COURSE STURCTURE

Of

4 YEARS DEGREE B.TECH. (Information Technology)

Department of Computer Science & Engineering

SCHOOL
OF
INFORMATION AND COMMUNICATION TECHNOLOGY

GAUTAM BUDDHA UNIVERSITY
GAUTAM BUDH NAGAR, GREATER NOIDA
2018-2019

4-Years Degree B. TECH. (Information Technology)

I-YEAR (I-SEMESTER)
(Effective from session: 2018-19)

SEMESTER-I					
S r . No.	**Subject Code**	**Courses**	**L-T-P**	**Credits**	**CBCS/AICTE**
		THEORY			
1	PH102	Engineering Physics	3-1-0	4	CC/BS
2	MA101	Engineering Mathematics – I	3-1-0	4	CC/BS
3	ME101	Engineering Mechanics	3-1-0	4	CC/ESC
4	EE102	Basics Electrical Engineering	3-1-0	4	CC/ESC
5	ES101	Environmental Science	2-0-0	2	AECC/BS
6	EN101	English Proficiency	2-0-0	2	AECC/HSMC
		PRACTICALS			
7	PH 104	Engineering Physics Lab	0-0-2	1	CC/BS
8	EE 104	Basic Electrical Engineering Lab	0-0-2	1	CC/ESC
9	ME102*	Workshop Practices	1-0-2	2	CC/ESC
10	EN151	Language Lab	0-0-2	1	AECC/HSMC
11	GP	General Proficiency	-	Non Credit	
		Total	**17-4-8**	**25**	
		Total Contact Hours	**29**		

I-YEAR (II-SEMESTER)
(Effective from session: 2018-19)

SEMESTER – II					
Sr. No.	**Subject Code**	**Courses**	**L-T-P**	**Credits**	**CBCS/AICTE**
		THEORY			
1	CY101	Engineering Chemistry	3-1-0	4	CC/BS
2	MA102	Engineering Mathematics – II	3-1-0	4	CC/BS
3	EC101	Basic Electronics Engineering	3-1-0	4	CC/ESC
4	CS101	Fundamentals of Computer Programming	3-1-0	4	SEC/ESC
5	BS101	Human Values & Buddhist Ethics	2-0-0	2	AECC/HSMC
		PRACTICALS			
6	CY 103	Engineering Chemistry Lab	0-0-2	1	CC/BS
7	EC 181	Basic Electronics Engineering Lab	0-0-2	1	CC/ESC
8	CS 181	Computer Programming Lab	0-0-2	1	SEC/ESC
9	CE103*	Engineering Graphics	1-0-2	2	CC/ESC
10	GP	General Proficiency	-	Non Credit	
		Total	**15-4-8**	**23**	
		Total Contact Hours	**27**		

II-YEAR (III-SEMESTER)
(Effective from session: 2018-19)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME						
						SESSIONAL EXAM		MID TERM EXAM	END TERM EXAM	SUBJECT TOTAL	CBCS	CREDITS
			L	T	P	CT	TA					
	THEORY											
1	MA201	Engineering Mathematics III	3	1	0	10	15	25	50	100	FCC18	4
2	IT203	Animation and Computer Graphics	3	1	0	10	15	25	50	100	C19	4
3	IT205	Operating Systems	3	1	0	10	15	25	50	100	C20	4
4	IT207	Data Structures	3	1	0	10	15	25	50	100	C21	4
5	IT209	System Design& Analysis Techniques	3	1	0	10	15	25	50	100	C22	4
	PRACTICAL											
6	IT281	Animation &Computer Graphics Lab	0	0	2	20	30	0	50	100	C23	1
7	IT283	Operating Systems Lab	0	0	2	20	30	0	50	100	C24	1
8	IT285	Data Structures Lab	0	0	2	20	30	0	50	100	C25	1
9	IT287	Web Technologies Lab I	0	0	2	20	30	0	50	100	SEC1	1
10	GP	General Proficiency										Non Credit
SEMESTER TOTAL			**15**	**5**	**8**	325		125	450	900		**24**
TOTAL CONTACT HOURS			**28**									**28hrs.**

SKILL ENHANCEMENT COURSE (SEC)		
1	IT 285	Web Technologies Lab I

II-YEAR (IV-SEMESTER)
(Effective from session: 2018-19)

S.No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME						
						SESSIONAL EXAM		MIDTERM EXAM	END TERM EXAM	SUBJECT TOTAL	CBCS	CREDITS
			L	T	P	CT	TA					
	THEORY											
	EC230	Digital Communication & Coding	3	1	0	10	15	25	50	100	C26	4
	CS202	Software Engineering	3	1	0	10	15	25	50	100	C27	4
	CS204	Discrete Structure	3	1	0	10	15	25	50	100	FC-C28	4
	CS206	Data Base Management System	3	1	0	10	15	25	50	100	C29	4
	EC221	Fundamentals Digital Electronic Circuits	3	1	0	10	15	25	50	100	FC-C30	4
	PRACTICAL											
	EC273	Digital Electronics Circuits Lab	0	0	2	20	30	0	50	100	FC-C31	1
	CS282	Software Engineering Lab	0	0	2	20	30	0	50	100	C32	1
	CS284	Database Management System Lab	0	0	2	20	30	0	50	100	C33	1
	IT282	Web Technologies Lab II	0	0	2	20	30	0	50	100	SEC2	1
	GP	General Proficiency										Non Credit
SEMESTER TOTAL CREDITS			**15**	**5**	**8**	325		125	450	900		**24**
TOTAL CONTACT HOURS			**28**									**28hrs.**

