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.)

Department	: Computer Science and Information Technology
Programme Name	**: B.Sc(CS)**

Academic Year : 2020-21

List of Courses Focus on Employability/ Entrepreneurship/Skill Development

Sr. No.	Course Code	Name of the Course
	SSCICR0101(L+P)	Programming Fundamentals using C++
	SSCIGE0101(L+P)	Introduction to Programming using C
	SSCICR0203(L+P)	Programming in JAVA
	(SSCIGE0202L)	Introduction to Internet Technologies
	(SSCICR0305L)	Internet Technologies
	SSCICR0306L	Database Management Systems
	SSCICR0307L	Computer Networks
	SSCISC0301(L+P)-A	HTML and XML Programming
	SSCISC0301(L+P)-B	UNIX / LINUX programming
	MS/CS/C-409L (SSCICR0409L)	Software Engineering
	SSCIGE0404(L+P)	Multimedia and Applications
	SSCISC0402(L+P)-A	PHP Programming
	SSCISC0402(L+P)-B	MATLAB
	PCSC-501	Introduction to Oops(++)
	PCSC-503	Internet Applications
	PCSC-505	Minor Project
	PCSC-601	Programming in Visual Basic
	PCSC-602	Introduction to JAVA

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	PCSC-603	Linux Operating System and Shell Programming
	PCSC-605	Major Project

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DEPT OF CSIT
G.G.V. BILASPUR (C.G.)

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School of Mathematical and Computational Sciences:

B.Sc. Honours Computer Science, Department of CSIT, GGV, Bilaspur

Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
1	Core-1	(SSCICR0101L)	Programming Fundamentals using C++	4	4
	Core -1 Practical	(SSCICR0101P)	Lab Based on Programming Fundamentals using C++	15.	4
	Core -2	(SSCICR0102L)	Data Structures	5	5
	Core -2 Tutorial	(SSCICR0102T)	Tutorials Based on Data Structures	1	1
	Generic Elective -1 (GE- IA)	(SSCIGE0101L)	Introduction to Programming using C	4	4
	Generic Elective - Practical	(SSCIGE0101P)	Lab Based on Introduction to Programming using C	2.	4
	Ability Enhancement Compulsory Course (AECC)	(SSCICC0101L)	English Communication / MIL (Hindi Communication)	4*	4
	ECA	(SSCIEC0101)	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/ Sports/ others	1.	(2)
			TOTAL	24	28

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Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
4.	Core-3	MS/CS /C-203L (SSCICR0203L)	Programming in JAVA	4	4
	Core -3 Practical	MS/CS /C-203P (SSCICR0203P)	Lab Based on Programming in JAVA	8.	4
	Core -4	MS/CS /C-204L (SSCICR0204L)	Discrete Structures	5	5
	Core -4 Tutorial	MS/CS /C-204T (SSCICR0204T)	Tutorial on Discrete Structures	1	1
	Generic Elective - 2 (GE-IB) Generic	MS/CS /GE-202L (SSCIGE0202L)	Introduction to Internet Technologies	4	4
	Elective - Practical Ability	MS/CS /GE-202P (SSCIGE0202P)	Lab Based on Internet Technologies	V.	4
	Enhancement Compulsory Course (AECC)	MS/CS /AE-201/ES (SSCICC0202L)	Environmental Science	4*	4
	ECA	(SSCIEC0202)	ECA-Extracurricular activity/ Tour, Field visit/ Industrial training/ NSS/ Swachhta/ vocational Training/	1.	(2)
			Sports/ others Total	24	28
SUMMER Internship: 15 days			Swayam Swachhta / NSS / Industrial/ others	2	100

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Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
	Core-5	(SSCICR0305L)	Internet Technologies	5	5
	Core -5 Tutorials	4. SSCICR0305T)	Tutorials on Internet Technologies	1	1
	Core -6		Database Management Systems	4	4
	Core -6 Practical	5. SSCICR0306L)	Lab based on Database Management System	9.	4
	Core - 7	6. SSCICR0306P)	Computer Networks	5	5
1.	Core – 7 Tutorial		Tutorial on Computer Networks	1	1
	Generic Elective -3 (GEII-A)	7. SSCICR0307L)	Introduction to Database Systems	4	4
	Generic Elective - Practical Skill Enhancement	8. SSCICR0307T)	Lab Based on Database System	24.	4
	Course (SEC -1)	9. SSCIGE0303L)	A.HTML and XML Programming 8. UNIX/LINUX Programming	25.	2
		1. SSCIGE0303P)	Total	26	30
		2. SSCISC0301L)			

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Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
IV	Core-8	MS/CS /C-408L (SSCICR0408L)	Computer System Architecture	5	5
	Core -8 Tutorials	MS/CS /C-408T (SSCICR0408T)	Tutorials on Computer System Architecture	1	1
	Core -9	MS/CS/C-409L (SSCICR0409L)	Software Engineering	4	4
	Core -9 Practical	MS/CS /C-409P (SSCICR0409P)	Lab Based on Software Engineering	2	4
	Core - 10	MS/CS /C-410L (SSCICR0410L)	Design and Analysis of Algorithms	5	5
	Core -10 Tutorials	MS/CS/C-410T (SSCICR0410L)	Tutorials on Design and Analysis of Algorithms	1	1
	Generic Elective -4 (GEII-B)	MS/CS/GE-404L (SSCIGE0404L)	Multimedia and Applications	4	4
	Generic Elective - Practical	MS/CS /GE-404P (SSCIGE0404P)	Lab Based on Multimedia and Applications	2	4
	Skill Enhancement Course (SEC - 2)	MS/CS/SEC-402 (SSCISC0402L+P)	A.PHP Programming B.MATLAB	2	2
			TOTAL	26	30

SUMMER Internship: 15 days			Swayam Swachhta / NSS / Industrial/ others	2	100

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Semester	Course Opted	Course Code	Name of the course		Hour /
V	**Core-11**	**MS/CS /C-511L (SSCICR0511L)**	**Operating System**	**5**	**5**
	Core -11 Tutorials	**MS/CS /C-511T (SSCICR0511T)**	**Tutorials based on Operating system**	**1**	**1**
	Core -12	**MS/CS /C-512L (SSCICR0512L)**	**Theory of Computation**	**5**	**5**
	Core -12 Tutorials	**MS/CS /C-512T (SSCICR0512T)**	**Tutorials on Theory of Computation**	**1**	**1**
	Discipline Specific Elective (DSE-1)	**MS/CS/DSE-501L(A) MS/CS/DSE-501L(B) (SSCIDS0501L)**	**27. Information Security B Operation Research**	**5(A) 5(B)**	**5(A) 5(B)**
	DSE-1 - Tutorials	**MS/CS/DSEP-501T(A) MS/CS/DSET-501T(B) (SSCIDS0501T)**	**28. Tutorials on Information Security B Tutorials on Operation Research**	**1(A) 1(B)**	**1(A) 1(B)**
	Discipline Specific Elective (DSE-2)	**MS/CS/DSE-502L(A) MS/CS/DSE-502L(B) (SSCIDS0502L)**	**29. Image Processing 1. Soft Computing**	**4(A) 4(B)**	**4(A) 4(B)**
	DSE-2 - Practical	**MS/CS/DSET-502P(A) MS/CS/DSEP-502P(B) (SSCIDS0502P)**	**1. Lab Based on Image Processing B Lab Based on Soft Computing**	**2(A) 2(B)**	**4(A) 4(B)**
			TOTAL	**24**	**26**

