its hardware). Also, they will be introduced to the basics of networking and Office

Course Outcome:

After completion of the course the student will be able:

- To understand and the use of basic concepts of Computer components.
- To understand the concept of memory hierarchy and the use of various input-output devices.
- To understand the various computer languages, operating system functions and the application of number systems.
- To gain knowledge of the Office and understand the overview of word processing, spreadsheet and presentation software.
- To understand the basic Computer Networking principles and the applications of WWW, multimedia and the usage of electronic mail.

Course Contents:

UNIT I

General Features of a Computer
General features of a computer, Generation of computers, Personal computer, workstation, mainframe computer and super computers. Computer applications – data processing, information processing, commercial, office automation, industry and engineering, healthcare, education, graphics and multimedia..

UNIT II

Computer Organization
Computer organization, central processing unit, computer memory – primary memory and secondary memory, Secondary storage devices – Magnetic and optical media, Input and output units, OMR, OCR, MICR, scanner, mouse, modem.

UNIT III

Computer Hardware and Software

Computer hardware and software, Machine language and high level language, Application software, computer program, operating system, Computer virus, antivirus and computer security, Elements of MS DOS and Windows OS, Computer arithmetic, Binary, octal and hexadecimal number systems, Algorithm and flowcharts, illustrations, elements of a database and its applications, Basic Gates (DeMorgans theorems, duality theorem, NOR, NAND, XOR, XNOR gates), Boolean expressions and logic diagrams, Types of Boolean expressions

UNIT IV

Office

Word processing and electronic spread sheet, An overview of word processing, spreadsheet and presentation software
Introduction to Networking
Network of computers, Types of networks, LAN, Intranet and Internet, Internet applications, World Wide Web, E-mail, browsing and searching, search engines, multimedia applications

Books:
1. Alexis Leon and Mathews Leon (1999) : Fundamentals of information Technology, Leon Techworld Pub.
2. Jain, S K (1999) : Information Technology "O" level made simple, BPB Pub
3. Jain V K (2000) "O" Level Personal Computer software, BPB Pub.
4. Rajaraman, V (1999): Fundamentals of Computers, Prentice Hall India
5. Hamacher, Computer Organization McGrawhill
6. Alexis Leon: Computers for everyone. Vikas, UBS
7. Anil Madaan : Illustrated Computer Encyclopedia. Dreamland Pub
8. Sinha. Computer Fundamentals BPB Pub.

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
Department of Computer Science and Engineering
BCA(OE)-03   **Programming in C**

L	T	P	Credit			
2	0	0	2	Theory :	60 marks	
				Sessional:	40 marks	
				Time:	3Hrs.	

Objective: Even with the introduction of several high level languages and frameworks, the development of procedural codes is important in several commercial app developments. The object oriented platforms and event driven systems use procedural languages for coding integral command content. C is an important procedural language and was developed initially to write the UNIX/LINUX operating system. UNIX/LINUX operating system, C compiler and all UNIX/LINUX application programs are written in C. C is popular because, it is easy to learn, produces efficient programs, can handle low-level activities, and can be compiled on a variety of platforms. This course focuses on all the basic concepts, syntax and constructs of the C language. For students, who are new to programming, this unit can be considered as the starting point before taking up any other programming oriented units. The students will be implementing the concepts explained here to create simple to complex programs

Course Outcome:

After completion of the course the student will be able:

- To be able to use the basic concepts of Computer components.
- To be able to design, implement, test, debug and document programs in C.
- To be able to use functions, and functions with parameters passing option.
- To be able to use pointers and arrays, perform pointer arithmetic.
- To be able to understand the advance topics in C like file handling functions and the concept of Standard C library.
- To be able to learn the concept of C preprocessor and its application in program development.

Course Contents:
UNIT I

Overview of Programming:

Introduction to computer based problem solving, Program design and implementation issues-

Flowcharts & Algorithms, Top down design & stepwise refinement, **Programming environment** –

Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters

UNIT II
Fundamentals of C programming:

BCA-CTIS-MMU

Overview of C, Data Types, Constants & Variables, Operators & Expressions, **Control constructs**-if then, for, while, **Arrays**- single & multidimensional arrays, **Functions**-fundamentals – general form, function arguments, return value, **Basic I/O**-formatted and Unformatted I/O, **Advanced features**-Type modifiers and storage class specifiers for data types, Bit operators, ? operator, &operator, * operator, Type casting, type conversion.

