

**List of Courses Focus on Employability/ Entrepreneurship/  
Skill Development**

**Department : Computer Science and Information Technology**

**Programme Name : MCA**

**Academic Year : 2017-18**

**List of Courses Focus on Employability/ Entrepreneurship/Skill Development**

Sr. No.	Course Code	Name of the Course
	MCA-202	Object Oriented Programming with C++
	MCA-204(Elective-I(1))	Computer Networks
	MCA-301	Programming in JAVA
	MCA-302	Artificial Intelligence and Expert Systems
	MCA-303	Relational Data Base Management System
	MCA305(Elective-II)	Computer Network
	MCA-306	Lab based on JAVA
	MCA-307	Lab Based on RDBMS
	MCA405(Elective-2)	Elective II(C# and .net framework)
	MCA-406	LAB based on C#
	MCA-407	Mini Project
	MCA-501	Soft Computing
	MCA-502	Interactive computer graphics and multimedia
	MCA-503	Data Mining and Data Warehousing
	MCA-504	Network Security



	MCA-507	Mini Project
	MCA-601	Major Project

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G.G.V. BILASPUR (C.G.)**



**Department of Computer Science & Information Technology Guru Ghasidas  
Vishwavidyalaya, Bilaspur (C.G.)**

**SYLLABUS FOR MCA COURSE UNDER CHOICE BASED CREDIT SYSTEM (CBCS) \***

**Session 2017-2018 (On and after)**

**MCA**

**Note: The decision of the GG Vishwavidyalaya for implementing CBCS system on this course shall be final, rest will remain the same.**

**Semester 1**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-101	Introduction to Information Technology	4		40	60	4
2	MCA-102	Computer programming & Numerical Methods	4		40	60	4
3	MCA-103	Discrete Mathematical Structures	4		40	60	4
4	MCA-104	Data Structures using C	4		40	60	4
5	MCA-105	Computer Organization	4		40	60	4
6	MCA-106	LAB: Data Structure using C		1		100	1
7	MCA-107	LAB-II: Computer Hardware and Digital Electronics		1		100	1
		Total	20	02	200	500	22

**Semester 2**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-201	Principles of Operating System	4		40	60	4
2	MCA-202	Object Oriented Programming with C++	4		40	60	4
3	MCA-203	Theory of Computation	4		40	60	4
4	MCA-204	Elective I	4		40	60	4
5	MCA-205	Elective II	4		40	60	4
6	MCA-206	OOP Lab (C++)		1		100	1
7	MCA-207	LAB based on Elective- II		1		100	1
		Total	20	02	200	500	22

**Semester 3**



Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-301	Probability and Statistics	4		40	60	4
2	MCA-302	Artificial Intelligence	4		40	60	4
3	MCA-303	Relational Data Base Management System	4		40	60	4
4	MCA-304	Elective III	4		40	60	4
5	MCA-305	Elective IV	4		40	60	4
6	MCA-306	RDBMS LAB		1		100	1
7	MCA-307	LAB based on Elective –III / IV		1		100	1
		<b>Total</b>	<b>20</b>	<b>02</b>	<b>200</b>	<b>500</b>	<b>22</b>

#### Semester 4

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-401	Design and Analysis of Algorithm	4		40	60	4
2	MCA-402	Compiler Design	4		40	60	4
3	MCA-403	Optimization Techniques	4		40	60	4
4	MCA-404	Elective V	4		40	60	4
5	MCA-405	Elective VI	4		40	60	4
6	MCA-406	Computer Network LAB		1		100	1
7	MCA-407	Minor Project		1		100	1
		<b>Total</b>	<b>20</b>	<b>02</b>	<b>200</b>	<b>500</b>	<b>22</b>

#### Semester 5

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-501	Soft Computing	4		40	60	4
2	MCA-502	Computer Graphics and Multimedia	4		40	60	4
3	MCA-503	Data Mining and Data Warehousing	4		40	60	4
4	MCA-504	Elective VII	4		40	60	4
5	MCA-505	Elective VIII	4		40	60	4
6	MCA-506	Lab based on MATLAB		1		100	1
7	MCA-507	<b>Minor Project</b>		1		100	1



		Total	20	02	200	500	22
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**Semester 6**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-601	Major Project	-	-	-	500	15
		Total	-	-	-	-	15

Total Course Credits – 125

Note: Electives to be decided at the start of the respective semester

**\* The syllabus is subjected to change as per the requirement.**

Electives

Sl.No	Paper Code	(I)	(2)	(3)
1	MCA-204 (Elective-I)	Computer Networks	System Analysis and Design	Introduction to Micro Processor
2	MCA-205 (Elective-II)	Object Oriented Software Engineering	Multimedia	Linux Operating System and Shell Programming
3	MCA-304 (Elective-III)	Advanced JAVA Programming	System Software	Neural Network
4	MCA-305 (Elective-IV)	Web Technology	Pattern Recognition	V.B.Net Programming
5	MCA-404 (Elective-V)	E-Commerce	Financial Accounting	Software Testing
6	MCA-405 (Elective-VI)	Mobile Application Programming	C# and .net Framework	Cloud Computing
7	MCA-504 (Elective-VII)	Big Data Analytics	Advanced Operating System	Parallel Processing
8	MCA-505 (Elective-VIII)	Management Information System	Network Security	Image Processing



MCA-202

### Object Oriented Programming with C++

- 1. Principles of OOP:** Procedure oriented Vs Object oriented, OOP paradigm, Features of OOP ,Basic Data types Tokens, Keywords, Constant ,Variables, Operator I/O statements , Structure of C++ program, Arrays, pointers, Object modeling technique (OMT).
- 2. Function, Object and Class:** Defining class, Abstract class ,Function prototype, Function with parameter ,Passing object as a parameter, Constructor function ,Types of constructor, Destructor Friend function , Friend class, Dynamic allocation operator new and delete.
- 3. Polymorphism and Inheritance:** Types of polymorphism, Constructor overloading ,Operator overloading, Template function Template class, Types of inheritance ,Private ,protected and public derivation of class ,Resolving ambiguity Pointer to object, This pointer ,Virtual class , virtual function.
- 4. Input - output and File handling:** I/O classes ,File and stream classes ,Opening and closing file Detecting end of file, String I/O, Char I/O, Object I/O, I/O with multiple object ,File pointer, Disk I/O.
- 5. Exception handling, Name spaces and Standard Template library (STL):** Need of Exception handling ,try ,catch and throws keywords , defining namespace ,benefit of namespace, Component of STL.

#### Readings:

1. Object oriented programming with C++ by E.Balagurusamy II nd edition Tata Mc-Graw Hill.
2. Object Oriented Programmin By McGregor and Sykes S A, 1992 Van Nostrand.
3. The C++ Programming Language By Strustrp B,Addision Wasley.
4. Object Oriented Programming in C++ By Lafore R, Galgotia Publications.
5. Introduction to Object Oriented Programming By Witt KV, Galgotia Publications.
6. Object Oriented Programming By Blaschek G, Springer Verlag



MCA-204

ELECTIVE-I

(1)

### Computer Networks

- 1. Introduction and Physical Layer :****Introduction:** Goal and application Network Hardware and Software, Protocol Hierarchies, Design Issue of the layers, Interfaces and services, Connection oriented and connection less services, Service Primitives, Reference Models – The OSI Reference model, The TCP/IP Model ,Types of computer Network :LAN,MAN,WAN, Topologies, Transmission mode .  
**Physical Layer :**Data and signal, Analog and digital Communication, Transmission Media ,Concept of data transmission, Switching Techniques ,Communication Satellites – Geosynchronous Satellite – VSAT, Low Orbit Satellites, ISDN and ATM.
- 2. Data Link Layer :** Data Link Layer design issues Data link control:Framing, Flow control. ErrorDetection and Correction. DLC protocol :Stop and Wait Protocol, Sliding window protocol, A Simplex protocol for noisy channel, Medium access sublayer: Channel allocation :static and dynamic ,Multiple access protocol FDDI, Data Link Layer in the Internet : SLIP,PPP. Wired and Wireless LAN protocol.
- 3. Network Layer :** The Network Layer Design Issue, IP addressing, Address mapping, Error reporting ,Multicasting ,Delivery, Forwarding and Routing. The Network Layer in the Internet : The IP Protocol. subnets, Internet control protocols ,internet multicasting.
- 4. Transport Layer :**The Transport layer services, The concept of client and server in terms of socket addressing Quality of service, Transport service primitives and buffering, Multiplexing, Crash Recovery. The Internet Transport Protocols (TCP/IP) – The TCP Service Model, The TCP protocol, The TCP segment header, TCP connection management, TCP transmission policy, TCP congestion control, TCP timer management, UDP.
- 5. Presentation and Application Layer :** Network Security, Traditional Cryptography, Private key cryptography and public key cryptography, Authentication protocols, DNS ,SNMP,E-mail, application layer protocols.