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Semester	Course Opted	Course Code	Name of the course	Credit	Hour / week
VI	Core-13	MS/CS /C-613L (SSCICR0613L)	Artificial Intelligence	5	5
	Core -13 Tutorials	MS/CS /C-613T (SSCICR0613T)	Tutorials on Artificial Intelligence	1	1
	Core -14	MS/CS/C-614L (SSCICR0614L)	Computer Graphics	4	4
	Core -14 Practical	MS/CS /C-614P (SSCICR0614T)	Lab based on Computer Graphics	2	4
	Discipline Specific Elective (DSE-3)	MS/CS/DSE-601L(A) MS/CS/DSE-601L (B) (SSCIDS0603L)	f) Big Data Analytics B Data Mining	5(A) 5(B)	5(A) 5(B)
	DSE-3 - Tutorials	MS/CS/DSET-601T(A) MS/CS/DSET-601T(B) (SSCIDS0603T)	g) Tutorials on Big Data Analytics B Tutorials on Data Mining	1(A) 1(B)	1(A) 1(B)
	Discipline Specific Elective (DSE-1) + DSE-4 – Practical Or Dissertation/ Project work followed by seminar	MS/CS/PW (SSCIDS0604)	Project work followed by seminar	4+2=6 Or 5 +1=6	8
			TOTAL	24	28
			TOTAL CREDITS	152 + 4 (SI)	

As per UGC CBCS guidelines, University / departments have liberty to offer GE and SEC courses offered by any department to students of other departments. The No. of GE course is four. One GE course is compulsory in first 4 semesters each. In present scheme it is proposed to have minimum two GE courses (from one subject) in first two semester after which student shall change two GE for another subject in IIIrd and IVth semester, so that the entire student can have exposure

of one additional subject. (Subject to approval by the competent authority)

and the function to display the message on the screen is given in another file (make use of Scanner package in this program).

16. Write a program to create a multilevel package and also creates a reusable class to generate Fibonacci series, where the function to generate fibonacii series is given in a different file belonging to the same package.

17. Write a program that creates illustrates different levels of protection in classes/subclassesbelonging to same package or different packages

18. Write a program —DivideByZero‖ that takes two numbers a and b as input, computes a/b,and invokes Arithmetic Exception to generate a message when the denominator is zero.

19. Write a program to show the use of nested try statements that emphasizes the sequence ofchecking for catch handler statements.

20. Write a program to create your own exception types to handle situation specific to your application (Hint: Define a subclass of Exception which itself is a subclass of Throwable).

21. Write a program to demonstrate priorities among multiple threads.

22. Write a program to demonstrate multithread communication by implementing synchronization among threads (Hint: you can implement a simple producer and consumerproblem).

23. Write a program to create URL object, create a URLConnection using the openConnection() method and then use it examine the different components of the URLand content.

24. Write a program to implement a simple datagram client and server in which a message thatis typed into the server window is sent to the client side where it is displayed.

25. Write a program that creates a Banner and then creates a thread to scrolls the message in thebanner from left to right across the applet_s window.

26. Write a program to get the URL/location of code (i.e. java code) and document(i.e.html file).

27. Write a program to demonstrate different mouse handling events like mouseClicked(), mouseEntered(), mouseExited(), mousePressed, mouseReleased() and mouseDragged().

28. Write a program to demonstrate different keyboard handling events.

29. Write a program to generate a window without an applet window using main() function.

30. Write a program to demonstrate the use of push buttons.

Generic Elective (GE-2) <mark>Subject – Introduction to Internet Technologies</mark> (SSCIGE0202L)

Theory: 60 lectures

Introduction to computer network: LAN, MAN, WAN, wireless LAN, internet, intranet, extranet, LAN topologies, Network devices: NIC, repeaters, hub, bridge, switch, gateway and router.

Internet Terms: Web page, Home page, website, internet browsers, URL, Hypertext,
ISP, Web server, download and upload, online and offline.

Internet Applications: www, telnet, ftp, e-mail, social networks, search engines,
Video Conferencing, e-Commerce, m-Commerce, VOIP, blogs.

Introduction to Web Design: Introduction to hypertext markup language (html) Document type definition, creating web pages, lists, hyperlinks, tables, web forms, inserting images, frames, hosting options and domain name registration. Customized Features: Cascading style sheet (css) for text formatting and other manipulations.

JavaScript Fundamentals: Data types and variables, functions, methods and events, controlling program flow, JavaScript object model, built-in objects and operators.

Reference Books:
1. Andrew S. Tanenbaum, David J. Wetherall Computer Networks (5th Edition),PHI, 2010
3.   B. A. Forouzan, Data Communication and Networking , TMH,2003.
4. D.R. Brooks, An Introduction to HTML and Javascript for Scientists and Engineers, Springer W. Willard,2009
5. HTML A Beginner's Guide, Tata McGraw-Hill Education, 2009.
6. J. A. Ramalho, Learn Advanced HTML 4.0 with DHTML, BPB Publications, 2007

Internet Technologies Lab Practical: 15 lectures (SSCIGE0202P)

Practical exercises based on concepts listed in theory using HTML.

2. **Create HTML document with following formatting – Bold, Italics, Underline, Colors, Headings, Title, Font and Font Width, Background, Paragraph, Line Brakes, Horizontal Line, Blinking text as well as marquee text.**

3. **Create HTML document with Ordered and Unordered lists, Inserting Images, Internaland External linking**

4. **Create HTML document with Table:**

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Some image here

5. **Create Form with Input Type, Select and Text Area in HTML.**

6. **Create an HTML containing Roll No., student_s name and Grades in a tabular form.**

7. **Create an HTML document (having two frames) which will appear as follows:**

About	This frame would show the contents according to the link clicked by the user on the left frame.
Department 1	
Department 2	
Department 3	

7. **Create an HTML document containing horizontal frames as follows:**

Department Names (could be along with Logos)
Contents according to the Link clicked

9. **Create a website of 6 – 7 pages with different effects as mentioned in above problems.**

10. **Create HTML documents (having multiple frames) in the following three formats:**

Frame2

Frame1

Frame2	Frame3

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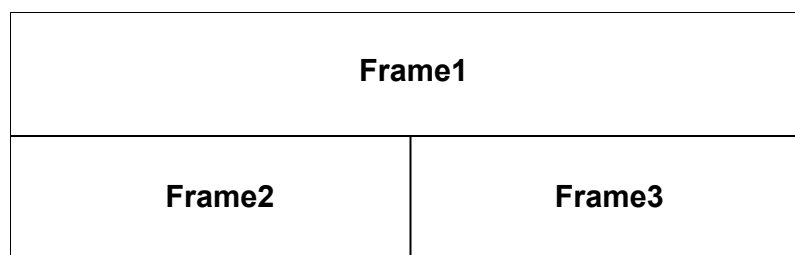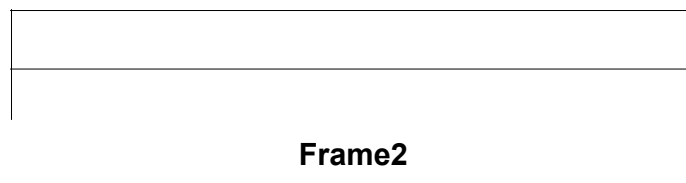
10. Create a form using HTML which has the following types of controls:

- W.   Text Box
- VI.   Option/radio buttons
- VII.   Check boxes
- VIII. Reset and Submit buttons

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List of Practicals using Javascript :

Create event driven program for following:

2. **Print a table of numbers from 5 to 15 and their squares and cubes using alert.**
3. **Print the largest of three numbers.**
4. **Find the factorial of a number n.**
5. Enter a list of positive numbers terminated by Zero. Find the sum and average of these numbers.
6. **A person deposits Rs 1000 in a fixed account yielding 5% interest. Compute the amount in the account at the end of each year for n years.**
7. Read n numbers. Count the number of negative numbers, positive numbers and zeros in the list.