UNIT III

Advanced programming techniques:
Control constructs- Do while, Switch statement, break and continue, exit() function, go to and label, Scope rules- Local & global variables, scope rules of functions, Functions-parameter passing, call by value and call by reference, calling functions with arrays, argc and argv, recursion- basic concepts, ex-towers of Hanoi

UNIT IV

Dynamic data structures in C:

Pointers- The & and * operator, pointer expression, assignments, arithmetic, comparison, mallocvscalloc, arrays of pointers, pointers to pointers, initializing pointers, pointers to functions, function retuning pointers, **Structures**- Basics, declaring, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures, **Unions** – Declaration, uses, enumerated data-types, typedef

Additional features:
File Handling – The file pointer, file accessing functions, fopen, fclose, puc, getc, fprintf, C Preprocessor- #define, #include, #undef, Conditional compilation directives, C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions

Books:

1. Let us C by Yashwant Kanetkar, 6th Edition, BPB Publication

2. The C programming Language by Richie and Kenninghan, 2004, BPB Publication

3. Programming in ANSI C by Balaguruswamy, 3rd Edition, 2005, Tata McGraw Hill

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal mark

M.M. University, Sadopur (Ambala)
Department of Computer Science and Engineering

BCA(OE)-04   **Professional Skills**

L	T	P	Credit		Theory : 60 marks
2	0	0	2		Sessional: 40 marks
					Time: 3Hrs

Objective: This course focuses on developing skill sets that help students become stronger, more confident leaders and help to understand some of the processes involved in decision making, to the psychology of decision making and the social context in which decisions are made. Topics includes Leadership & Team building, Decision Making & Negotiation, Creativity at workplace, emotional intelligence. Upon completion of this course, the students will be able to describe and discuss leadership characteristics and styles, evaluate the effectiveness of specific leadership styles in a given situation

Course outcomes:

After completion of this course, students should be able to develop following qualities in their behavior:

- Leadership & Team building
- Decision Making & Negotiation
- Creativity at workplace
- Emotional intelligence

Course Contents:

UNIT I

Leadership & Team Building

Leader and Leadership; Leadership Traits; Leadership Styles; Leadership Trends; Team Building; Types of Teams;

UNIT II

Decision Making & Negotiation

What is Decision Making; Steps for Decision Making; Decision Making Techniques; Negotiation Fundamentals; Negotiation Styles; Major Negotiation Concepts.

UNIT III

Creativity at Work Place

Creativity; Motivation; Nurturing Hobbies at work; The Six Thinking Hat Method

UNIT IV

Emotional Intelligence

Meaning and Definition; Need for Emotional Intelligence; Intelligence Quotient versus Emotional Intelligence quotient; Components of EI, Skills to develop EI

Books:

1. Soft Skills – An integrated approach to Maximise Personality, Gajendra Singh Chauhan &Sangeeta Sharma, Wiley Publications

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

M.M. University, Sadopur (Ambala)
Department of Computer Science and Engineering
BCA(OE)-05　　　　　**Information Security Fundamentals**

L	T	P	Credit
2	0	0	2

Theory : 60 marks
Sessional: 40 marks
Time:3Hrs

Objective- The course primarily covers the Types of Threats, Vulnerabilities, Risks and various terminologies in Information Security. It explains the formation of Security policy at various levels inside the Organization and provides the definition Procedures, Standard and Guidelines. The units emphasizes the need of Performing Asset Classification and Declassification, Retention and Disposal of Information Asset also it identifies the various levels of Authorization for access Viz., Owner, Custodian and User. The course covers the different types of Access Controls and Physical security measures to safeguard the Assets and conclusively, it deals with the Digital Rights Management also covering the concepts of Common Authentication protocols and Real world Protocols. This course enables the students to understand the concepts of IT security, Threats, Vulnerabilities, Impact and control measures. And also to get familiarized with Asset management along with the objective to create awareness in Digital Rights management.

Course Outcome:

At the end of the course, the student will be able to:-

- Understand the Concept and need of Information Security
- Define the Server Security, Concept and need of Firewalls
- Understand the Concept of Internet Security
- Describe the various attacks and preventive measure
- Understand vulnerability assessment
- Understand the Cyber laws

Describe model for Risk Assessment

Course Contents:

UNIT I

Introduction to Information Security

Definition of Information Security, Evolution of Information Security; Basics Principles of Information Security; Critical Concepts of Information Security; Components of the

Information System; Balancing Information Security and Access; Implementing IT Security, The system Development Life cycle, Security professional in the organization.