#### Readings:

1. Data Communications and Networking By Forouzan, Tata McGraw Hill Company.
2. Computer Networks By A.S. Tanenbaum
3. Computer Network By S.S.Shinde ,New Age International Publisher.
4. Data and computer Communication by Shashi banzal ,Firewall media
5. Internetworking with TCP/IP :Principles,protocols,and Architecture Vol 1 5<sup>th</sup> Edition ,PHI publication
6. Data Communications and Computer Network by Prakash C Gupta, PHI Publication.



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**SYLLABUS FOR MCA COURSE UNDER CHOICE BASED CREDIT SYSTEM (CBCS) \***

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**Note: The decision of the GG Vishwavidyalaya for implementing CBCS system on this course shall be final, rest will remain the same.**

**Semester 1**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-101	Introduction to Information Technology	4		40	60	4
2	MCA-102	Programming Based Numerical Analysis	4		40	60	4
3	MCA-103	Programming in 'C' Language	4		40	60	4
4	MCA-104	Data Structure	4		40	60	4
5	MCA-105	Computer Organization	4		40	60	4
6	MCA-106	LAB-I: Programming in C		1		100	1
7	MCA-107	LAB-II: Data Structure Using C		1		100	1
		<b>Total</b>	<b>20</b>	<b>02</b>	<b>200</b>	<b>500</b>	<b>22</b>

**Semester 2**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-201	Principles of Operating system	4		40	60	4
2	MCA-202	Object Oriented Programming with C++	4		40	60	4
3	MCA-203	Discrete Mathematics	4		40	60	4
4	MCA-204	Elective I (Web Technology)	4		40	60	4
5	MCA-205	Elective II (Theory of Computation)	4		40	60	4
6	MCA-206	Lab based on C++		1		100	1
7	MCA-207	Lab Based on Elective-I		1		100	1
		<b>Total</b>	<b>20</b>	<b>02</b>	<b>200</b>	<b>500</b>	<b>22</b>





**Semester 3**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-301	Programming in JAVA	4		40	60	4
2	MCA-302	Artificial Intelligence and Expert Systems	4		40	60	4
3	MCA-303	Relational Data Base Management System	4		40	60	4
4	MCA-304(Elective-I)	Elective I (Compiler Design)	4		40	60	4
5	MCA-305(Elective-II)	Elective II(Computer Network)	4		40	60	4
6	MCA-306	Lab based on JAVA		1		100	1
7	MCA-307	Lab Based on RDBMS		1		100	1
		Total	20	02	200	500	22

**Semester 4**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-401	Analysis and Design of Algorithm	4		40	60	4
2	MCA-402	Software Engineering	4		40	60	4
3	MCA-403	Operation Research	4		40	60	4
4	MCA-404(Elective-I)	Elective I(E-Commerce)	4		40	60	4
5	MCA-405(Elective-2)	Elective II(C# and .net framework)	4		40	60	4
6	MCA-406	Lab based on C#		1		100	1
7	MCA-407	LAN Based Mini Project		1		100	1
		Total	20	02	200	500	22

**Semester 5**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-501	Soft Computing	4		40	60	4
2	MCA-502	Interactive computer graphics and multimedia	4		40	60	4
3	MCA-503	Data Mining and Data Warehousing	4		40	60	4
4	MCA-504	Elective I (Network Security)	4		40	60	4
5	MCA-505(Elective-II)	Elective II (Parallel Processing)	4		40	60	4
6	MCA-506	Lab based on MATLAB		1		100	1
7	MCA-507	Web Based Mini Project		1		100	1
		Total	20	02	200	500	22



**Semester 6**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MCA-601	Major Project	-	-	-	500	15
		Total	-	-	-	-	15

Total Course Credits – 125





MCA-301

## Programming in JAVA

- 1. Overview of JAVA :** The genesis of java, An overview of java, java virtual machine (JVM) ,Java developmentkit (JDK) ,Java Vs C++, Data types, Literals, Variables, and Arrays, Operators, Control statements, Introducing Class, closer look at Methods and class ,Nested and inner class ,Exploring Java.lang, String handling ,Constructor ,Garbage collection and finalize() method. Writing simple JAVA program.
- 2. Inheritance, Packages and interface-** Types of inheritance ,Access specifier ,using super, method overriding , Abstract class ,constructor in multilevel inheritance ,using final with inheritance ,Dynamic method dispatch , Defining package, CLASSPATH, Access protection ,Importing package ,Defining and implementing interface , Extending interface, Nested interface.
- 3. Exception handling and Multithreading:** Using try and catch ,multiple catch classes, Nested try statements , throw ,throws and finally ,Built in exception ,Uncaught exception , Creating own exception class , Java Thread Model: Main thread ,Creating own Thread ,Life cycle of thread, Thread priorities ,Synchronization and messaging, Interthread communication ,Suspending ,Resuming and stopping thread.
- 4. Input Output and Networking :** I/O classes: Byte stream and character stream ,Predefined stream ,reading console input, writing consol output,PrintWriter class ,Reading and writing files. **Networking :** classes and interface ,Socket and overview, TCP/IP client socket and server socket ,Inet address ,URL Connection, Datagram.
- 5 . Applet ,AWT,Swing, Event handling and Advance JAVA-** Applet life cycle, Creating an applet, Using image and sound in applet ,passing parameter.Exploring AWT and introduction to Swing.Event handling – The delegation-event model , Event classes ,Source of event, Event listener interfaces ,handling mouse and keyboard event ,Adapter class.  
**Advance JAVA :** JDBC API. Servlet – Overview of servelet,Life cycle of servlet, JAVA servlet architecture Generic servlet and http servlet ,The servlet interface, Request and response.

### Readings:

1. Java: The complete reference By Naughton P and schildt H. ,Osborne Mcgraw-Hill, Berkeley, USA, 1997.
2. Simply JAVA :An Introduction to JAVA programming By James R. Levenick ,Firewall Media publication New,Delhi
3. Java Programming By E.Balguruswami
4. Core JAVA for beginners By Rashmi Kanta Das ,Vikas Publication.
5. Core JAVA : A Comprehensive Study by Mahesh P. Matha , PHI publication.



MCA - 303

### Relational Data Base Management System

- 1. Overview of Database Management** :Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file oriented approach verses database oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational. Introduction to distributed databases.
- 2. Relational Model** : Entity - Relationship model as a tool for conceptual design-entities attributes and relationships. ER diagrams; Concept of keys: candidate key, primary key, alternate key, foreign key; Strong and weak entities, Case studies of ER modeling Generalization; specialization and aggregation. Converting an ER model into relational Schema. Extended ER features.
- 3. Structured Query Language** :Relational Algebra: select, project, cross product different types of joins (inner join, outer joins, self join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, stand alone and embedded query languages, Introduction to SQL constructs (SELECT...FROM, WHERE... GROUP BY... HAVING... ORDERBY....), INSERT, DELETE, UPDATE, VIEW definition and use, Temporary tables, Nested queries, and correlated nested queries, Integrity constraints: Not null, unique, check, primary key, foreign key, references, Triggers. Embedded SQL and Application Programming Interfaces.
- 4. Relational Database Design** :Normalization concept in logical model; Pitfalls in database design, update anomalies: Functional dependencies, Join dependencies, Normal forms (1NF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design; Concepts of indexes, File organization for relational tables, De-normalization.
- 5. Introduction to Query Processing and Protecting the Database & Data Organizations** : Parsing, translation, optimization, evaluation and overview of Query Processing. Protecting the Data Base - Integrity, Security and Recovery. Domain Constraints, Referential Integrity, Assertion, Triggers, Security & Authorization in SQL.