COMPUTER SCIENCE (C-V): Internet Technologies Theory: 60 Lectures

Java   **(5 lectures)**
Use of Objects, Array and ArrayList class

JavaScript   **(15 lectures)**

Data types, operators, functions, control structures, events and event handling.

JDBC   **(10 lectures)**

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JDBC Fundamentals, Establishing Connectivity and working with connection interface, Working with statements, Creating and Executing SQL Statements, Working with Result Set Objects.

JSP   (20 lectures)

Introduction to JavaServer Pages, HTTP and Servlet Basics, The Problem with Servlets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC, Setting Up the JSP Environment, Implicit JSP Objects, Conditional Processing, Displaying Values, Using an expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Database Access.

Java Beans   (10 Lectures)

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Java Beans Fundamentals, JAR files, Introspection, Developing a simple Bean, Connecting to DB

Recommended Books:

2. Ivan Bayross, Web Enabled Commercial Application Development Using Html, Dhtml,javascript, Perl Cgi , BPB Publications, 2009.
3. Cay Horstmann, BIG Java, Wiley Publication , 3rd Edition., 2009
4. Herbert Schildt , Java 7, The Complete Reference, , 8th Edition, 2009.
5. Jim Keogh ,The Complete Reference J2EE, TMH, , 2002.
6. O'Reilly , Java Server Pages, Hans Bergsten, Third Edition, 2003.

COMPUTER SCIENCE (CORE -V): Internet Technologies Tutorial Tutorial : 15 lectures

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COMPUTER SCIENCE (C-VI): Database Management Systems Theory: 60 Lectures

Lectures

1. Introduction (6)

Characteristics of database approach, data models, database system architecture and data Independence.

2. Entity Relationship(ER) Modelling (8 Lectures)

Entity types, relationships, constraints.

3. Relation data model (20 Lectures)

Relational model concepts, relational constraints, relational algebra, SQLqueries

4. Database design (15 Lectures)

Mapping ER/EER model to relational database, functional dependencies,Lossless decomposition, Normalforms(upto BCNF).

5. Transaction Processing (3 Lectures)

ACID properties, concurrency control

6. File Structure and Indexing (8 Lectures)

Operations on files, File of Unordered and ordered records, overview of File organizations, Indexing structures for files(Primary index, secondary index, clustering index), Multilevel

+

indexing using B and B trees.

Books Recommended:

1. R. Elmasri, S.B. Navathe, Fundamentals of Database Systems 6th Edition, Pearson Education, 2010.
2. R. Ramakrishanan, J. Gehrke, Database Management Systems Edition, McGraw-Hill, 3rd 2002.
3. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.

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10.   R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education,2013.

COMPUTER SCIENCE LAB (C-VI): Database Management SystemsLab
Practical: 60 Lectures

Create and use the following database schema to answer the given queries.

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EMPLOYEE Schema

Field	Type	NULL	KEY	DEFAULT
Eno	Char(3)	NO	PRI	NIL
Ename	Varchar(50)	NO		NIL
Job_type	Varchar(50)	NO		NIL
Manager	Char(3)	Yes	FK	NIL
Hire_date	Date	NO		NIL
Dno	Integer	YES	FK	NIL
Commission	Decimal(10,2)	YES		NIL
Salary	Decimal(7,2)	NO		NIL

DEPARTMENT Schema

Field	Type	NULL	KEY	DEFAULT
Dno	Integer	No	PRI	NULL
Dname	Varchar(50)	Yes		NULL
Location	Varchar(50)	Yes		New Delhi

Query List

3. Query to display Employee Name, Job, Hire Date, Employee Number; for each employee withthe Employee Number appearing first.

4. Query to display unique Jobs from the Employee Table.

5. Query to display the Employee Name concatenated by a Job separated by a comma.

6. Query to display all the data from the Employee Table. Separate each Column by a comma andname the said column as THE_OUTPUT.

7. Query to display the Employee Name and Salary of all the employees earning more than $2850.

8. Query to display Employee Name and Department Number for the Employee No= 7900.

9. Query to display Employee Name and Salary for all employees whose salary is not in the

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rangeof $1500 and $2850.

9. Query to display Employee Name and Department No. of all the employees in Dept 10 andDept 30 in the alphabetical order by name.

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10. Query to display Name and Job of all employees who don_t have a current Manager.

11. Query to display the Name, Salary and Commission for all the employees who earncommission.

12. Sort the data in descending order of Salary and Commission.

13. Query to display Name of all the employees where the third letter of their name is _A_.

14. Query to display Name of all employees either have two _R_s or have two _A_s in theirname and are either in Dept No = 30 or their Manger_s Employee No = 7788.

15. Query to display Name, Salary and Commission for all employees whose Commission Amountis 14 greater than their Salary increased by 5%.

16. Query to display the Current Date.

17. Query to display Name, Hire Date and Salary Review Date which is the 1st Monday after sixmonths of employment.

18. Query to display Name and calculate the number of months between today and the date eachemployee was hired.
19. Query to display the following for each employee <E-Name> earns < Salary> monthly butwants < 3 * Current Salary >. Label the Column as Dream Salary.

20. Query to display Name with the 1st letter capitalized and all other letter lower case and lengthof their name of all the employees whose name starts with _J_, _A_ and _M_.

21. Query to display Name, Hire Date and Day of the week on which the employee started.

22. Query to display Name, Department Name and Department No for all the employees.

23. Query to display Unique Listing of all Jobs that are in Department # 30.

24. Query to display Name, Dept Name of all employees who have an _A_ in their name.

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26. **Query to display Name, Job, Department No. And Department Name for all the employeesworking at the Dallas location.**

27. **Query to display Name and Employee no. Along with their Manger_s Name and the Manager_semployee no; along with the Employees_ Name who do not have a Manager.**

28. **Query to display Name, Dept No. And Salary of any employee whose department No. and salary matches both the department no. And the salary of any employee who earns acommission.**

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30. **Query to display Name and Salaries represented by asterisks, where each asterisk (*)signifies $100.**

31. **Query to display the Highest, Lowest, Sum and Average Salaries of all the employees**

32. **Query to display the number of employees performing the same Job type functions.**

33. **Query to display the no. of managers without listing their names.**

34. **Query to display the Department Name, Location Name, No. of Employees and theaverage salary for all employees in that department.**

35. **Query to display Name and Hire Date for all employees in the same dept. as Blake.**

36. **Query to display the Employee No. And Name for all employees who earn more thanthe average salary.**

37. **Query to display Employee Number and Name for all employees who work in a department with any employee whose name contains a _T_.**

38. **Query to display the names and salaries of all employees who report to King.**

39. **Query to display the department no, name and job for all employees in the Sales department.**

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COMPUTER SCIENCE (C-VII): Computer Networks Theory: 60 Lectures

1. Introduction to Computer Networks   (8 Lectures)

Network definition; network topologies; network classifications; network protocol; layered network architecture; overview of OSI reference model; overview of TCP/IP protocol suite.

2. Data Communication Fundamentals and Techniques   (10 Lectures)
Analog and digital signal; data-rate limits; digital to digital line encoding schemes; pulse code modulation; parallel and serial transmission; digital to analog modulation-; multiplexing techniques- FDM, TDM; transmission media.

3. Networks Switching Techniques and Access mechanisms (10 Lectures) Circuit switching; packet switching- connectionless datagram switching, connection-orientedvirtual circuit switching; dial-up modems; digital subscriber line;
cable TV for data transfer.

4. Data Link Layer Functions and Protocol   (10 Lectures)

Error detection and error correction techniques; data-link control- framing and flow control; error recovery protocols- stop and wait ARQ, go-back-n ARQ; Point to Point Protocol on Internet.