UNIT II

The Need for IT Security

Business Needs-Protecting the functionality, Enabling the safe operations, Protecting the data, safe guarding the technology assets; Threats-compromises to Intellectual property, deliberate software attacks, Espionage and trespass, sabotage and vandalism; Attacks-Malicious Codes, Back Doors, Denial of Service and Distributed Denial of Service, Spoofing, sniffing, Spam, Social Engineering.

UNIT III

Risk Management

Definition of risk management, risk identification, and risk control, Identifying and Accessing Risk, Assessing risk based on probability of occurrence and likely impact, the fundamental aspects of documenting risk via the process of risk assessment, the various risk mitigation strategy options, the categories that can be used to classify controls.

UNIT IV

Network Infrastructure Security and Connectivity

Understanding Infrastructure Security- Device Based Security, Media-Based Security, Monitoring and Diagnosing; Monitoring Network- Firewall, Intrusion Detection System, Intrusion Prevention system; OS and Network Hardening, Application Hardening; Physical and Network Security- Policies, Standards and Guidelines.

Books:
4. Information Security Risk Analysis - Thomas R. Peltier, Third Edition, Pub: Auerbach, 2012
5. Operating System Concepts, 8th Edition by Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Pub: John Wiley & sons, Inc., 2009.
6. Information security: Principles and Practice - Mark Stamp, 2nd Edition, Pub: John Wiley & Sons, Inc., 2011

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.

BCA-CTIS-MMU

M.M. University, Sadopur (Ambala)
Department of Computer Science and Engineering

BCA(OE)-06   **ITIL**

L   T   P   Credit   Theory : 60 marks

2   0   0   2   Sessional: 40 marks

                                                  Time: 3Hrs

Objective: ITIL-compatible tools offer better integration, interaction and compatibility with your global partners, and in addition, sticking to strict ITIL standards from a single vendor can help process integrations go seamlessly and ensure all parties are speaking the same technical language.

It is always an advantage to understand what types of ITIL tools your global partners are working with and how they rate them. ITIL frameworks provide a homogenous IT environment and eases interactions with other global companies using similar preapproved tools. Managing staff, providing services to customers and creating efficiencies for less money can be daunting tasks for any IT organization.

Course Outcome:

On successful completion of this module the student will be able to

- Identify the components of the ITIL Library
- Understand the Service Design Lifecycle Stage
- Evaluate Change Management and deployment Process
- Identify the various Service Operation Functions
- Understand the continual Service Improvement processes

Course Contents:

UNIT I

ITIL Overview and Service Strategy

ITIL History, Components of the ITIL Library, IT Service Management, Organizing for IT Service Management, Technology and Architecture, Overview of HPSM and OTRS as service management tool, Service Strategy: Service Strategy Lifecycle Stage, Service Portfolio Management, the Demand Management Process, the IT Financial Management Process, Introduction to ISO 20000 Standards

UNIT II

Service Design

Service Design Lifecycle Stage, The Service Catalog Management Process, The Service Level Management Process, The Availability Management Process, The Capacity Management Process, The

Information Security, Management Process, The IT Service Continuity, Management Process, The Supplier Management Process   .

UNIT III

Service Transition

Service Transition Lifecycle Stage, the Change Management Process, the Release and Deployment Management Process, the Service Asset and Configuration Management Process, Knowledge Management

Service Operation

Service Operation Functions : Service Operation Lifecycle Stage, The Service Desk Function, The Technical Management Function, The Application Management Function, The IT Operations Management Function Service Operation Processes :The Event Management Process, The Incident Management Process, The Request Fulfilment Process, The Access Management Process, The Problem Management Process

UNIT IV

Continual Service Improvement

Continual Service Improvement principles - CSI and organizational change, Ownership, Role definitions , External and internal drivers , Service Level Management , The Deming Cycle, Service measurement ,Knowledge Management, Benchmarks , Governance ,Frameworks, models, standards and quality systems. Continual Service Improvement processes: 7step improvement process, Service reporting, Service management, return on in investment for CSI, business questions for CSI, Service level management

Books:

- Introduction to ITIL, Jan van Bon Stationery Office Books, The Stationery Office, 2010
- HP operation Manual from HP, 2010
- A Guide to Service Desk Concepts Donna Knapp From Cengage Learning, 2010
- The Shortcut Guide to Virtualization and Service Automation, Greg Shield Real-time Publishers, 2008
- Service automation and dynamic provisioning techniques in IP/MPLS environments - Christian Jacquenet, Gilles Bourdon, Mohamed Boucadair John Wiley and Sons, 2008

Note: The examiner is requested to set eight questions (two from each unit). The candidate has to attempt five questions selecting at least one question from each unit. All questions carry equal marks.