SKILL ENHANCEMENT COURSE (SEC)		
1	IT 282	Web Technologies Lab II

III-YEAR (V-SEMESTER)
(Effective from session: 2018-19)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME						
						SESSIONAL EXAM		MID TERM EXAM	END TERM EXAM	SUBJECT TOTAL	CBCS	CREDITS
			L	T	P	CT	TA					
	THEORY											
1	CS301	Theory of Automata	3	1	0	10	15	25	50	100	C34	4
2	IT303	Computer Networks	3	1	0	10	15	25	50	100	C35	4
3	IT305	Compiler Design	3	1	0	10	15	25	50	100	C36	4
4	IT307	Computer Programming III	3	1	0	10	15	25	50	100	C37	4
5		Open Elective 2	3	1	0	10	15	25	50	100	OE2	4
	PRACTICAL											
6	IT383	Computer Networks Lab	0	0	2	20	30	0	50	100	C38	1
7	IT385	Compiler Design Lab	0	0	2	20	30	0	50	100	C39	1
8	IT387	Computer Programming III Lab	0	0	2	20	30	0	50	100	C40	1
9	IT389	Web Technologies Lab III	0	0	2	20	30	0	50	100	SEC3	1

10	GP	General Proficiency										Non Credit
SEMESTER TOTAL CREDITS			**15**	**5**	**8**	325	125	450	900			**24**
TOTAL CONTACT HOURS			**28**									**28hrs.**

SKILL ENHANCEMENT COURSE (SEC)		
1	IT389	Web Technologies Lab III

OPEN ELECTIVE (OE2)		
1	IT311	Industrial Economics and Management
2	SW505	Introduction to Social Work
3	LB411	Right to Information and Public Accountability
4	IT309	IT Forensics

III-YEAR (VI-SEMESTER)
(Effective from session: 2018-19)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME						
						SESSIONAL EXAM		MID TERM EXAM	END TERM EXAM	SUBJECT TOTAL	CBCS	CREDITS
			L	T	P	CT	TA					
	THEORY											
1	IT300	Artificial Intelligence	3	1	0	10	15	25	50	100	C41	4
2	IT 302	Algorithm Design & Analysis	3	1	0	10	15	25	50	100	C42	4
3	IT304	Computer Organization	3	1	0	10	15	25	50	100	C43	4
4	IT306	Information & Network Security	3	1	0	10	15	25	50	100	C44	4
5	IT308	Information Retrieval & Management	3	1	0	10	15	25	50	100	C45	4
	PRACTICAL											
6	IT382	Algorithm Design & Analysis Lab	0	0	2	20	30	0	50	100	C46	1
7	IT384	Artificial Intelligence Lab	0	0	2	20	30	0	50	100	C47	1
8	IT386	Information & Network Security Lab	0	0	2	20	30	0	50	100	C48	1
9	IT388	Seminar	0	0	2	20	30	0	50	100	DP1	1
10	GP	General Proficiency										Non Credit
SEMESTER TOTAL CREDITS			**15**	**5**	**8**	325		125	450	900		**24**
TOTAL CONTACT HOURS			**28**									**28hrs.**

IV-YEAR (VII-SEMESTER)

(Effective from session: 2018-19)

S. No.	COURSE CODE	SUBJECT	PERIODS			EVALUATION SCHEME						
						SESSIONAL EXAM		MIDTERM EXAM	END TERM EXAM	SUBJECT TOTAL	CBCS	CREDITS
			L	T	P	CT	TA					
	THEORY											
1		Generic Elective 1	3	1	0	10	15	25	50	100	GE 1	4
2	IT401	Ad-Hoc & Sensor Networks	3	1	0	10	15	25	50	100	C49	4
3	IT403	Cloud Computing	3	1	0	10	15	25	50	100	C50	4
4		Elective 1	2	1	0	10	15	25	50	100	DSE 1	3
5		Elective 2	2	1	0	10	15	25	50	100	DSE 2	3
	PRACTICAL											
6	IT481	Software/Project Development Lab	0	0	2	20	30	0	50	100	C51	1
7	IT483	Simulation Lab	0	0	2	20	30	0	50	100	C52	1
8	IT493	Industrial Training	0	0	2	20	30	0	50	100	DP2	1
9	IT495	Minor Project	0	0	6	20	30	0	50	100	DP3	3
	GP	General Proficiency										Non Credit
SEMESTER TOTAL CREDITS			**13**	**5**	**10**	325		125	450	900		**24**
TOTAL CONTACT HOURS			**28**									**28 hrs.**