5. Multiple Access Protocol and Networks   (5 Lectures)

CSMA/CD protocols; Ethernet LANS; connecting LAN and back-bone networks- repeaters, hubs, switches, bridges, router and gateways; Routing; routing algorithms; network layer protocol of Internet –IP protocol, Internet control protocol. Transport services-error and flow control, Connection establishment and release- three way handshake.

8. Overview of Application layer protocol   (5 Lectures)

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Overview of DNS protocol; Overview of WWW &HTTP protocol.

Reference Books
2. B. A. Forouzan: Data Communications and Networking, Fourth edition, THM ,2007.
3. A. S. Tanenbaum: Computer Networks, Fourth edition, PHI , 2002

COMPUTER SCIENCE (C-VII): Computer Networks Tutorial   Tutorial : 15 lectures

Generic Elective -3 (GE- 3A)   Subject – Introduction to Database System

Theory: 60 lectures

Database: Introduction to database, relational data model, DBMS architecture, data 14L independence, DBA, database users, end users, front end tools

E-R Modeling: Entity types, entity set, attribute and key, relationships, relation 14L types, E- R diagrams, database design using ER diagrams

Relational Data Model: Relational model concepts, relational constraints, primary 14L

and foreign key, normalization: 1NF, 2NF, 3NF

Structured Query Language: SQL queries, create a database table, create 18L relationships between database tables, modify and manage tables, queries, forms, reports, modify, filter and view data.

Reference Books :
2. P. Rob, C. Coronel, Database System Concepts by, Cengage Learning India, 2008
3. R. Elmsasri,S. Navathe Fundamentals of Database Systems, Pearson
   Education, Fifth Edition, 2007
4. MySQL : Reference Manual

Generic Elective (GE- 3) LAB : Database System Practical

Practical : 15 Lectures

Introduction to Database System Lab   Practical: 15 lectures
2) Create a database having two tables with the specified fields, to computerize a librarysystem of a Delhi University College.
   LibraryBooks (Accession number, Title, Author, Department, PurchaseDate, Price) IssuedBooks (Accession number, Borrower)
   a) Identify primary and foreign keys. Create the tables and insert at least 5 records ineach table.
   b) Delete the record of book titled —Database System Concepts‖.
   c) Change the Department of the book titled —Discrete Maths‖ to —CS‖.
   d) List all books that belong to —CS‖ department.
   e) List all books that belong to —CS‖ department and are written by author —Navathe‖.

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h) List all computer (Department=‖CS‖) that have been issued.

i) List all books which have a price less than 500 or purchased between —01/01/1999‖land —01/01/2004‖.

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in your college.

Personal information about Student (College roll number, Name of student, Date of birth, Address, Marks(rounded off to whole number) in percentage at 10 + 2, Phone number) Paper Details (Paper code, Name of the Paper)
Student's Academic and Attendance details (College roll number, Paper code, Attendance, Marks in home examination).

h) Identify primary and foreign keys. Create the tables and insert at least 5 records ineach table.

i) Design a query that will return the records (from the second table) along with the name of student from the first table, related to students who have more than 75%attendance and more than 60% marks in paper 2.

j) List all students who live in —Delhi‖ and have marks greater than 60 in paper 1.

k) Find the total attendance and total marks obtained by each student.

l) List the name of student who has got the highest marks in paper 2.

2) Create the following tables and answer the queries given below:Customer (CustID, email, Name, Phone, ReferrerID)
Bicycle (BicycleID, DatePurchased, Color, CustID, ModelNo) BicycleModel (ModelNo, Manufacturer, Style)
Service (StartDate, BicycleID, EndDate)

a) Identify primary and foreign keys. Create the tables and insert at least 5 records in eachtable.

b) List all the customers who have the bicycles manufactured by manufacturer —Honda‖.

c) List the bicycles purchased by the customers who have been referred by customer —C1‖.

d) List the manufacturer of red colored bicycles.

e) List the models of the bicycles given for service.

3) Create the following tables, enter at least 5 records in each table and answer the queries given below.
EMPLOYEE (Person_Name, Street, City)
WORKS (Person_Name, Company_Name, Salary)COMPANY (Company_Name, City)
MANAGES (Person_Name, Manager_Name)

a) Identify primary and foreign keys.

b) Alter table employee, add a column —email‖ of type varchar(20).

c) Find the name of all managers who work for both Samba Bank and NCB Bank.

d) Find the names, street address and cities of residence and salary of all employees who work for —Samba Bank‖ and earn more than $10,000.

e) Find the names of all employees who live in the same city as the company for which they work.

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f) Find the highest salary, lowest salary and average salary paid by each company.

g) Find the sum of salary and number of employees in each company.

h) Find the name of the company that pays highest salary.

4) **Create the following tables, enter at least 5 records in each table and answer the queries given below.**

Suppliers (SNo, Sname, Status, SCity)Parts (PNo, Pname, Colour, Weight, City) Project (JNo, Jname, Jcity) Shipment (Sno, Pno, Jno, Qunatity)

a) Identify primary and foreign keys.

b) Get supplier numbers for suppliers in Paris with status>20.

c) Get suppliers details for suppliers who supply part P2. Display the supplier list in increasing order of supplier numbers.

d) Get suppliers names for suppliers who do not supply part P2.

e) For each shipment get full shipment details, including total shipment weights.

f) Get all the shipments where the quantity is in the range 300 to 750 inclusive.

g) Get part nos. for parts that either weigh more than 16 pounds or are supplied by suppliers S2, or both.

h) Get the names of cities that store more than five red parts.

i) Get full details of parts supplied by a supplier in London.

j) Get part numbers for part supplied by a supplier in London to a project in London.

k) Get the total number of project supplied by a supplier (say, S1).

l) Get the total quantity of a part (say, P1) supplied by a supplier (say, S1).

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SKILL ENHANCEMENT COURSE (SEC-1) A HTML and XML programming

Tutorials:60

HTML Programming

- **Unit-I: Introduction** (1L)
- **Unit-II: The Basics** (2L)
  - o The Head, the Body
  - o Colors, Attributes
  - o Lists, ordered and unordered

- **Unit-III:** (3L)

Links
  - o **Introduction**
  - o **Relative Links, Absolute Links**
  - o Link Attributes
  - o Using the ID Attribute to Link Within a Document

- **Unit-IV:** (2L)

Images
  - o **Putting an Image on a Page**
  - o Using Images as Links
  - o Putting an Image in the Background

- **Unit V: – Tables** (4L)
  - o **Creating a Table**
  - o Table Headers
  - o Captions

  - o Spanning Multiple Columns o Styling Table

- **Unit VI – Forms** (3L)
  - o **Basic Input and Attributes**
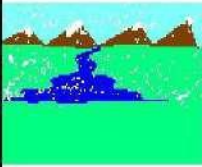 - o **Other Kinds of Inputs** o

  - o **Where To Go From Here**

Book Recommended:

1. **Virginia DeBolt , Integrated HTML and CSS A Smarter, Faster Way to Learn Wiley / Sybex , 2006**
2. **Cassidy Williams, Camryn Williams Introduction to HTML and CSS, O'Reilly, 2015**

Software Lab Based on HTML:

Q.1 Create an HTML document with the following formatting options:
  - I. **Bold**
  - II. **Italics**

  - V. **Font (Type, Size and Color)**

  - X. **Pre tag**

    - I. **Ordered List**
    - II. **Unordered List**
    - III. **Nested List**
    - IV. **Image**

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XYZ Ltd's Update

1. Introduction
2. Company Financial Update
   o First Quarter
   o Second Quarter
   o Third Quarter
   o Fourth Quarter
3. Advertising Update
   o Result of Newspaper Campaign
   o Additions to staff
   o New Thoughts on Television
4. Human Resources Update

A. Saftey Considerations
   1. Body substance isolation
   2. Sense safty
   3. Initial size-up
B. Intitial Patient Assessment
   1. General Impression
   2. Unresponsiveness
      i. Alert to person, place and time
      ii. Verbal response to audible stimuli
      iii. Pain evokes verbal or physical response
      iv. Unresponsive to all stimuli
C. Patient Critical Needs
   1. Airway
   2. Breathing
      i. Use oxygen if indicated
      ii. Consider use of assisting with bag value mask
   3. Circulation
   4. Bleeding

Q.3 Create an HTML document which implements Internal linking as well as External linking. Q.4
Q4 Create a table using HTML which consists of columns for Roll No., Student_s name and grade.