#### Readings:

1. Database system concept By H. Korth and A. Silberschatz, TMH.
2. Data Base Management System By Alexies & Mathews , Vikas publication.
3. Data Base Management System By C. J. Date ,Narosha Pub.



4. Data Base Management System By James Matin .
5. Principles of Database System By Ullman.
6. An Introduction to database systems By Bipin Desai, 2011 ed.,Galgotia Publication.

**MCA 305**

### **Computer Networks (Elective-II)**

1. **Introduction and Physical Layer :Introduction:** Goal and application Network Hardware and Software , Protocol Hierarchies, Design Issue of the layers, Interfaces and services, Connection oriented and connection less services, Service Primitives, Reference Models – The OSI Reference model, The TCP/IP Model ,Types of computer Network :LAN,MAN,WAN, Topologies, Transmission mode .  
**Physical Layer :**Data and signal, Analog and digital Communication, Transmission Media ,Concept of data transmission, Switching Techniques ,Communication Satellites – Geosynchronous Satellite – VSAT, Low Orbit Satellites, ISDN and ATM.
2. **Data Link Layer :** Data Link Layer design issues Data link control:Framing, Flow control. Error Detection and Correction. DLC protocol :Stop and Wait Protocol, Sliding window protocol, A Simplex protocol for noisy channel, Medium access sublayer: Channel allocation :static and dynamic ,Multiple access protocol FDDI, Data Link Layer in the Internet : SLIP,PPP. Wired and Wireless LAN protocol.
3. **Network Layer :** The Network Layer Design Issue, IP addressing, Address mapping, Error reporting , Multicasting ,Delivery, Forwarding and Routing. The Network Layer in the Internet : The IP Protocol. subnets, Internet control protocols ,internet multicasting.
4. **Transport Layer :**The Transport layer services, The concept of client and server in terms of socket addressing Quality of service, Transport service primitives and buffering, Multiplexing, Crash Recovery. The Internet Transport Protocols (TCP/IP) – The TCP Service Model, The TCP protocol, The TCP segment header, TCP connection management, TCP transmission policy, TCP congestion control, TCP timer management, UDP.
5. **Presentation and Application Layer :** Network Security, Traditional Cryptography, Private key cryptography and public key cryptography, Authentication protocols, DNS ,SNMP,E-mail, application layer protocols.

#### **Readings:**

1. Data Communications and Networking By Forouzan, Tata McGraw Hill Company. 2  
Computer Networks By A.S. Tanenbaum
3. Computer Network By S.S.Shinde ,New Age International Publisher.
4. Data and computer Communication by Shashi banzal ,Firewall media .



MCA-501

### Soft Computing

1. **Introduction** -What is soft computing, important soft computing techniques
2. **Artificial Neural Network** :Biological neural network Vs Artificial neural network, Neuron Model and Neural Network Architectures, ANN terminologies, ANN benefits, Supervised learning network :Error back propagation network, Perceptron learning (single layer only), Unsupervised learning network :Kohonen self organizing feature maps (SOM)
3. **Fuzzy Logic**-Crisp set Vs Fuzzy set, Operations on Fuzzy sets, Fuzzy relation, Membership function, Fuzzy arithmetic and Fuzzy measures
4. **Genetic Algorithm** – Introduction, representations of GA by binary and real-valued numbers, Genetic Operators and Parameters: Selection, crossover, mutation, elitism, Genetic Algorithms in Problem Solving
5. **Swarm Intelligence**: Meaning, Particle Swarm Optimization: basics, terminology, problem solving using PSO

### Readings:

1. Principles of soft computing , S.N.Shivanandan and S.N. deepa Wiley India publication ,First Indian edition ,2008.
2. A Comprehensive Foundation to Neural Networks , Simon Haykins , Prentice Hall
3. Fuzzy Sets and Fuzzy Logic: Theory and Applications , G. J. Klir, and B. Yuan, PHI learning ,2011.
4. Dr.G.Canon, Fuzzy Logic and Fuzzy Decision Making: Concepts and Applications, Galgotia Publication.
5. D. E. Goldberg, Genetic Algorithms in Search, Optimization, and Machine Learning, Addison-Wesley, 1989.
6. Jang,Sun and Mizutani :Neuro-Fuzzy and soft computing :A computational Approach to learning and machine intelligence ,PHI learning ,2011.
7. N.K. Sinha & M. M. Gupta(Eds), Soft Computing and Intelligent Systems: Theory & Applications, Academic Press, 2000.



MCA- 502

### Interactive Computer Graphics And Multimedia

- 1 Fundamentals of Computer Graphics:** Concepts and applications, Random and Raster scan devices, input-output devices: CRT, LCD, laser printer. Output primitives: Line drawing algorithm: DDA and Bresenham's; Circle generating algorithm: Bresenham's Midpoint algorithms, Ellipse: midpoint ellipse drawing algorithm. Antialiasing techniques: super sampling, pixel weighting, area sampling, pixel phasing Area filling: boundary fill algorithm, flood fill algorithm: Scan-line Polygon Fill Algorithm.
- 2 Transformation, viewing, Clipping:** 2-D Transformation: Translation, scaling, rotation, reflection, shear, matrix representation of all homogeneous coordinates, composite transformations. Two dimensional viewing: Viewing pipeline Window-to-view port transformation. Clipping operations: Line Clipping: Cohen Sutherland and Liang-barsky, Polygon Clipping: Cohen-Sutherland-Hodgeman and Weiler – Atherton Polygon clipping.
- 3 3D Transformation, Visible Surface Detection and curves:** Visible Surface detection Algorithm: Object based and image based methods, depth comparison, A-Buffer, Back face removal, Scan-line method, Depth Sorting Method Area subdivision method. 3-D Transformation: translation, scaling, rotation, reflection. Three- dimensional object representations 3-D Viewing Projections – parallel and perspective projection. Curved lines and Surfaces: Spline representations, Interpolating and approximation curves, continuity conditions Bezier curves: concept and characteristics; B-Spline curves: concept and characteristics.
- 4 Color Models and Basic Concept of Animation:** Introduction of multimedia: Properties and applications, types of medium, data stream characteristics, Basic File and Data format: BMP, JPEG, GIF, TIFF. Color models: RGB, YIQ, CMY, HSV. Animation: Basic concept, animation languages, computer-based animation, methods of controlling animation, display of animation, animation techniques: onion skinning, motion cycling, masking, morphing, and transmission of animation, Multimedia Authoring tools.
- 5 Multimedia Systems:** Data compression: storage space, coding requirements. Source, entropy and hybrid coding some basic compression technique: runlength code, Huffman code. JPEG: Image preparation, Lossy sequential DCT –based mode, expanded Lossy DCT based mode, Lossless mode, and hierarchical mode. MPEG, Huffman Encoding, LWZ compression.

#### Readings:

- 1 Principles of interactive compo Graphics; W.M. Newman & Robert F Sproull.



MCA-503

### Data Mining and Data Warehousing

1. **Data Mining:** Meaning, necessity, steps, Normal searching Vs. knowledge extraction
2. **Data Mining on different types of databases:** Relational, Data Warehouses, Transactional, Object oriented, Object relational, Spatial, Temporal and time series, Text and multimedia (i) Heterogeneous and legacy.
3. **Data Warehouse:** Meaning, definition, OLTP Vs. OLAP, Data cube, star, snow flake, constellations, basic concepts in writing of DMQL, Three Tier Architecture, Indexing.
4. **Data Preprocessing :** Noisy data, Inconsistent data, Data integration, Data transformation, Dimensionality reduction, Data compression.
5. **Classification, Clustering and Prediction:** Meaning, Neural network based classification, k-nearest neighbourhood (kNN) classifiers, Clustering, Types of Clustering, Partitioning Method: k-means clustering, Prediction using Regression and Neural Network, Performance Measures.

#### Readings:

1. Data Mining: Concepts and Techniques, Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers  
nd  
(Elsevier, 2<sup>nd</sup> edition), 2006
2. Data Mining Methods for Knowledge Discovery , Cios, Pedrycz, Swiniarski, Kluwer Academic Publishers, London – 1998.





MCA-504

**Network Security (Elective-I)**

**1. Foundations of Cryptography and security**

Security trends, The OSI Security architecture Security attack, services and mechanism

Ciphers and secret messages, Mathematical tools for cryptography: substitution techniques, modular arithmetic, Euclid's algorithm, finite fields, polynomial arithmetic.