ELECTIVE 1		
S. No.	**COURSE CODE**	**SUBJECT**
1	EC455	Advanced Communication Systems
2	IT405	Bio-Informatics
3	IT407	Distributed Databases
4	IT411	Data Warehousing and Data Mining

ELECTIVE 2

S. No.	C. CODE	SUBJECT
1	IT411	Fuzzy & Soft Computi
2	IT413	Service Oriented Archi
3	CS405	Formal Methods
4	CS441	Software project manag

GENERIC ELECTIVE 1

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8-19)

								EVALUATION SCHEME				
								MID TERM EXAM	END TERM EXAM	SUBJECT TOTAL	CBCS	CREDITS
	THEORY											
1		Generic Elective 2	3	1	0	10	15	25	50	100	GE2	4
2	IT402	Big Data Analytics	3	1	0	10	15	25	50	100	C53	4
3	IT404	Internet of Things	2	1	0	10	15	25	50	100	C54	3
4		Elective 3	2	1	0	10	15	25	50	100	DSE 3	3
	PRACTICAL											
5	IT482	Big Data Analytics Lab	0	0	2	20	30	0	50	100	C55	1
6	IT496	Major Project	0	0	10	20	30	0	50	100	DP4	5
	GP	General Proficiency										Non Credit
SEMESTER TOTAL			**10**	**4**	**12**	200		100	300	600		**20**
TOTAL CONTACT HOURS			**26**									**26 hrs.**

ELECTIVE 3		
S. No.	**COURSE CODE**	**SUBJECT**
1	IT408	Data Compression
2	IT410	High Speed Networks
3	IT412	Mobile Computing
4	EC430	Mobile Communication

GENERIC ELECTIVE 2

S. No.	COURSE CODE	SUBJECT
1	MA402	Modeling and Simulation
2	MA416	Probability and Stochastic

I-SEMESTER

I-YEAR (I-SEMESTER)

ENGINEERING MATHEMATICS – I		Course Code: MA101	Credits:4
No. of Lectures (Hrs./Week):4	No. of Lectures (Sem.):60	Mid Sem. Exam (Hrs.):1.5	End Sem. Exam (Hrs.):3

(Effective from session: 2018-19)

Unit I: Water

Introduction, Specification for water, Impurities in water, Hardness of water, Numerical problems based on Hardness, Analysis of water: alkalinity, Numerical problems based on alkalinity Dissolved Oxygen, Boiler feed water, boiler problems-scale, sludge, priming and foaming, caustic embittlerment and corrosion, their causes and prevention, Water softening processes: External treatment(Lime – Soda process, Numerical problems based on Lime-soda Process, Zeolite process ,Ion exchange Process) and Internal treatment (Colloidal conditioning, carbonate conditioning, calgon conditioning and phosphate conditioning), Domestic water treatment: sedimentation, coagulation, Filtration, Disinfection, chlorination, break point chlorination, Ozonization.

Unit II: Corrosion and its Control

Introduction, Types of corrosion- Dry, Wet, Galvanic , Pitting, Water line and Stress corrosion, Mechanism of corrosion- Dry or Chemical, Wet or Electrochemical, Pilling-Bedworth rule, Galvanic series, Factors influencing corrosion, Corrosion control- Modification of environment, corrosion inhibitor and Metallic coatings.

Unit III: Fuel

Classification, Characteristics of fuel, Characteristic of good fuel, Calorific Value, Determination of Calorific Value by bomb calorimeter, Analysis of coal –Proximate and Ultimate analysis, Numerical problems based on Proximate and Ultimate analysis, Carbonization-Types of Carbonization of coal, Manufacture of Metallurgical coke by Otto Hoffman process, Conversion of Coal into Liquid Fuels by Fischer-tropsch process and Bergius Process, Liquid Fuels- Petroleum-Refining of crude oil, Cracking of heavy oil residues – thermal and catalytic cracking, Cracking of heavy oil residues – thermal and catalytic cracking, Gaseous Fuels - Natural gas, Water gas, Producer gas, Coal gas.

Unit III: Polymers

Introduction, Classification(based on origin, structure, intermolecular forces, tacticity, type of monomer, response to temperature, conductance and synthesis), Polymerization- Condensation(step growth), Addition (chain growth),Conducting polymer and Biopolymers, Introduction to polymeric composites, Types of composite materials.

Unit IV: Phase Rule

The Phase Rule, Explanation of terms, Advantages and limitations of Phase Rule, Phase rule for one component system (The water system).

Unit V: **Lubricants**

Introduction, Functions, Classification of Lubricants, Mechanism of Lubrication, Properties- Viscosity and viscosity index, Flash and fire point, Aniline point, Neutralization number, Saponification Number and Iodine Number

Unit VI: Insulators

Introduction, Thermal insulators-Organic and Inorganic insulators and Electrical Insulators.