Result		
Roll No.	Name	Grade

Q.5   Create a Table with the following view:

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Q.6   **Place an image here**

Create a form using HTML which has the following types of controls:
   I.   **Text Box**
   II.   **Option/radio**
 buttons III. Check boxes
   IV.   **Reset and Submit buttons**

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Interested in receiving daily small updates of all latest News? Well, now you can. And best of all, it is free! Just fill out this form and submit it by clicking the "send it In" button. We will put you on our mailing list and you will receive your first email in 3-5 days.

Please fill the following boxes to help us send the emails and our news letter:
First Name: [   ]
Last Name: [   ]
Business: [   ]
We must have a correct e-mail address to send you the news letter:
Email: [   ]
How did you hear about XYZ News Magazine and Emails?
⦿ Here on the Web ○ In a magazine ○ Television ○ Other
Would you like to be on our regular mailing list?
☑ Yes, we love junk emails

[Reset] [Send it in!]

Q.7   **Create HTML documents (having multiple frames) in the following three formats:**

Frame1
Frame2

Frame1	
Frame2	Frame3

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4. XML Programming

Introduction: Understanding Mark-up Languages, Introduction to
    XML and its Goals. (3L)
XML Basics: XML Structure and Syntax, Document
    classes and Rules. (5L)
Other XML Concepts: Scripting XML, XML as Data,
    Linkingwith XML. (4L)

XML with Style: XSL –Style Sheet Basics, XSL
    basics, XSL style sheets. (3L)

Books Recommended
1. **XML in action web technology by William J. Pardi**
2. **Step by Step XML by Michael J. Young**

Software Lab Based on XML:

Exercise #1 – Information Structure

In this exercise, student will practice identifying the structure of an

information object. For the sample document provided below:

 Label the information structures you see, including containing structures.

1. Draw a tree representation of the structure.


```
Bathe cat
Vacuum house
Pay bills
Buy groceries
```
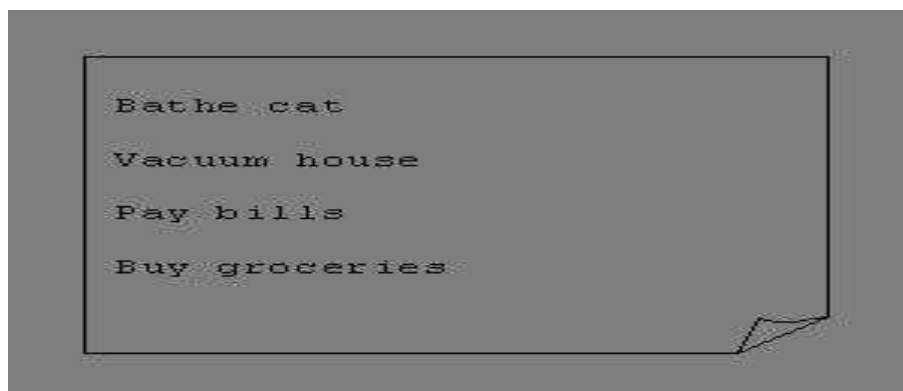
Exercise 2# Deconstructing an XML Document

In this exercise, student will practice identifying the explicit structure within an XML document. In a sense, this is the reverse of what you did in Exercise #1. For the sample XML markup below, create a document-like representation (or a simple drawing) for the content contained within the XML tags:

<book>

<coverInfo>

   <title>The XML Handbook</title>

   <author>Charles F. Goldfarb</author>

   <author>Paul Prescod</author>

   <edition>Second</edition>

```
<description>The definitive XML resource: applications, products, and
technologies. Revised and expanded—over 600 new pages.
</description>

</coverInfo>

</book>
```

Exercise #3 – Creating XML Markup

In this exercise, create some XML markup based on the tree representation
from Exercise #1 above, and the content from the original sample document.

Exercise #4 – Well-Formedness

This exercise checks your understanding of the constraints for well-formedness.
Are the following document instances well-formed? Explain any NO answers.

```
<list><title>The first list</title><item>An item</list>
```

```
<item>An item</item><item>Another item</item>
```

```
<para>Bathing a cat is a <emph>relatively</emph> easy task as long as the cat is
```

```
willing.</para> <bibl><title>How to Bathe a Cat<author></title>Merlin Bauer<author></bibl>
```

Exercise #5-Well Formedness

This exercise is a bit more challenging than the previous example. Here is a
fragment of an XML document instance. Identify all the places where it fails to
match the constraints for well-formedness.

```
<PROCEDURE><TITLEHow to Bathe a
```

```
Cat</TITLE> <OVERVIEW>
```

This procedure tells you how to bathe a cat. `<WARNING></OVERVIEW>`Cats don't like to
take baths. You could get hurt doing this. Be sure to obtain all the required protective gear
before you start. `</WARNING><EQUIPEMENT><ITEM>`Hockey Mask `<ITEM>`Padded Full-
body Kevlar Armor`</ITEM><ITEM>`Tub full of warm water`</ITEM><ITEM>`Towels
`</ITEM><ITEM>`First Aid kit`</ITEM><ITEM>`Cat Shampoo`</ITEM>`
`<EQUIPMENT><INSTRUCTIONS> <STEP>` Locate the cat, who by now is hiding under the
bed.`</STEP><STEP>`Place the cat in the tub of water.`</STEP> <ITEM>`Using the First Aid
kit, repair the damage to your head and arms.`</STEP> <STEP>`Place the cat back in the tub
and hold it down.`</STEP> <STEP>`Wash it really fast, then make an effort to dry it with the
towels.`</STEP> <STEP>`Decide not to do this again. `</STEP> </INSTRUCTIONS>`

Note: Cover more exercises based on XML Programming theory concepts.

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Skill Enhancement Course (SEC ==Linux / Unix Programming==
- 1) B S==yllabus==

- [ ] **What is linux/unix Operating systems   (5L)**
- [ ] **Difference between linux/unix and other operating systems**
- [ ] **Features and Architecturee**
- [ ] **Various Distributions avaailable in the market**
- [ ] **Installation, Booting and shutdown process**

- [ ] **System processes (an oveerview)**
- [ ] **External and internal commmands**
- [ ] **Creation of partitions in OS**
- [ ] **Processes and its creation phases – Fork, Exec, wait**
  User Management and the File System   (5 L)
- [ ] **Types of Users, Creating users, Granting rights**
- [ ] **User management commaands**
- [ ] **File quota and various filee systems available**
- [ ] **File System Management and Layout, File permissions**
- [ ] **Login process, Managing Disk Quotas**
- [ ] **Links (hard links, symbollic links)**

- [ ] **Shell introduction and Shell Scripting (6L)**
  What is shell and various type of shell, Various editors present in linuxx [ ] **Different modes of operattion in vi editor**
- [ ] **What is shell script, Writiing and executing the shell script**
- [ ] **Shell variable (user defineed and system variables)**
- [ ] **System calls, Using system calls**
- [ ] **Pipes and Filters**
- [ ] **Decision making in Shell Scripts (If else, switch), Loops in shell**
- [ ] **Functions**
- [ ] **Utility programs (cut, paste, join, tr , uniq utilities)**
- [ ] **Pattern   matching utility   (grep)**