**2. Symmetric Cipher**

Symmetric cipher model, Design Principles of Block Ciphers, Theory of Block Cipher Design, Feistel cipher network structure, Data Encryption Standard (DES), Strength of DES Triple DES ,Modes of operation. Advance encryption Standard (AES)- Evaluation criteria of AES, AES cipher ,key distribution.

**3. Public Key cryptography and Hash function**

Prime numbers and testing for primality, factoring large numbers, Principles of public key cryptosystem, RSA algorithm. Key management: Diffie-Hellman Key exchange, Hash and Message authentication Code (MAC), Hash and MAC algorithms, Digital signature.

**4. IP and Web security protocols:**

Authentication application: Kerberos, Public key infrastructure .E-mail: Pretty Good Privacy (PGP), S/MIME. IP security, Web Security: Secure Socket layer (SSL) and Transport layer security, Secure Electronic Transaction (SET).

**5. System Security: Firewall, and Intrusion Detection system (IDS), Malicious Software.**

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Department : **Computer Science and Information Technology**

Programme Name : **B.Sc(CS)**

Academic Year : **2017-18**

**List of Courses Focus on Employability/ Entrepreneurship/Skill Development**

Sr. No.	Course Code	Name of the Course
	PCSC-102	Computer Programming using C
	PCSC-302	Database Management Systems
	PCSC-401	Database Management System
	PCSC-501	Introduction to OOPs(C++)
	PCSC-503	Internet Applications
	PCSC-601	Programming with Visual Basic
	PCSC-602	Introduction to JAVA
	PCSC-603	Linux Operating System and Shell Programming
	PCSC-605	Major Project

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SYLLABUS FOR UG/PG INTEGRATED (CS) COURSE UNDER CHOICE BASED CREDIT SYSTEM (CBCS)

**Semester 1**

**Session 2017-18 (On and after)**

Sno	Subject Code	Title	Credit		Marks		Total Credits
			L	P	Internal	External	
1	PCSC-101	Fundamentals of Computers and Programming Methodology	2		20	30	2
2	PCSC-102	Introduction to Logics of Computer	2		20	30	2
3		Maths-I	3		30	45	3
4		Maths-II	3		30	45	3
5		Physics/Electronics - I	2		20	30	2
6		Physics/Electronics - II	2		20	30	2
7		Hindi	2		40	60	2
8		English	2		40	60	2
9	PCSC-103	Lab based on Computer Science		2	20	30	2
10		Lab based on Physics/Electronics		2	20	30	2
			18	4	260	390	22

**Semester 2**

Sno	Subject Code	Title	Credit		Marks		Total Credits
			L	P	Internal	External	
1	PCSC-201	Introduction to Data Structures	2		20	30	2
2	PCSC-202	Computer Programming using C	2		20	30	2
3		Maths-I	3		30	45	3
4		Maths-II	3		30	45	3
5		Physics/Electronics - I	2		20	30	2
6		Physics/Electronics - II	2		20	30	2
7		Hindi	2		40	60	2
8		English	2		40	60	2
9	PCSC-203	Lab based on Computer Science		2	20	30	2
10		Lab based on Physics/Electronics		2	20	30	2
			18	4	260	390	22

**Semester 3**

Sno	Subject Code	Title	Credit		Marks		Total Credits
			L	P	Internal	External	
1	PCSC-301	Computer Based Numerical Methods	2		20	30	2
2	PCSC-302	Database Management Systems	2		20	30	2
3		Maths-I	3		30	45	3
4		Maths-II	3		30	45	3

**गुरु घासीदास विश्वविद्यालय**  
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)  
**कोनी, बिलासपुर - 495009 (छ.ग.)**



**Guru Ghasidas Vishwavidyalaya**  
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)  
**Koni, Bilaspur - 495009 (C.G.)**

5		Physics/Electronics - I	2		20	30	2
6		Physics/Electronics - II	2		20	30	2
7		Environment - I	3		40	60	3
8	PCSC-303	Lab based on Computer Science		2	20	30	2
9		Lab based on Physics/Electronics		2	20	30	2
			17	4	220	330	21



**Semester 4**

Sno	Subject Code	Title	Credit		Marks		Total Credits
			L	P	Internal	External	
1	PCSC-401	System Analysis and Design	2		20	30	2
2	PCSC-402	Introduction to Computer Networks	2		20	30	2
3		Maths-I	3		30	45	3
4		Maths-II	3		30	45	3
5		Physics/Electronics – I	2		20	30	2
6		Physics/Electronics – II	2		20	30	2
7		Environment – I	3		40	60	3
9	PCSC-403	Lab based on Computer Science		2	20	30	2
10		Lab based on Physics/Electronics		2	20	30	2
			17	4	220	330	21

**Semester 5**

Sno	Subject Code	Title	Credit		Marks		Remarks
			L	P	Internal	External	
1	PCSC -501	Introduction to OOPS (C++)	4		20	30	4
2	PCSC-502	Introduction to Operating Systems	4		20	30	4
3	PCSC-503	Internet Applications	4		20	30	4
4	PCSC-504	Introduction to Software Engineering	4		20	30	4
5	PCSC-505	Minor Project		4		100	4
		Total	16	4	80	220	20

**Semester 6**

Sno	Subject Code	Title	Credit		Marks		Remarks
			L	P	Internal	External	
1	PCSC -601	Programming in Visual Basic	4		20	30	4
2	PCSC-602	Introduction to JAVA	4		20	30	4
3	PCSC-603	Linux Operating System and Shell Programming	4		20	30	4
4	PCSC-604	Introduction to Artificial Intelligence	4		20	30	4
5	PCSC-605	Major Project		4		100	4
		Total	16	4	80	220	20

**Total Course Credits – 126**

**\* The syllabus is subjected to change as per the requirement.**



**Subject –Computer Programming using C**  
**Paper code – PCSC-202**

**Origin & Introduction to C :** About C, Evolution of C, Structure of a C program, Compiling a C program, Simple C program, Character set in C, Keywords in C, Basic data types, Qualifiers used with basic data types, Variables in C, Type declaration, Input function, Output function and format specifiers, arithmetic operators, Unary operators, Relational and logical operators, address operator, conditional operator, Hierarchy of operators.

**Decision Making, looping & Branching:** Control statements, if statement, if else statement, for statement, while loop, do while loop, switch statement, break statement, continue statement, goto statement.

**Arrays & String Handling :** Introduction to arrays, advantages of arrays, single dimensional arrays, multidimensional arrays, array declaration, array initialization, accessing data from array, Character arrays, String Variables, Reading & writing strings, string handling functions.

**Pointers & User Defined Functions :** Introduction to pointers, pointer variables, pointers and arrays, pointers to pointers, array of pointers, 2 dimensional arrays and pointers, Introduction to functions, advantages of functions, declaring a function, calling a function, passing arguments to a function.

**Structure, Union & File Management:** Declaring structure and union **File Management:** Defining & opening a file, closing a file, I/O operations on file.

**Readings:**

- 1.A. K. Saxena, Programming Language C : Anamaya Publishers, New Delhi.
- 2.Y. Kanetkar, Let Us C, BPB Publication.
- 3.B.S. Gottfried, Schaum's outline of Theory and Problems of Programming with C, McGraw-Hill.