Books (Text Books & Reference Books):

1. J.C. Kuriacose & J. Rajaram, Chemistry in Engineering & Technology ,Vol I & II, By Tata McGraw-Hill Education.
2. Dr S.S. Dara, S.S. Umare, Engineering Chemistry , S. Chand & Company Ltd.
3. Jain & Jain, Engineering Chemistry, Dhanpat Rai Publications.
4. V. R. Gowarikar, V.Viswanatha, Jayadev Sreedhar, Polymer Science, New Age International.
5. G. T. Austin, Shreve's Chemical Process Industries Mc-Graw-Hill.

I-YEAR (I-SEMESTER)

ENVIRONMENTAL SCIENCE		**Course Code:** ES101	**Credits:**3
No. of Lectures (Hrs./Week):3	**No. of Lectures (Sem.):**45	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

Unit I: Multidisciplinary nature of environmental studies
Definition, scope and importance, Need for public awareness.

Unit II: Natural Resources
Renewable and non-renewable resources:

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

Unit III: Ecosystems

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

Unit IV: Biodiversity and its conservation

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

Unit 5: Environmental Pollution

Definition, Causes, effects and control measures of :-

Air pollution; Water pollution; Soil pollution; Marine pollution; Noise pollution; Thermal pollution; Nuclear hazards

Unit 6: Social Issues and the Environment

- From Unsustainable to Sustainable development.
- Environmental ethics: issues and possible solutions.
- Consumerism and waste products.
- Environment Protection and Control of Pollution Act.
- Environment and human health.

Books Recommended:

1. Howad, Environmental Engineering, McGraw Hill.
2. Emil T. Chanlett, Environmental Protection, McGraw Hill.
3. A.K. Dey, Environmental Chemistry, Wiley Eastern Ltd.
4. Cumingham, Saigo, Environmental Science, TMH.
5. Manuel C. Mmoller, Ecology Concepts and Application, TMH.

I-YEAR (I-SEMESTER)

ENGLISH PROFICIENCY		Course Code: EN101	Credits: 2
No. of Lectures (Hrs./Week): 2	No. of Lectures (Sem.):30	Mid Sem. Exam (Hrs.):1.5	End Sem. Exam (Hrs.):3

(Effective from session: 2018-19)

Unit I: Functional Grammar

Form and Functions, Sentences: Simple, Complex, and Compound, Sub-Verb Agreement and Concord,Vocabulary Building: Affixations, Conversions, Idioms and Phrases, Words in Context.

Unit II: Language Skills (LSRW)

Listening Skills: Activity based, Speaking Skills: Activity based, Introduction to IPA, Use of Dictionary,Word stress, Reading Skills: Skimming and Scanning, Reading Comprehension, Writing Skills:Paragraph, Précis and Compositions, Note Making and Note Taking, Logical Ordering of Ideas andContents, Figures of Speech

Unit III: Learning through thematic Texts

- *My Visions for India:* Dr. Abdul Kalam
- From *In an Antique Land:*Amitav Ghosh
- *The Gift of Magi* O' Henry
- *Master and Man* Leo N. Tolstoy.
- *If*Rudyard Kipling
- *The Solitary Reaper*William Wordsworth

Text Books:

1. Pointon & Clark,*Word for Word*, Oxford University Press
2. Carter, Ronald; McCarthy, Michael (2006); *Cambridge Grammar of English: A Comprehensive Guide*. Cambridge University Press.

Reference Books:

3. Roach, J. Hartman and J. Setter (eds); *An English Pronouncing Dictionary*, London: Dent, 17thedn, PCambridge: CUP, 2006.
4. Redman, Stuart; 2011 English Vocabulary I Use: Pre-intermediate and intermediate. Cambridge:
   CUP Cambridge Phrasal Verbs Dictionary Second edition, Cambridge University Press

II-SEMESTER

FUNDAMENTALS OF COMPUTER PROGRAMMING	
Course Code: CS101	Credits: 3-1-0
No. of Lectures (Hrs/Week): 4	
Total No. of Lectures: 60	End Sem Exam Hours: 3

UNIT I INTRODUCTION TO COMPUTER AND PROGRAMMING CONCEPTS

Definition, characteristic, generation of computers, basic components of a computer system, memory, input, output and storage units, high level language and low level language, Software: system software, application software, hardware, firmware, Operating System, compiler, interpreter and assembler, linker, loader, debugger, IDE. Introduction to algorithm and flow chart; representation of algorithm using flow chart symbol, pseudo code, basic algorithm design, characteristics of good algorithm, development of algorithm.

UNIT II INTRODUCTION TO C PROGRAMMING LANGUAGE

Introduction to C programming language , Declaring variables, preprocessor statements, arithmetic operators, programming style, keyboard input , relational operators, introduction, feature of C language, concepts, uses, basic program structure, simple data types, variables, constants, operators, comments, control flow statement :if, while, for, do-while, switch.