  Reference Books:

  1. **Sumitabha, Das, Unix Concepts And Applications, Tata McGraw-Hiill Education, 2006**

  2. **Michael Jang RHCSA/ RHCE Red Hat Linux Certification: Exams (EEx200 & Ex300) (Certification Press), 2011**

  3. **Nemeth Synder & Heinn, Linux Administration Handbook, Pearson Education, 2nd Edition ,2010**

  4.**W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Unix Network**

  Programming, The sockets Networking API, Vol. 1, 3rd Edition,2014

Software Lab Based on Linux:

1. **Write a shell script to cheeck if the number entered at the command line is prime or not.**
2. Write a shell script to modify —calll command to display calendars of the specified months.
3. **Write a shell script to modify —calll command to display calendars of the specified rangeof months.**
4. **Write a shell script to accept a login name. If not a valid login name diisplay message –**

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―Entered login name is invalid‖.

5. Write a shell script to display date in the mm/dd/yy format.

6. Write a shell script to display on the screen sorted output of ―who‖ command along withthe total number of users .

7. Write a shell script to display the multiplication table any number,

8. Write a shell script to compare two files and if found equal asks the user to delete theduplicate file.

9. Write a shell script to find the sum of digits of a given number.

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10. Write a shell script to merge the contents of three files, sort the contents and then displaythem page by page.
11. Write a shell script to find the LCD(least common divisor) of two numbers.
12. Write a shell script to perform the tasks of basic calculator.
13. Write a shell script to find the power of a given number.
14. Write a shell script to find the binomial coefficient C(n , x).
15. Write a shell script to find the permutation P(n,x).
16. Write a shell script to find the greatest number among the three numbers.
17. Write a shell script to find the factorial of a given number.
18. Write a shell script to check whether the number is Armstrong or not.
19. Write a shell script to check whether the file have all the permissions or not.
20. Write a program to show the pyramid of special character —*.

DSE-2(A) Digital Image Processing

Theory: 60 Lectures

1. Introduction   (6 Lectures)
Light, Brightness adaption and discrimination, Pixels, coordinate conventions, Imaging Geometry, Perspective Projection, Spatial Domain Filtering, sampling and quantization.

2. Spatial Domain Filtering   (7 Lectures)
Intensity transformations, contrast stretching, histogram equalization, Correlation and convolution, Smoothing filters, sharpening filters, gradient and Laplacian.

3. Filtering in the Frequency domain   (8 Lectures)
Hotelling Transform, Fourier Transforms and properties, FFT (Decimation in Frequency and Decimation in Time Techniques), Convolution, Correlation, 2-D sampling, Discrete Cosine Transform, Frequency domain filtering.

4. Image Restoration   (8 Lectures)
Basic Framework, Interactive Restoration, Image deformation and geometric transformations, image morphing, Restoration techniques, Noise characterization, Noise restoration filters, Adaptive filters, Linear, Position invariant degradations, Estimation of Degradation functions, Restoration from projections.

5. Image Compression   (10 Lectures)
Encoder-Decoder model, Types of redundancies, Lossy and Lossless compression, Entropy of an information source, Shannon's 1st Theorem, Huffman Coding, Arithmetic Coding, Golomb Coding, LZW coding, Transform Coding, Sub-image size selection, blocking artifacts, DCT implementation using FFT, Run length coding, FAX compression (CCITT Group-3 and Group-4), Symbol-based coding, JBIG-2, Bit-plane encoding, Bit-allocation, Zonal Coding, Threshold Coding, JPEG, Lossless predictive coding, Lossy predictive coding, Motion Compensation

6. Wavelet based Image Compression   (5 Lectures)
Expansion of functions, Multi-resolution analysis, Scaling functions, MRA refinement equation, Wavelet series expansion, Discrete Wavelet Transform (DWT), Continuous Wavelet Transform, Fast Wavelet Transform, 2-D wavelet Transform, JPEG-2000 encoding, Digital Image Watermarking.

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7. Morphological Image Processing (7 Lectures)

Basics, SE, Erosion, Dilation, Opening, Closing, Hit-or-Miss Transform, BoundaryDetection, Hole filling, Connected components, convex hull, thinning, thickening, skeletons,pruning, Geodesic Dilation, Erosion, Reconstruction by dilation and erosion.

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8. Image Segmentation   (9 Lectures)

Boundary detection based techniques, Point, line detection, Edge detection, Edge linking, local processing, regional processing, Hough transform, Thresholding, Iterative thresholding, Otsu's method, Moving averages, Multivariable thresholding, Region-based segmentation, Watershed algorithm, Use of motion in segmentation

Reference Books

1. R C Gonzalez , R E Woods, Digital Image Processing, 3rd Edition, Pearson Education.2008.
2. A K Jain, Fundamentals of Digital image Processing, Prentice Hall of India.1989.
3. K R Castleman, Digital Image Processing, Pearson Education.1996
4. Schalkoff, Digital Image Processing and Computer Vision, John Wiley and Sons.1989.
5. Rafael C. Gonzalez, Richard E. Woods, Steven Eddins,' Digital Image Processing using MATLAB', Pearson Education, Inc., 2004.

Digital Image Processing Lab
Practical: 60 Lectures

1. Write program to read and display digital image using MATLAB or SCILAB
   a. Become familiar with SCILAB/MATLAB Basic commands
   b. Read and display image in SCILAB/MATLAB
   c. Resize given image
   d. Convert given color image into gray-scale image
   e. Convert given color/gray-scale image into black & white image
   f. Draw image profile
   g. Separate color image in three R G & B planes
   h. Create color image using R, G and B three separate planes
   i. Flow control and LOOP in SCILAB
   j. Write given 2-D data in image file

2. To write and execute image processing programs using point processing method
   a. Obtain Negative image
   b. Obtain Flip image
   c. Thresholding
   d. Contrast stretching

3. To write and execute programs for image arithmetic operations
   a. Addition of two images
   b. Subtract one image from other image
   c. Calculate mean value of image
   d. Different Brightness by changing mean value

4. To write and execute programs for image logical operations
   a. AND operation between two images
   b. OR operation between two images
   c. Calculate intersection of two images
   d. Water Marking using EX-OR operation

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    e. NOT operation (Negative image)

5. To write a program for histogram calculation and equalization using
    a. Standard MATLAB function
    b. Program without using standard MATLAB functions
    c. C Program

6. To write and execute program for geometric transformation of image
    a. Translation
    b. Scaling
    c. Rotation
    d. Shrinking
    e. Zooming

7. To understand various image noise models and to write programs for
    a. image restoration
    b. Remove Salt and Pepper Noise
    c. Minimize Gaussian noise
    d. Median filter and Weiner filter

8. Write and execute programs to remove noise using spatial filters
    a. Understand 1-D and 2-D convolution process
    b. Use 3x3 Mask for low pass filter and high pass filter

9. Write and execute programs for image frequency domain filtering
    a. Apply FFT on given image
    b. Perform low pass and high pass filtering in frequency domain
    c. Apply IFFT to reconstruct image

10. Write a program in C and MATLAB/SCILAB for edge detection using different edge detection mask

11. Write and execute program for image morphological operations erosion and dilation.

12. To write and execute program for wavelet transform on given image and perform

inversewavelet transform to reconstruct image.