**Department of Computer Science & Information technology**  
**Guru Ghasidas Vishwavidyalaya, Bilaspur, C.G.**

**SYLLABUS FOR UG/PG INTEGRATED (CS) COURSE UNDER CHOICE BASED CREDIT SYSTEM (CBCS)**

**Semester 1**

Sno	Subject Code	Title	Credit		Marks		Total Credits
			L	P	Internal	External	
1	PCSC-101	Computer Science - I	2		20	30	2
2	PCSC-102	Computer Science - II	2		20	30	2
3		Maths-I	3		30	45	3
4		Maths-II	3		30	45	3
5		Physics/Electronics - I	2		20	30	2
6		Physics/Electronics - II	2		20	30	2
7		Hindi	2		40	60	2
8		English	2		40	60	2
9	PCSC-103	Lab based on Computer Science		2	20	30	2
10		Lab based on Physics/Electronics		2	20	30	2
			18	4	260	390	22

**Semester 2**

Sno	Subject Code	Title	Credit		Marks		Total Credits
			L	P	Internal	External	
1	PCSC-201	Computer Science - I	2		20	30	2
2	PCSC-202	Computer Science - II	2		20	30	2
3		Maths-I	3		30	45	3
4		Maths-II	3		30	45	3
5		Physics/Electronics - I	2		20	30	2
6		Physics/Electronics - II	2		20	30	2
7		Hindi	2		40	60	2
8		English	2		40	60	2
9	PCSC-203	Lab based on Computer Science		2	20	30	2
10		Lab based on Physics/Electronics		2	20	30	2
			18	4	260	390	22

**Semester 3**

Sno	Subject Code	Title	Credit		Marks		Total Credits
			L	P	Internal	External	
1	PCSC-301	Computer Science - I	2		20	30	2
2	PCSC-302	Computer Science - II	2		20	30	2
3		Maths-I	3		30	45	3

**गुरु घासीदास विश्वविद्यालय**  
 (केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)  
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4		Maths-II	3		30	45	3
5		Physics/Electronics - I	2		20	30	2
6		Physics/Electronics - II	2		20	30	2
7		Environment - I	3		40	60	3
8	PCSC-303	Lab based on Computer Science		2	20	30	2
9		Lab based on Physics/Electronics		2	20	30	2
			17	4	220	330	21





**Semester 4**

Sno	Subject Code	Title	Credit		Marks		Total Credits
			L	P	Internal	External	
1	PCSC-401	Computer Science - I	2		20	30	2
2	PCSC-402	Computer Science - II	2		20	30	2
3		Maths-I	3		30	45	3
4		Maths-II	3		30	45	3
5		Physics/Electronics - I	2		20	30	2
6		Physics/Electronics - II	2		20	30	2
7		Environment - I	3		40	60	3
9	PCSC-403	Lab based on Computer Science		2	20	30	2
10		Lab based on Physics/Electronics		2	20	30	2
			17	4	220	330	21

**Semester 5**

Sno	Subject Code	Title	Credit		Marks		Remarks
			L	P	Internal	External	
1	PCSC -501	Programming with Visual Basic	4		20	30	4
2	PCSC-502	Object Oriented Concepts	4		20	30	4
3	PCSC-503	Linux Operating System and Shell Programming	4		20	30	4
4	PCSC-504	Introduction to Artificial Neural Network	4		20	30	4
5	PCSC-505	Web Based Mini Project		4		100	4
		Total	16	4	80	220	20

**Semester 6**

Sno	Subject Code	Title	Credit		Marks		Remarks
			L	P	Internal	External	
1	PCSC -601	Introduction to JAVA	4		20	30	4
2	PCSC-602	Software Testing	4		20	30	4
3	PCSC-603	Introduction to Data Structure	4		20	30	4
4	PCSC-604	Management Information System	4		20	30	4
5	PCSC-605	Major Project		4		100	4
		Total	16	4	80	220	20

**Total Course Credits – 126**



**Subject -Introduction to C Language**  
**Paper code – PCSC-302**

**Origin & Introduction to C :** About C, Evolution of C, Programming languages, Structure of a C program, Compiling a C program, Simple C program, Character set in C, Keywords in C, Basic data types, Qualifiers used with basic data types, Variables in C, Type declaration, Input function, Output function and format specifiers, arithmetic operators, Unary operators, Relational and logical operators, address operator, conditional operator, Hierarchy of operators.

**Decision Making, looping & Branching:** Control statements, if statement, if else statement, for statement, while loop, do while loop, switch statement, break statement, continue statement, goto statement.

**Arrays & String Handling :** Introduction to arrays, advantages of arrays, single dimensional arrays, multidimensional arrays, array declaration, array initialization, accessing data from array, Character arrays, String Variables, Reading & writing strings, string handling functions.

**Pointers & User Defined Functions :** Introduction to pointers, pointer variables, pointers and arrays, pointers to pointers, array of pointers, 2 dimensional arrays and pointers, Introduction to functions, advantages of functions, declaring a function, calling a function, passing arguments to a function.

**Structure, Union & Enum :** **Structure:** Array of structure, array within structure, Nested structure, passing arguments and returning structure for functions. **Union:** declaring union and its usage. **Dynamic memory allocation functions** – malloc, calloc, realloc and free.

**File Management in C :** Defining & opening a file, closing a file, I/O operations on file, error handling during I/O operations.

**Readings:**

1. A. K. Saxena, Programming Language C : Anamaya Publishers, New Delhi.
2. Y. Kanetkar, Let Us C, BPB Publication.
3. B.S. Gottfried, Schaum's outline of Theory and Problems of Programming with C, McGraw-Hill.



Subject – **Database Management System**

Paper code – PCSC-401

**Introduction** : Purpose of Database System, Concept of database & its evaluation, Views of Data, Types of DBMS, DBMS architecture, Data Independency, Data Models, Data Dictionary.

**E-R Model** : Basic Concept, Design Issues, Entity Sets, Attributes & its Types, E-R Diagram, Design of an E-R Database Schema , Keys.

**Normalization** : Purpose of Normalization , Functional Dependencies, 1 NF, 2 NF and 3 NF.

**SQL** : Introduction to SQL, DDL, DML & DCL statements, Basic Operations, Aggregate function, Modification of Database, other SQL features.

**Relational Model** : Structure of Relational Model, The Relational algebra (Selection, Projection, Union, Intersection, Cartesian product, Join), Tuple relational calculus.

**Readings:**

1. Database system concepts By H.Korth and A. Silberschatz ,S.Sudarshan,TMH Publication , 2010.
2. An introduction to Database Systems by Bipin Desai, Galgotia Publications, 2003 edition.
3. An Introduction to Database Systems, C.J.Date, A.Kannan, S. Swamynathan, Pearson Publication, Eight edition, Database Management System C.J.Data



**Subject – Programming with Visual Basic**

**Paper code – PCSC-501**

**Introduction to visual Basic:** Hardware requirements, features of VB, Editions of Visual Basic, and Event Driven Programming vs procedure oriented programming. Introduction to Integrated Development Environment. Basic concepts of Visual Basic programming: Controls, properties, methods, events, forms, projects. Creating Executable files. Variables, constants, data types, data conversion function. Scope of variables Operators Control Structure: Conditional / branching statements: If...else..endif, Select case Looping statements: do.. while, for.. next, for each, exiting a loop, goto statement, msgbox and input box functions.

**Arrays & Functions:** types of arrays, array manipulation, working with standard controls. Working with control array, various key and mouse events, using drag and drop concepts. Procedure and Functions: types of function, library function, date and time function, format function, and string related function, validation function. Creating user defined function & procedure, call by value and call by reference, concept of recursion.

**Working with Advanced Controls:** toolbar, status bar, tabbed dialog controls, progress bar, animation controls, dtpicker, calendar, common dialog control. SDI & MDI Application: creating MDI application, menu editor: defining menu & popup menu, sub main, startup objects.

**Error Handling:** Types of errors, error trapping tools: watch window, local window, immediate window, debug menu, tracing program flow with call stack, the err object, error function, error handling routines: on error goto statements. File Handling: type of file handling, Sequential file handling: reading, writing and appending in file, understanding user defined data type, Random access file: reading, writing and appending in file.

**Data Access Using the ADO Data Control:** Basic concepts of relational database, visual data manager, introduction to SQL, concept of ODBC, Overview of DAO and RDO, Using DAO and RDO to access data. Data Environment: accessing data using data environment, Report Generation: Overview of Data Report, creating Data report, adding groups, using data report functions.

**Readings:**

1. Mastering Visual Basic 6 Fundamentals - By Microsoft
2. Mastering in Visual Basic - Bv BPB Publications.
3. Introduction to VB Programming – By V. K Jain
4. Visual Basic 6 Programming Black Book By Holzner Dreamtech



## Subject – Linux Operating System and Shell Programming

Paper code – PCSC-503

**Introduction to Linux:** Introduction to Linux system, History and Emergence, Features of Linux system, Different Linux distributions, Hardware Requirements for the different versions of Linux, Architecture of the Linux, Features of the Kernel and Kernel Shell relationship. Linux File System Features of Linux file system, File types and permissions, Getting started, Logging in /out with the concept of home directory. File operations and links, Commonly used commands like GREP, Find, who, ls, pwd, mv, ls, cd, df, cat, head, tail, rm, sort, grip, ps, whoami, chmod, chonn, gunzip, date, bc, tar.