UNIT III DATA TYPES AND STRUCTURES

bitwise operators, Pre defined and User defined data types, arrays, declaration and operations on arrays, searching and sorting on arrays, types of sorting, 2D arrays, Passing 2D arrays to functions, structure, member accessing, structure and union, array of structures, functions, declaration and use of functions, parameter passing, recurssion .

UNIT IV FUNDAMENTALS OF POINTERS

Introduction to pointers, pointer notations in C,Declaration and usages of pointers, operations that can be performed on computers, use of pointers in programming exercises, parameter passing in pointers, call by value, call by references, array and characters using pointers, dynamic memory allocation

UNIT V FILE HANDLING IN C AND ENUM

Introduction to file handling, file operations in C , defining and opening in file, reading a file, closing a file, input output operations on file, counting: characters, tabs , spaces, file opening modes, error handling in input/output operations.

sEnumerated data types, use of Enum, declaration of Enum.

Text Books:

1. C Programming, Herbert Shield
2. C Programming Language 2nd Edition by Brian, W Kernighan Pearson Education.

Reference Books:

3. Programming in ANSI C by E. Balagurusamy, Tata Mgraw Hill
4. C Puzzle Book: Puzzles For The C. Programming Language by Alan R Feuer Prentice Hall-Gale
5. Expert C Programming: Deep C Secrets (s) by Peter Van Der Linden Dorling Kindersley India.
6. Introduction To UNIX System by Morgan Rachel Tata Mcgraw Hill Education.
7. C: A Reference Manual (5th Edition) by Samuel P. Harbison&Samuel P. Harbison.
8. Programming Using the C Language by Hutchison,R.C, Mcgraw Hill Book Company, New York

9. Fundamentals of computers and programming with C, A.K. SHARMA

COMPUTER PROGRAMMING LAB	
Course Code: CS181 No. of Labs(Hrs/Week): 2 Total No. of Experiments: 15	Credits: 1 Total no of hours: 30 End Sem Exam Hours: 2

LIST OF EXPERIMENTS:

1. Write a program to find the sum of the digits of a number.
2. Write a program to calculate factorial of a number using recursion.
3. Write a program to find the reverse of a given number.
4. Write a program to check whether the year is leap or not.
5. Write a program to take marks of a student of 5 subjects as an input and print the grade. marks<40 = FAIL

marks>=40 and <=59 =GOOD

marks>=59 and <80 =EXCELLENT

marks>=80 = OUTSTANDING

6. Perform program number 5 using switch case statement.
7. Write a program to compute the roots of a quadratic equations.
8. Write a program to compute the length of a string using While Loop.
9. Write a program to print the following pattern::-

A) *
**

***

****

*****

B)

```
*
* *
* * *
* * * *
```

C)

```
0
1 2
3 4 5
6 7 8 9
```

10. Write a program to compute and display the product of two matrices.

11. Write a program to illustrate the difference between call by value and call by reference.

12. Write a program to check whether a given string is palindrome or not.

13.Create a structure called STUDENT having name, reg no., class as its field.

Compute the size of structure STUDENT.

14. Write a program to compute the length of a string using pointers.

15. Write a program to create a file , input data and display its content.

I-YEAR (II-SEMESTER)

ENGINEERING MATHEMATICS – II		**Course Code:** MA102	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

Unit I:

Matrices, Algebra of Matrices, Elementary row and column operations and reduced echelon forms, Normal Form, Rank of a matrix, Consistency of linear system of equations and their solutions.

Unit II:

Finite dimensional vector spaces over reals, Subspace, Linear Dependence and Independence of vectors, Basis, Dimension. Characteristic equation and characteristic polynomial, eigenvalues and eigenvectors, Cayley-Hamilton theorem, diagonalisation.

Unit III:

Algebra of Complex numbers, Polar form of complex numbers, Functions of complex variables, Limit, Continuity and Differentiability of Complex functions.

Unit IV:

Analytic function, C-R equation, Harmonic functions, Line Integral in complex form, Cauchy's integral theorem, Morera's Theorem, Cauchy's integral formula: Cauchy's Integral formula for derivatives of analytic functions, Liouville's theorem, Fundamental Theorem of algebra.

Unit V:

Taylors and Laurent's Series, Singularities, Zeroes and Poles, Residue, Residue theorem, Evaluation of real integrals, Conformal mapping.

Textbook:

1. E. Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons.

Books

2. R. K. Jain & S.R.K Iyengar, Advanced Engineering Mathematics, Narosa Publications.
3. J. W. Brown & R. V. Churchill, Complex Variables and Applications, McGraw-Hill Higher Education

III-SEMESTER

II-YEAR (III-SEMESTER)

ENGINEERING MATHEMATICS III		**Course Code:**MA201	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

Unit I

Definition of differential equation (linear/nonlinear) with examples, order and degree of the differential equation, types of solutions of differential equations, methods of solution, variables separable method, exact differential equations, integrating factors of first order differential equation of the type $M(x, y)dx + N(x, y)dy = 0$, Bernoulli equations, Riccati differential equation,

Picard's existence and uniqueness theorem for $dy/dx = f(x, y)$ (without proof)

Unit II

Linear differential equations of nth order with constant coefficients, solutions of homogeneous and non-homogeneous linear differential equations, complementary functions and particular integrals, Operator Method, simultaneous linear differential equations, Euler -Cauchy linear differential equations, method of variation of parameters, applications to engineering problems (Motion of a particle in resisting medium, simple harmonic motion, electric circuit problem).