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DSE-2(B) Soft Computing

Tutorials on DSE-2(B) Soft Computing

Introduction: Hard computing, Soft Computing, Definition. Advantages and applications of neural networks, Artificial neural network, Biological neural network, Biological neuron vs artificial neuron, evolution of neural networks. Basic models of ANN : connections, supervised learning, unsupervised and reinforcement learning, activation functions, terminologies of ANN : weights, bias, threshold, learning rate, momentum factor. McCulloch-Pitts neuron, Linear separability, Nonlinear separability, Hebb Network, Perceptron Networks : theory, learning rule, architecture, training algorithm for single output classes, training algorithm for multiple output classes, testing algorithm, Adaline, Multiple adaptive linear neurons, Back propagation network, Functional link artificial neural network(FLANN), Radialbasis function network(RBFN).

Introduction to Fuzzy logic, classical sets and Fuzzy sets, classical relation and Fuzzy relations, Membership functions, defuzzification, Fuzzy Inference systems.

Genetic algorithm : Encoding, types of selection, crossover and its types, mutation and its types, cost function, flow chart, algorithm for function optimization, real coded genetic algorithm.

Books:

1. **Neural Networks and Learning Machines by Simon Haykin, PearsonEducation, 3rd Edition.**
2. **Principles of Soft Computing by S. N. Sivanandam and S. N. Deepa, 2nd edition, Wiley.**
3. **Artificial Neural Networks by B. Yegnanarayana, PHI**
4. **Neural Networks, Fuzzy logic and Genetic algorithm by S. Rajasekaran and G. A. Vijayalakshmi Pai, PHI**

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SEMESTER-VI

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COMPUTER SCIENCE (C-XIII): Artificial Intelligence

Theory: 60 Lectures

1. Introduction   (06 Lectures)

Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment.

2. Problem Solving and Searching Techniques   (20 Lectures)

Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A* algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.

3. Knowledge Representation   (20 Lectures)

Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules, Conceptual Graphs.

Programming in Logic (PROLOG)

4. Dealing with Uncertainty and Inconsistencies   (08 Lectures)

Truth Maintenance System, Default Reasoning, Probabilistic Reasoning, Bayesian Probabilistic Inference, Possible World Representations.

5. Understanding Natural Languages   (06 Lectures)

Parsing Techniques, Context-Free and Transformational Grammars, Recursive and Augmented Transition Nets.

BOOKS RECOMMENDED:

1.   DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2007.

2.   Russell &Norvig, Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall, 2nd edition, 2005.

3.   Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2nd edition, 1991.

4.   W.F. Clocksin and Mellish, Programming in PROLOG, Narosa Publishing House, 3rd edition, 2001.

5.   Ivan Bratko, Prolog Programming for Artificial Intelligence, Addison-Wesley, Pearson

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TUTORIALS ON COMPUTER SCIENCE (C-XIII): Artificial Intelligence

COMPUTER SCIENCE LAB (C-XIV): Computer Graphics

Theory: 60 Lectures

1. Introduction   **(5 Lectures)**
Basic elements of Computer graphics, Applications of Computer Graphics.

2. Graphics Hardware   **(8 Lectures)**

Architecture of Raster and Random scan display devices, input/output devices.

3. Fundamental Techniques in Graphics   **(22 Lectures)**

Raster scan line, circle and ellipse drawing, thick primitives, Polygon filling, line and polygon clipping algorithms, 2D and 3D Geometric Transformations, 2D and 3D Viewing Transformations (Projections- Parallel and Perspective), Vanishing points.

4. Geometric Modeling   **(10 Lectures)**

Representing curves & Surfaces.

5. Visible Surface determination   **(8 Lectures)**

Hidden surface elimination.

6. Surface rendering   **(7 Lectures)**

Illumination and shading models. Basic color models and Computer Animation.

Books Recommended:

1. **J.D.Foley, A.Van Dan, Feiner, Hughes Computer Graphics Principles & Practice** nd

    2   edition Publication Addison Wesley 1990.

2. **D.Hearn, Baker: Computer Graphics, Prentice Hall of India 2008.**

3. **D.F.Rogers Procedural Elements for Computer Graphics, McGraw Hill 1997.**

4. **D.F.Rogers, Adams Mathematical Elements for Computer Graphics, McGraw Hill**

nd

    2   edition 1989.

COMPUTER SCIENCE LAB (C-XIV): Computer Graphics

LabPractical: 60 Lectures

1. **Write a program to implement Bresenham_s line drawing algorithm.**

2. **Write a program to implement mid-point circle drawing algorithm.**

3. **Write a program to clip a line using Cohen and Sutherland line clipping algorithm.**

4. **Write a program to clip a polygon using Sutherland Hodgeman algorithm.**
5. **Write a program to apply various 2D transformations on a 2D object (use homogenouscoordinates).**

6. **Write a program to apply various 3D transformations on a 3D object and then applyparallel and perspective projection on it.**

7. **Write a program to draw Hermite/Bezier curve.**

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DSE 3(A) Big Data Analytics

1. **Understanding Big Data:** Datasets, Data Analysis, Data Analytics-Descriptive Analysis, Diagnostics Analytics, Predictive Analytics, Prescriptive Analytics, Big Data Characteristics – volume, velocity, variety, veracity, value, Different Types of Data – Structured Data, Unstructured Data, Semi-Structured Data

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

4. **HADOOP ARCHITECTURE:** Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands, Anatomy of File Write and Read, NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks.

4. **Theory and methods for big data analytics:** Regression Modeling, Multivariate Analysis, Bayesian Modeling, Inference and Bayesian Networks, Support Vector and Kernel Methods, Analysis of Time Series: Linear Systems Analysis, Nonlinear Dynamics, Rule Induction, Decision Trees.

5. **Programming with R :** Basic Syntax, Data types, Variables, Operators, Decision Making, Loops, Functions, Vectors, lists, Matrices, Arrays, Data Frames, R Data Interfaces – CSV Files, Excel Files, Database, R charts & graphs , R statistics – Mean, Median, Mode, Linear Regression.

Readings: 1. Chris Eaton, Dirk deroos et al. , —Understanding Big data ‖, McGraw Hill, 2012.
2. —Big Data Fundamentals: Concepts, Drivers & Techniques‖, 1/e, 2016,
Thomas Erl, Wajid Khattak, Paul Buhler, Prentice Hall.
3. —Big Data Analytics with R and Hadoop‖, 1e, 2013, Vignesh Prajapati, Packt Publishing Ltd, UK.
4. —The Art of R Programming: A Tour of Statistical Software Design‖,revised,2011, Norman Matloff, No Starch Press 5. "Hadoop:The Definitive Guide," 3/e, 2012, Tom White, O'REILLY Publications.
6. "Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming Data" ,2012, Paul Zikopoulos, IBM, Chris Eaton, Paul Zikopoulos, The McGraw-Hill Companies.
7. "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications",2014, Bart Baesens, Wiley Publications .
8. —Mining of Massive Datasets‖, 2012, Anand Rajaraman and Jeffrey David Ullman , Cambridge University Press

Tutorials on DSE3 (A) Big Data Analytics

DSE 3 (B) <mark>Data Mining</mark>

Introduction, steps in knowledge discovery, architecture of data mining system, types of databases, functionalities of data mining, major issues.

Data Warehouse : difference between database and data warehouse, OLTP vs OLAP, Schemas for multidimensional databases, DMQL, Concept hierarchies, Starnet query model, three tier architecture of data warehouse.

Data Preprocessing : descriptive data summarization, data cleaning, data integration, transformation, data reduction, dimensionality reduction.

Cluster Analysis : types of variables, dissimilarity, Partitioning methods : k-means and k- medoids, Hierarchical clustering.

Classification : Meaning, issues, classification using k-NN and artificial neural network. Prediction : Meaning, regression techniques, prediction using neural network, Association rule mining : meaning, Apriori algorithm.