**Text Processing:** Introduction to Text Processing, Vi editor, Vi Features, Vi Commands, Yanking, Running shell commands, from within Vi, Command macros, Set showmode, Set Auto Indent, Set number, Introduction to Exrcfile. Emacs editor, Emacs feature, Emacs commands, Using cut, paste and copy in Emacs, Saving buffer in Emacs.

**Introduction to Shell & Shell Programming:** Features of a Shell, Different types of a Shell, Why use more shell, Shell treatment to the command line, the environment, set, set env, path, home, ifs, mail, ps1, ps2, term, log name, profile, sty, profile file, login/ logout file, setting environment, simple shell programs, for... do, case, do while construct

**X-windows :** what is X-windows, Microsoft windows verses x-windows, windows manager, FVWM and FVWM95, twm, the client server model of x-windows, starting and stopping an X-window session. GNOME & KDE Using the GNOME & KDE desktop environment : starting the GNOME desktop environment, the GNOME panel, using the main system menu, the Gnome file manager, getting help in GNOME, using the Gnome control. A history of KDE project, starting the KDE desktop environment, exploring the Kde desktop, KDE main system menu, using file manager window, setting wallpaper, screen savers in KDE

**System Administration of Linux:** Installation & system Administration of Linux: responsibilities of a system administrator, startup and shutdown process, inittub and profile file importance, security file access permission, user and group related jobs, managing disk space, managing file system, backup and restart process.

### Readings:

1. Mastering Linux by Paul S. Wang
2. BPB publication Complete Reference Linux by Richard Petersen.



**Subject- Introduction to JAVA**

PCSC – 601

**Introduction:** Genesis of java, importance to the Internet, overview and features. **Language Basics:** Constants Variables and Primitive Data types, Operators and Expression, Decision Making and Branching statement, Decision Making and Looping, Classes, Objects and Methods, Arrays, Strings and Vectors.

**Inheritance:** Definition, Types, Method overloading and Method Overriding, super and this keywords. **Interfaces** Defining Interface, Extending Interfaces Implementing Interface.

**Packages:** Defining Packages, Java API Packages, Naming Conventions, Creating Packages, Accessing Packages Adding class to Package, CLASS PATH. **Exception handling:** Exception Types, Try, Catch & finally Blocks, Throw and Throws keywords. Creating user defined Exception.

**Multithreaded Programming:** Thread Model, Creating Threads, Thread Priority, Thread Exception, Synchronization **Input/output:** Basic Streams, Byte and Character Stream, predefined streams, reading and writing from console and files.

**Java Collection:** Introduction, Overview of Interfaces, Overview of Classes. **Introduction to AWT:** Window fundamentals, creating windowed programs working with graphics, Using AWT controls, Delegation event model handling mouse and keyboard event

*Asavens*  
HEAD  
DEPT OF CSIT  
G.G.V. BILASPUR (C.G.)



Department : **Computer Science and Information Technology**

Programme Name : **M.Sc(CS)**

Academic Year : **2017-18**

**List of Courses Focus on Employability/ Entrepreneurship/Skill Development**

Sr. No.	Course Code	Name of the Course
	MSC-202	Object Oriented Programming with C++
	MSC-204 (Elective-I(1))	Computer Networks
	MSC-205 (Elective-II(2))	Multimedia
	MSC-205 (Elective-II(3))	Linux Operating System and Shell Programming
	MSC-301	Programming in JAVA
	MSC-302	Artificial Intelligence and Expert System
	MSC-303	Relational Database Management System
	MSC-304	Web Technology
	MSC-305	Computer Network
	MSC-306	LAB based on JAVA
	MSC-401	Major Project

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**Department of Computer Science & Information Technology**  
**Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)**  
**SYLLABUS FOR MSC COURSE UNDER CHOICE BASED CREDIT SYSTEM (CBCS) \***

**Session 2017-18(on and after)**  
**M.Sc(CS)**

**Note: The decision of the GG Vishwavidyalaya for implementing CBCS system on this course shall be final, rest will remain the same.**

**Semester 1**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MSC-101	Introduction to Information Technology	4		40	60	4
2	MSC-102	Computer programming & Numerical Methods	4		40	60	4
3	MSC-103	Discrete Mathematical Structures	4		40	60	4
4	MSC-104	Data Structures using C	4		40	60	4
5	MSC-105	Computer Organization	4		40	60	4
6	MSC-106	LAB-I: Data Structure using C		1		100	1
7	MSC-107	LAB-II: Computer Hardware and Digital Electronics		1		100	1
		Total	20	02	200	500	22

**Semester 2**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MSC-201	Principles of Operating system	4		40	60	4
2	MSC-202	Object Oriented Programming with C++	4		40	60	4
3	MSC-203	Theory of Computation	4		40	60	4
4	MSC-204	Elective I	4		40	60	4
5	MSC-205	Elective II	4		40	60	4
6	MSC-206	OOP Lab (C++)		1		100	1
7	MSC-207	LAB based on Elective-II		1		100	1
		Total	20	02	200	500	22





Syllabus for MSC [on and after 2017]

**Semester 3**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MSC-301	Probability and Statistics	4		40	60	4
2	MSC-302	Artificial Intelligence	4		40	60	4
3	MSC-303	Relational Data Base Management System	4		40	60	4
4	MSC-304	Elective III	4		40	60	4
5	MSC-305	Elective IV	4		40	60	4
6	MSC-306	RDBMS LAB		1		100	1
7	MSC-307	LAB based on Elective III / IV		1		100	1
		Total	20	02	200	500	22

**Semester 4**

M.Sc. (CS)IV <sup>th</sup> Semester			
S.No.	Subject Code	Subject	Total Marks
1.	M.Sc. (CS)401	Major Project ( Viva Voce)	500
Total			500

ELECTIVES

Sl.No	Paper Code	(1)	(2)	(3)
1	MSC-204 (Eletive-I)	Computer Networks	System Analysis and Design	Introduction to Micro Processor
2	MSC-205 (Elective-II)	Object Oriented Software Engineering	Multimedia	Linux Operating System and Shell Programming
3	MSC-304 (Elective-III)	Advanced JAVA Programming	System Software	Neural Network
4	MSC-305 (Elective-IV)	Web Technology	Pattern Recognition	Compiler Design

**\* The syllabus is subjected to change as per the requirement.**



MSC-202

### Object Oriented Programming with C++

- 1. Principles of OOP:** Procedure oriented Vs Object oriented, OOP paradigm, Features of OOP ,Basic Data types Tokens, Keywords, Constant ,Variables, Operator I/O statements , Structure of C++ program, Arrays, pointers, Object modeling technique (OMT).
- 2. Function, Object and Class:** Defining class, Abstract class ,Function prototype, Function with parameter ,Passing object as a parameter, Constructor function ,Types of constructor, Destructor Friend function , Friend class, Dynamic allocation operator new and delete.
- 3. Polymorphism and Inheritance:** Types of polymorphism, Constructor overloading ,Operator overloading, Template function Template class, Types of inheritance ,Private ,protected and public derivation of class ,Resolving ambiguity Pointer to object, This pointer ,Virtual class , virtual function.
- 4. Input - output and File handling:** I/O classes ,File and stream classes ,Opening and closing file Detecting end of file, String I/O, Char I/O, Object I/O, I/O with multiple object ,File pointer, Disk I/O.
- 5. Exception handling, Name spaces and Standard Template library (STL):** Need of Exception handling ,try ,catch and throws keywords , defining namespace ,benefit of namespace, Component of STL.