Unit III

Existence theorem for Laplace transform, Laplace transform of derivatives and integrals, Inverse Laplace transform, Unit step

function, Dirac delta function, Laplace transform of periodic functions, Convolution theorem, Application to solve linear and simultaneous differential equations.

Unit IV

Periodic functions, Trigonometric series, Fourier series of period 2π, Euler's formulae, Functions having arbitrary period, Change

of interval, Even and odd functions, Half range sine and cosine Fourier series,

Unit V

PDEs and its Applications: Linear partial differential equations with constant coefficients. Classifications of 2nd order PDE.

Method of separation of variables for solving partial differential equations, its applications to solve Heat conduction equation,

Wave equation, steady state heat equation (Laplace equation) through Fourier series.

Textbook:

1. R. K. Jain & S.R.K Iyengar, Advanced Engineering Mathematics, Narosa Publications.

II-YEAR (III-SEMESTER)

ANIMATION & COMPUTER GRAPHICS		Course Code: IT203	Credits:4
No. of Lectures (Hrs./Week):3+1	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

UNIT I INTRODUCTION

Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices, Output primitives : Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms

UNIT II 2-D GEOMETRICAL TRANSFORMS

Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems, 2-D viewing : The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm

UNIT III REPRESENTATION AND TRANSFORMATION

3-D object representation Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces, basic illumination models, polygon rendering methods, 3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations, 3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping

UNIT IV VISIBLE SURFACE DETECTION METHODS

Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods.Tools of Multimedia: Paint and Draw Applications, Graphic effects and techniques, Image File Format, Anti-aliasing, Morphing, Multimedia Authoring tools, professional development tools.

UNIT V COMPUTER ANIMATION

Introduction and Principles of Animations, Power of Motion, Animation Techniques, Animation File Format, Making animation for Rolling Ball, making animation for a Bouncing Ball, Animation for the web, GIF, Plugins and Players, Animation tools for World Wide Web. Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

Text Books:

[1]Donald Hearn and M.Pauline Baker"Computer Graphics C version", Pearson Education.

References Books:

[2] Foley, VanDam, Feiner and Hughes,"Computer Graphics Principles & practice", II edition in C, , Pearson Education.

II-YEAR (III-SEMESTER)

Operating Systems		Course Code:IT205	Credits:4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

UNIT I INTRODUCTION TO OPERATING SYSTEM

Importance of operating systems, basic concepts and terminology about operating system, memory management, processor management, device management, information management functions.

UNIT II PROCESS MANAGEMENT

Elementary concept of process, job scheduler, process scheduling, operation on process, threads, overview, scheduling criteria, scheduling algorithms, algorithm evaluation process synchronization, synchronization hardware, semaphores, classical problem of synchronization, monitors and atomic transaction deadlocks: system model, deadlock characterization, deadlocks prevention, deadlocks avoidance, deadlocks detection, recovery from deadlock.

UNIT III MEMORY &STORAGE MANAGEMENT

Basic Memory Management: Definition, Logical and Physical address map, Memory allocation: Contiguous Memory allocation, partition, Fragmentation, Compaction, Paging, Segmentation.

Virtual Memory: Basics of virtual memory, Hardware and control structures-Locality of reference, Page fault, Demand paging, page replacement policies: First In First Out (FIFO), second chance (SC), Not recently used (NRU) and Least recently used (LRU).

UNIT IV UNIX/LINUX OPERATING SYSTEM: Development Of Unix/Linux, Role & Function Of Kernel, System Calls, Elementary Linux command & Shell Programming, Directory Structure, System Administration, Case study: Linux, Windows Operating System

UNIT V SECURITY & PROTECTION: Security Environment, Design Principles of Security, User authentication, Protection Mechanism: Protection Domain, Access Control List

Text Books:

[1]. Galvin, Wiley, Operating Systems Concepts, 8th edition, 2009.
[2]. James L Peterson, Operating Systems Concept, John Wiley & Sons Inc, the 6Rev edition, 2007.

Reference Books:

[3]. Deitel H. M., An Introduction to Operating Systems, Addison-Wesley, 1990.
[4]. Stallings William, Operating Systems, PHI, New Delhi, 1997.
[5]. S. Tanenbaum Modern Operating Systems, Pearson Education, 3rd edition, 2007.
[6]. Nutt, Operating System, Pearson Education, 2009.
[7]. S. Tanenbaum, Distributed Operating Systems, Prentice Hall, 2nd edition, 2007.