BOOKS

1. Data Mining concepts and techniques by J. Han and M. Kamber, 2nd Edition, Elsevier
2. Data Mining Methods for Knowledge Discovery, Cios, Pedrycz, Swiniarski,Kluwer Academic Publishers, London – 1998.

Tutorials on DSE3 (B) Data Mining

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Guru Ghasidas Vishwavidyalaya [Syllabus for MSc [on and after 2017]
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| DSE 4 | **Project work followed by seminar** |

Discipline Specific Elective: Dissertation / Project work

The students will be allowed to work on any project based on the concepts studied in core / elective or skill based elective courses.

The group size should be maximum of three (03) students.

Each group will be assigned a teacher as a supervisor who will handle both their theory as well lab classes.
A maximum of Four (04) projects would be assigned to one teacher.

MAJOR PROJECT

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Syllabus for MSC [on and after 2017]
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MSC-205   ELECTIVE-II   (2)

<mark>Multimedia</mark>

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: MDI 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).

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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:

1. Sumitabha Das, "Unix Concepts and Applications", 4thEdition. TMH, 2006. (1, 2 units)
2. Behrouz A. Forouzan, Richard F. Gilbery, "Unix and shell Programming", 1stEdition, Cengage Learning India, 2003.

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3. Beginning Linux Programming, 4th Edition, N.Matthew, R.Stones,Wrox, Wiley India Edition.

4. Graham Glass, King Ables, "Unix for programmers and users", 3rd Edition, Pearson Education, 2009.

5. N.B Venkateswarlu, "Advanced Unix programming", 2ndEdition, BS Publications, 2010.

6. Yashwanth Kanitkar," Unix Shell programming", 1stEdition, BPB Publisher, 2010.

7. Linux: Complete Reference, 6th Edition, Richard Petersen, Tata McGraw-Hill

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MSC -302

Artificial Intelligence

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 prepositional 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.

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Guru Ghasidas Vishwavidyalaya
Syllabus for MSC [on and after 2017]
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)
Koni, Bilaspur – 495009 (C.G.)

MSC - 303

<mark>Relational Data Base Management Sy</mark>stem

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.
7. Database Management System By A. K. Majumdar & P.Bhattacharya, TMH

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Syllabus for MSC [on and after 2017]

MSC-304   ELECTIVE-III   (1)

<mark>Advanced Java Programming</mark>

1. **Basics of Core JAVA: class, interface, exception handling.Collections : Collection Interfaces, Concrete Collections, The Collections Framework Multithreading : Creating thread and running it, Multiple Thread acting on single object,Synchronization, Thread communication, Thread group, Thread priorities, Daemon Thread, Life Cycle of Thread.**

2. **Networking:Internet Addressing, InetAddress, Factory Methods, Instance Methods, TCP/IP Client Sockets, URL, URL Connection, TCP/IP Server Sockets, Datagrams.Java Database Connectivity (JDBC): Merging Data from Multiple Tables: Joining, Manipulating, Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures.**

3. **Servlets: Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, HandlingHTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with HttpSession**

4. **Java Server Pages (JSP): Introduction, JavaServer Pages Overview, A First JavaServer Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries, Enterprise Java Bean: Preparing a Class to be a JavaBean, Creating a JavaBean, JavaBean Properties,Types of beans, Stateful Session bean, Stateless Session bean, Entity bean**

5. **Remote Method Invocation: Defining the Remote Interface, Implementing the Remote Interface, Compiling and Executing the Server and the Client, Struts: Basics of Struts,Struts : What and Why? ,Model1 vs Model2 ,Struts2 Features, Steps to create Struts application ,Understanding Action class ,Understanding struts.xml file**

Readings:

1. **"Advanced Java 2 Platform HOW TO PROGRAM" by H. M.Deitel, P. J. Deitel, S. E. Santry – Prentice Hall**
2. **"Beginning Java™ EE 6 Platform with GlassFish 3 From Novice to Professional" by Antonio Goncalves – Apress publication**

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MSC-305   **ELECTIVE-IV**   **(1)**

Web Technology

1 Internet Concept: Fundamental of Web ,History of Web, Web development overview, Domain Name System (DNS),DHCP,and SMTP and other servers ,Internet service provider (ISP), Concept of IP Address, Internet Protocol, TCP/IP Architecture ,Web Browser and Web Server.

2. HTML and DHTML:- HTML Tag, Rules of HTML, Text Formatting and Style, List, Adding Graphics to Html Document, Tables and Layout , Linking Documents, Frame, Forms, Project in HTML, Introduction to DHTML, CSS, Class and DIV, External Style Sheet.

3. Scripting Languages: Java Script (JS) in Web Page, Advantage of Java Script, JS object model and hierarchy ,Handling event, Operators and syntax of JS, JS Function, Client side JS Vs Server side JS ,JS security, Introduction to VB Script, Operator and Syntax of VB Script, Dialog Boxes, Control and Loop, Function in VBS.

4. XML:Introduction to XML, XML in Action, Commercial Benefits of XML, Gaining Competitive advantage with XML, Programming in XML, XML Schema ,XSLT ,DOM structure model ,XML quires and transformation.

5. Active Server Page (ASP): Introduction ,Internet Information System (IIS),ASP object ,Server object, File system object, session ,Accessing data base with an ASP page ,ODBC – ADO connection object, common methods and properties, ADO record set object .Introduction to ASP.Net.

Readings:

1. The complete Reference By Thomos A. Powell ,TMH publication
2. Web Technology :A Developers Perspective ,N.P.Gopalan ,J.Akilandeswani,PHI Publication.
3. Java Script :The definite Guide By Flangam , O"Reilly

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4. Java Script :Developers Resource by Kamran Husain and Jason Levitt PTR-PHI publication. 5."Mastering VB Script" BPB Publication.

6.　　World Wide Web design with HTML by Xavier Tata McGraw Hill Publication .

7.　XML By Example, Sean Mc Grath Pentice Hall Publication.

8.　Web Technology : A Developments Perspective , N.P. Gopalan, J. Akilandeswari,

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MSC -305   ELECTIVE –IV   (2)

<mark>Pattern Recognition</mark>

1. **Pattern Concept:** Meaning of pattern, examples of patterns, importance of study of patterns in machine learning, meaning of labels, attributes, features, dimensions in patters with examples, pattern recognition and classification, meaning of machine learning

2. **Pattern Recognition and classification:** Meaning and importance in machine learning, supervised and unsupervised learning with meaning and examples, classifiers, k-nn classification and k-means clustering, implementation and applications

3. **Decision Trees:** Meaning of tree and hence decision tree, building a decision tree, decision tree induction, classification using a decision tree, classification using ID3

4. **Evolutionary Computing:** Meaning of evolutionary computing, various operators used in evolutionary computing, genetic algorithms and their applications, Particle Swarm Optimization and their applications, Multi-objective Genetic Algorithms with examples

5. **Ensemble of classifiers:** Meaning and importance of ensembles, boosting and AdaBoost algorithm, bagging and random forest, weak and strong learning, ensembles of classifiers with voting

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Readings:

1. **Pattern Classification: Duda, R.O, Peter Hart, David Stork, 2010, Wiley India**
2. **Data Mining: Concept and Techniques, Morgan and Kaufmann, 2001**
3. **Pattern Recognition: Rajjan Shinghal, Oxford University Press New Delhi, 2006**
4. **Ensemble Methods, Foundations and Algorithms, Zhi-Hua Zhou, A CRC Press, Chapman and Hall Book, 2010**
5. **Pattern Recognition, Robi Polikar, Wiley Encyclopedia of Biomedical Engineering, 2006 John Wiley &Sons, Inc**

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