#### Readings:

1. Object oriented programming with C++ by E.Balagurusamy II nd edition Tata Mc-Graw Hill.
2. Object Oriented Programmin By McGregor and Sykes S A, 1992 Van Nostrand.
3. The C++ Programming Language By Strustrp B,Addision Wasley.
4. Object Oriented Programming in C++ By Lafore R, Galgotia Publications.
5. Introduction to Object Oriented Programming By Witt KV, Galgotia Publications.
6. Object Oriented Programming By Blaschek G, Springer Verlag



**MSC-204                      ELECTIVE-I                      (1)**

**Computer Networks**

- 1. Introduction and Physical Layer :****Introduction:** Goal and application Network Hardware and Software, Protocol Hierarchies, Design Issue of the layers, Interfaces and services, Connection oriented and connection less services, Service Primitives, Reference Models – The OSI Reference model, The TCP/IP Model ,Types of computer Network :LAN,MAN,WAN, Topologies, Transmission mode .  
**Physical Layer :**Data and signal, Analog and digital Communication, Transmission Media ,Concept of data transmission, Switching Techniques ,Communication Satellites – Geosynchronous Satellite – VSAT, Low Orbit Satellites, ISDN and ATM.
- 2. Data Link Layer :** Data Link Layer design issues Data link control:Framing, Flow control. ErrorDetection and Correction. DLC protocol :Stop and Wait Protocol, Sliding window protocol, A Simplex protocol for noisy channel, Medium access sublayer: Channel allocation :static and dynamic ,Multiple access protocol FDDI, Data Link Layer in the Internet : SLIP,PPP. Wired and Wireless LAN protocol.
- 3. Network Layer :** The Network Layer Design Issue, IP addressing, Address mapping, Error reporting ,Multicasting ,Delivery, Forwarding and Routing. The Network Layer in the Internet : The IP Protocol. subnets, Internet control protocols ,internet multicasting.
- 4. Transport Layer :**The Transport layer services, The concept of client and server in terms of socket addressing Quality of service, Transport service primitives and buffering, Multiplexing, Crash Recovery. The Internet Transport Protocols (TCP/IP) – The TCP Service Model, The TCP protocol, The TCP segment header, TCP connection management, TCP transmission policy, TCP congestion control, TCP timer management, UDP.
- 5. Presentation and Application Layer :** Network Security, Traditional Cryptography, Private key cryptography and public key cryptography, Authentication protocols, DNS ,SNMP,E-mail, application layer protocols.

**Readings:**

1. Data Communications and Networking By Forouzan, Tata McGraw Hill Company.
2. Computer Networks By A.S. Tanenbaum
3. Computer Network By S.S.Shinde ,New Age International Publisher.
4. Data and computer Communication by Shashi banzal ,Firewall media
5. Internetworking with TCP/IP :Principles,protocols,and Architecture Vol 1 5<sup>th</sup> Edition ,PHI publication



**MSC-205 ELECTIVE-II (2)**

**Multimedia**

1. Introduction to Multimedia System Multimedia elements, Multimedia applications, Global structure, Technologies for Multimedia system. Multimedia: Media & Data Streams Multimedia: media & data streams, Properties, Traditional data stream characteristics, Data stream characteristics for continuous media, Information units.
2. Sound / Audio Sound Concepts, Music: MIDI Concepts, MIDI devices, MIDI messages, MIDI software, Speech: Speech generation, Speech Analysis, Speech Transmission. Image And Graphics Digital Image Representation, Image Formats, Graphics Formats, Image Processing: Image Synthesis, Image Analysis, Image Transmission.
3. Video & Animation Basic concepts, Television (Conventional systems, Enhanced definition systems, High Definition system), Computer based Animation.
4. Data Compression Storage space, Coding requirements, Source Entropy & Hybrid coding, Basic compression techniques, Introduction to following compression techniques: JPEG, H.261 (PX64), MPEG ,DVI
5. Optical Storage Media & Retrieval Technologies Basic Technology, Video Disk & other WORMS, CD ROM, CD ROM Extended Architecture, Compact Disk Magneto optical.

**Readings:**

1. Multimedia System Design By P. K. Andleigh, Kiran Thakrar.
2. Multimedia Computing Communication & Application. By Ralf Steinmetz, & Klaranashtedt. (Pearson Education).



MSC-205 ELECTIVE-II (3)

### Linux operating System and Shell Programming

- 1. INTRODUCTION TO LINUX:** History, The Linux Architecture, Features of Linux, Internal and External Commands, Command Structure, difference between Linux and Unix, various Linux distributions, basic commands. **UTILITIES:** file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, Text processing utilities and backup utilities, Security commands. The vi editor, security by file Permissions.
- 2. INTRODUCTION TO SHELLS:** Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command-Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell Edition Environment Customization. Filters. **GREP:** Operation, grep Family, Searching for File Content. **SED:** Scripts, Operation, Addresses, commands, Applications. **AWK:** Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands in awk, Applications.
- 3. INTERACTIVE KORN SHELL:** Korn Shell Features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, Options, Startup Scripts, Command History, Command Execution Process. **KORN SHELL PROGRAMMING:** Basic Script concepts, Expressions, Decisions Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.
- 4. INTERACTIVE C SHELL:** C shell features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, On-Off Variables, Startup and Shutdown Scripts, Command History, Command Execution Scripts. **C SHELL PROGRAMMING:** Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.
- 5. FILE MANAGEMENT:** File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir, closedir, mkdir, rmdir, umask.

**Readings:**



**Department of Computer Science & Information Technology**  
**Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)**  
SYLLABUS FOR M.Sc.-CS COURSE UNDER CHOICE BASED CREDIT SYSTEM (CBCS) \*

Session 2015-2016

**M.Sc- Computer Science**

Note: The decision of the GG Vishwavidyalaya for implementing CBCS system on this course shall be final, rest will remain the same.

**Semester 1**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MSC-101	Introduction to Information Technology	4		40	60	4
2	MSC-102	Programming Based Numerical Analysis	4		40	60	4
3	MSC-103	Programming in 'C' Language	4		40	60	4
4	MSC-104	Data Structure	4		40	60	4
5	MSC-105	Computer Organization	4		40	60	4
6	MSC-106	LAB-I: Programming in C		1		100	1
7	MSC-107	LAB-II: Data Structure Using C		1		100	1
		<b>Total</b>	<b>20</b>	<b>02</b>	<b>200</b>	<b>500</b>	<b>22</b>

**Semester 2**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MSC-201	Principles of Operating system	4		40	60	4
2	MSC-202	Object Oriented Programming with C++	4		40	60	4
3	MSC-203	Discrete Mathematics	4		40	60	4
4	MSC-204	Elective I(Web Technology)	4		40	60	4
5	MSC-205	Elective II(Theory of Computation)	4		40	60	4
6	MSC-206	Lab based on C++		1		100	1
7	MSC-207	Lab Based on Elective-I		1		100	1
		<b>Total</b>	<b>20</b>	<b>02</b>	<b>200</b>	<b>500</b>	<b>22</b>



**Semester 3**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MSC-301	Programming in JAVA	4		40	60	4
2	MSC-302	Artificial Intelligence and Expert Systems	4		40	60	4
3	MSC-303	Relational Data Base Management System	4		40	60	4
4	MSC-304(Elective-I)	Elective I	4		40	60	4
5	MSC-305(Elective-II)	Elective II	4		40	60	4
6	MSC-306	Lab based on JAVA		1		100	1
7	MSC-307	Lab Based on RDBMS		1		100	1
		Total	20	02	200	500	22

**Semester 4**

Sno	Subject Code	Title	Credit		Marks		Credits
			L	P	Internal	External	
1	MSC-401	Major Project	-	-	-	500	15
		Total	-	-	-	-	15

Total Course Credits – 81

Note: Electives to be decided at the start of the respective semester



MSC-301

### Programming in JAVA

- 1. Overview of JAVA :** The genesis of java, An overview of java, java virtual machine (JVM) ,Java development kit (JDK) ,Java Vs C++, Data types, Literals, Variables, and Arrays, Operators, Control statements, Introducing Class, closer look at Methods and class ,Nested and inner class ,Exploring Java.lang, String handling ,Constructor ,Garbage collection and finalize() method. Writing simple JAVA program.
- 2. Inheritance, Packages and interface-** Types of inheritance ,Access specifier ,using super, method overriding , Abstract class ,constructor in multilevel inheritance ,using final with inheritance ,Dynamic method dispatch , Defining package, CLASSPATH, Access protection ,Importing package ,Defining and implementing interface , Extending interface, Nested interface.
- 3. Exception handling and Multithreading:** Using try and catch ,multiple catch classes, Nested try statements , throw ,throws and finally ,Built in exception ,Uncaught exception , Creating own exception class , Java Thread Model: Main thread ,Creating own Thread ,Life cycle of thread, Thread priorities ,Synchronization and messaging, Interthread communication ,Suspending ,Resuming and stopping thread.
- 4. Input Output and Networking :** I/O classes: Byte stream and character stream ,Predefined stream ,reading console input, writing consol output,PrintWriter class ,Reading and writing files. **Networking :** classes and interface ,Socket and overview, TCP/IP client socket and server socket ,Inet address ,URL Connection, Datagram.
- 5. Applet ,AWT,Swing, Event handling and Advance JAVA–** Applet life cycle, Creating an applet, Using image and sound in applet ,passing parameter.Exploring AWT and introduction to Swing.Event handling – The delegation-event model , Event classes ,Source of event, Event listener interfaces ,handling mouse and keyboard event ,Adapter class.  
**Advance JAVA :** JDBC API. Servlet – Overview of servelet,Life cycle of servlet, JAVA servlet architecture Generic servlet and http servlet ,The servlet interface, Request and response.