II-YEAR (II-SEMESTER)

DATA STRUCTURES		**Course Code:IT207**	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

UNIT I INTRODUCTION TO DATA STRUCTURES: Abstract data types, sequences as value definitions, data types in C, pointers in C, data structures and C, arrays in C, array as ADT, one dimensional array, Implementing one dimensional array, array as parameters, two dimensional array, structures in C,

implementing structures, Unions in C, implementation of unions, structure parameters, allocation of storage and scope of variables, recursive definition and processes: factorial function, fibonacci sequence, recursion in C, efficiency of recursion, hashing: hash function, open hashing, closed hashing: linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNITII STACK, QUEUE AND LINKED LIST: Stack definition and examples, primitive operations, example -representing stacks in C, push and pop operation implementation, queue as ADT, C Implementation of queues, insert operation, priority queue, array implementation of priority queue, inserting and removing nodes from a list-linked implementation of stack, queue and priority queue, other list structures, circular lists: stack and queue as circular list - primitive operations on circular lists, header nodes, doubly linked lists, addition of long positive integers on circular and doubly linked list.

UNIT III TREES: Binary trees: operations on binary trees, applications of binary trees, binary tree representation, node representation of binary trees, implicit array representation of binary tree, binary tree traversal in C, threaded binary tree, representing list as binary tree, finding the Kth element, deleting an element, trees and their applications: C representation of trees, tree traversals, evaluating an expression tree, constructingtree.

UNIT IV SORTING AND SEARCHING: General background of sorting: efficiency considerations, notations, efficiency of sorting, exchange sorts: bubble sort; quick sort; selection sort; binary tree sort; heap sort, heap as a priority queue, sorting using a heap, heap sort procedure, insertion sorts: simple insertion, shell sort, address calculation sort, merge sort, radix sort, sequential search: indexed sequential search, binary search, interpolation search.

UNIT V GRAPHS: Application of graph, C representation of graphs, transitive closure, Warshall's algorithm, shortest path algorithm, linked representation of graphs, Dijkstra's algorithm, graph traversal, traversal methods for graphs, spanning forests, undirected graph and their traversals, depth first traversal, application of depth first traversal, efficiency of depth first traversal, breadth first traversal, minimum spanning tree, Kruskal's algorithm, round robin algorithm.

Text Books:

[1]. Aaron M. Tenenbaum, Yeedidyah Langsam, Moshe J. Augenstein, 'Data structures using C', Pearson Education, 2004 / PHI.

References Books:

[2]. E. Balagurusamy, 'Programming in Ansi C', 2nd Edition, TMH, 2003.
[3]. Robert L. Kruse, Bruce P. Leung Clovis L.Tondo, 'Data Structures and Program Design in C', Pearson Education, 2000 / PHI.

II-YEAR (III-SEMESTER)

SYSTEM DESIGN AND ANALYSIS TECHNIQUES		**Course Code: IT209**	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

UNIT I DATAANDINFORMATION

Types of information: operational, tactical, strategic and statutory, why do we need information systems, management structure, requirements of information at different levels of management, functional allocation of management, requirements of information for various functions, qualities of information, small case study.

UNIT II SYSTEMS ANALYSIS AND DESIGN LIFE CYCLE
Requirements determination, requirements specifications, feasibility analysis, final specifications, hardware and software study, system design, system implementation, system evaluation, system modification, role of systems analyst, attributes of a systems analyst, tools used in system analysis

UNITIIIINFORMATION GATHERING
Strategies, methods, case study, documenting study, system requirements specification, from narratives of requirements to classification of requirements as strategic, tactical, operational and statutory.

UNIT IV FEASIBILITY ANALYSIS
Deciding project goals, examining alternative solutions, cost benefit analysis, quantifications of costs and benefits, payback period, system proposal preparation for managements, parts and documentation of a proposal, tools for prototype creation.

UNIT V TOOLS FOR SYSTEMS ANALYSTS
Data flow diagrams, case study for use of DFD, good conventions, leveling of DFDs, leveling rules, logical and physical DFDs, software tools to create DFDs, decision tables for complex logical specifications, specification oriented design vs procedure oriented design

Text Books:

[1]. Elias M.Awad., System Analysis and Design.
[2]. Perry Edwards,System Analysis and Design.

Reference Books:

[3]. James A.Senn, Analysis and Design of Information Systems.

II-YEAR (III-SEMESTER)

ANIMATION & COMPUTER GRAPHICS LAB		**Course Code: IT281**	**Credits:**1
No. of Lab (Hrs./Week):1	**No. of Lab Sessions (Sem.):**15	**Mid Sem. Exam (Hrs.):**0	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

NOTE: Suggested list of experiments but not limited to these only.

List of Experiments:

1. Procedure to create an animation to represent the growing moon.
2. Procedure to create an animation to indicate a ball bouncing on steps.
3. Procedure to simulate movement of a cloud.
4. Procedure to draw the fan blades and to give proper animation.
5. Procedure to display the background given (filename: tulip.jpg) through your name.
6. Procedure to display the background given (filename: garden.jpg) through your name using mask.

7. Procedure to create an animation with the following features.

WELCOME (Letters should appear one by one .The fill color of the text should change to a differentcolour after the display of the full word.)