#### Readings:

1. Java: The complete reference By Naughton P and schildt H. ,Osborne Mcgraw-Hill, Berkeley, USA, 1997.
2. Simply JAVA :An Introduction to JAVA programming By James R. Levenick ,Firewall Media publication New,Delhi
3. Java Programming By E.Balguruswami





MSC -302

### Artificial Intelligence and Expert Systems

- 1. Introduction:** Definitions and approaches, Foundation of A.I. , Challenges in AI, Area and Applications of A.I., Intelligent Agents: meaning, types, environments, examples.
- 2. Problem Solving:** Problem solving as state space search, production system, writing production system and solution for a Water jug problem; some AI classical problems (statements only) cannibal missionaries, tower of Hanoi, tic tac toe, 8-puzzle, Search techniques: Breadth First, and Depth-first, Best-First Search, Hill-climbing, Heuristics, A\* algorithm, local and global maxima(minima),
- 3. Knowledge Representation and Reasoning:** Predicate and propositional logic, conversion of sentences to wffs of predicate logic, Resolution, clause form, Skolem functions, Unification, Resolution in Propositional and predicate logic, Semantic Nets.
- 4. Pattern Recognition:** Meaning of pattern, Pattern Recognition, Classification, Supervised & Unsupervised Learning of classifiers, K-NN, K-MEANS algorithms.
- 5. Expert Systems:** Introduction, Advantages, components and participants in an expert system, Application

#### Readings:

1. Artificial Intelligence: E. Rich and K. Knight, Tata McGraw Hill.
2. Artificial Intelligence: A New Synthesis By Nilsson, Morgan Kaufmann.
3. Pattern Classification 2nd Edition By R.O. Duda, Hart, Stork (2001) ,John wiley, New York.
4. Pattern Recognition : Technique and Applications By Shinghal (2006) ,Oxford University Press,New Delhi.



MSC - 303

## RDBMS

- 1. Overview of Database Management** :Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file oriented approach verses database oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational. Introduction to distributed databases.
- 2. Relational Model** : Entity - Relationship model as a tool for conceptual design-entities attributes and relationships. ER diagrams; Concept of keys: candidate key, primary key, alternate key, foreign key; Strong and weak entities, Case studies of ER modeling Generalization; specialization and aggregation. Converting an ER model into relational Schema. Extended ER features.
- 3. Structured Query Language** :Relational Algebra: select, project, cross product different types of joins (inner join, outer joins, self join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, stand alone and embedded query languages, Introduction to SQL constructs (SELECT...FROM, WHERE... GROUP BY... HAVING... ORDERBY....), INSERT, DELETE, UPDATE, VIEW definition and use, Temporary tables, Nested queries, and correlated nested queries, Integrity constraints: Not null, unique, check, primary key, foreign key, references, Triggers. Embedded SQL and Application Programming Interfaces.
- 4. Relational Database Design** :Normalization concept in logical model; Pitfalls in database design, update anomalies: Functional dependencies, Join dependencies, Normal forms (1NF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design; Concepts of indexes, File organization for relational tables, De-normalization.
- 5. Introduction to Query Processing and Protecting the Database & Data Organizations** : Parsing, translation, optimization, evaluation and overview of Query Processing. Protecting the Data Base - Integrity, Security and Recovery. Domain Constraints, Referential Integrity, Assertion, Triggers, Security & Authorization in SQL.

### Readings:

1. Database system concept By H. Korth and A. Silberschatz, TMH.
2. Data Base Management System By Alexies & Mathews , Vikas publication.
3. Data Base Management System By C. J. Date ,Narosha Pub.



MSC-304

### Compiler Design ( Elective-I)

- 1. Basics of Compilers and Lexical Analysis:** Compilers and Translators, Bootstrap compiler, Phases of Compiler, Compiler writing tools, Bootstrapping, Overview of one pass compiler, Finite Automation, Basics of DFA, NFA, Regular sets and Regular expressions.
- 2. Syntax analysis & Parsing techniques:** Basics of context free grammars and derivation of parse trees, Top down parsing and its implementation, Operator precedence parsing, Predicative top down parser, Bottom up parsing, Handel of right sentential form, LR parser, Canonical collection of sets, Construction of parsing action and GOTO table, Construction of LALR parsing table, Handling ambiguous grammar.
- 3. Syntax directed definition and Translation:** L-attributed definition, Syntax directed translation scheme, Intermediate code generation, Representing three address statements, Syntax directed translation scheme to specify the translation of various programming language construct, Implementing increment and decrement operators, Array reference, Switch/case.
- 4. Symbol table management & Error Handling:** Various approaches to symbol table organization, Representation of scope information in symbol table, Storage allocation activation of procedure and record, Static allocation and stack allocation. Error recovery, Error recovery in LR parsing, Predicative parsing error recovery.
- 5. Code Optimization and Code Generation :** Introduction, Loop optimization, Eliminating induction variable, Eliminating local common sub expression, DAG, Eliminating global common sub expression, loop unrolling, loop jamming, Problems hindering code generation, Straight forward code generation, Using DAG for code generation, Peephole optimization.

#### Readings:

1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman. "Compilers Principles, Techniques and Tools". Pearson Education, 2008.
2. O.G. Kakde, "Compiler Design", 2005, Laxmi Publication.
3. Adesh K. Pandey "Concepts of Compiler Design", First Edition, S.K. Kataria & Sons Publication.
4. Steven S. Muchnick, "Advanced Compiler Design Implementation", Morgan Koffman, 1997.
5. Allen Holub, "Compiler Design in C", Prentice Hall of India, 1990.



### Computer Networks ( Elective-II)

- 1. Introduction and Physical Layer :Introduction:** Goal and application Network Hardware and Software , Protocol Hierarchies, Design Issue of the layers, Interfaces and services, Connection oriented and connectionless services, Service Primitives, Reference Models – The OSI Reference model, The TCP/IP Model ,Types of computer Network :LAN,MAN,WAN, Topologies, Transmission mode .  
**Physical Layer :**Data and signal, Analog and digital Communication, Transmission Media ,Concept of data transmission, Switching Techniques ,Communication Satellites – Geosynchronous Satellite – VSAT, Low Orbit Satellites, ISDN and ATM.
- 2. Data Link Layer :** Data Link Layer design issues Data link control:Framing, Flow control. Error Detection and Correction. DLC protocol :Stop and Wait Protocol, Sliding window protocol, A Simplex protocol for noisy channel, Medium access sublayer: Channel allocation :static and dynamic ,Multiple access protocol FDDI, Data Link Layer in the Internet : SLIP,PPP. Wired and Wireless LAN protocol.
- 3. Network Layer :** The Network Layer Design Issue, IP addressing, Address mapping, Error reporting ,Multicasting ,Delivery, Forwarding and Routing. The Network Layer in the Internet : The IP Protocol.subnets, Internet control protocols ,internet multicasting.
- 4. Transport Layer :**The Transport layer services, The concept of client and server in terms of socket addressing Quality of service, Transport service primitives and buffering, Multiplexing, Crash Recovery. The Internet Transport Protocols (TCP/IP) – The TCP Service Model, The TCP protocol, The TCP segment header, TCP connection management, TCP transmission policy, TCP congestion control, TCP timer management, UDP.
- 5. Presentation and Application Layer :** Network Security, Traditional Cryptography, Private key cryptography and public key cryptography, Authentication protocols, DNS ,SNMP,E-mail, application layer protocols.

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