8. Procedure to simulate a ball hitting another ball.

9. Procedure to design a visiting card containing at least one graphic and text information.

10. Procedure to take a photographic image. Give a title for the image. Put the border. Write yournames. Write the name of institution and place.

11. Procedure to prepare a cover page for the book in your subject area. Plan your own design.

12. Procedure to extract the flower only from given photographic image and organize it on a background. Selecting your own background for organization.

13. Procedure to change a circle into a square using flash.

14. Procedure to display the background given (FILENAME: GARDEN.JPG) through your name using.

II-YEAR (III-SEMESTER)

Operating Systems Lab		**Course Code:**IT283	**Credits:**1
No. of Lab (Hrs./Week): 2	**No. of Lab Sessions (Sem.):**10	**Mid Sem. Exam (Hrs.):** 0	**End Sem. Exam (Hrs.):**2

(Effective from session: 2018-19)

NOTE: Suggested list of experiments but not limited to these only.

List of Experiments:

1. Program for file handling.
2. Program for Dining Philosophers Problem.
3. Program for Producer – Consumer Problem concept.
4. Program for First Come First Serve Algorithm.
5. Program for Shortest Job First Scheduling Algorithm.
6. Program for Round Robin Scheduling Method.
7. Program for Priority Scheduling Algorithm.
8. Implement the concept of Fragmentation and Defragmentation.
9. Design and develop an Android App.

II-YEAR (III-SEMESTER)

DATA STRUCTURES LAB		Course Code:IT285	Credits:1
No. of Lab (Hrs./Week):2	No. of Lab Sessions (Sem.):10	Mid Sem. Exam (Hrs.):0	End Sem. Exam (Hrs.):2

(Effective from session: 2018-19)

NOTE: Suggested list of experiments but not limited to these only.
List of Experiments:

1. Run time analysis of Fibonacci Series
2. Study and Application of various data Structure
3. Study and Implementation of Array Based Program
    a. Searching (Linear Search, Binary Search)
    b. Sorting (Bubble, Insertion, Selection, Quick, Merge etc)
    c. Merging
4. Implementation of Link List
    a. Creation of Singly link list, Doubly Linked list
    b. Concatenation of Link list
    c. Insertion and Deletion of node in link list
    d. Splitting the link list into two link list
5. Implementation of STACK and QUEUE with the help of
    a. Array
    b. Link List
6. Implementation of Binary Tree, Binary Search Tree, Height Balance Tree
7. Write a program to simulate various traversing Technique
8. Representation and Implementation of Graph
    a. Depth First Search
    b. Breadth First Search
    c. Prims Algorthim
    d. Kruskal's Algorithms
9. Implementation of Hash Table.

II-YEAR (III-SEMESTER)
(Effective from session: 2018-19)

WEB TECHNOLOGIES LAB I		Course Code: IT287	Credits:1
No. of Lab (Hrs/Week):2	No. of Lab Sessions (Sem.):10	Mid Sem. Exam (Hrs):0	End Sem. Exam (Hrs):2

In this lab programs related to XML and HTML.

IV-SEMESTER

II-YEAR (IV-SEMESTER)

DIGITAL COMMUNICATION AND CODING		**Course Code:EC230**	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

Unit I: Signals and their classification, Fourier Transforms and their properties, Modulation Theorem, Convolution Theorems, Frequency Spectrum, Autocorrelation Cross correlation and their Properties, Energy Spectral Density, Power Spectral Density, Condition of Distortionless Transmission.
Modulation, Needs of Modulation, Types of modulation: AM, FM and PM (equations of modulated ware, modulation index, bandwidth requirements, effect of noise)

Unit II: Sampling of Signal, Sampling Theorem for Low Pass and Band Pass Signals, Aliasing, Pulse Modulation: PAM, PPM and PWM, Time Division Multiplexing, Channel Bandwidth for PAM-TDM Signal, Types of Sampling: Instantaneous, Natural and Flat Top, Aperture Effect

Unit II: Pulse Code Modulation: Quantization: Uniform and Non-Uniform, Quantization Error, Signal-to-Noise Ratio in PCM, Companding: A-Law and μ-Law, Data Rate and Bandwidth of Multiplexed PCM Signal, Digital Hierarchy (T_0 , T_1, T_2, T_3 and T_4), Inter-symbol Interference, Differential PCM, Delta Modulation, Adaptive Delta Modulation, Slope Overload Error, Granular Noise. Line Coding: Unipolar RZ and NRZ, Bipolar RZ and NRZ, AMI, Split Phase etc. Properties for the selection of Line Codes, HDB Signaling , B8ZS Signaling, Inter-symbol Interference, Nyquist Criteria for Zero ISI, Differential Coding, Regenerative Repeaters, Eye Diagram.

Unit III: Digital Modulation Techniques:- Analysis, Generation and Detection , Spectrum and Bandwidth of Amplitude Shift Keying, Binary Phase Shift Keying, Differential Phase Shift Keying , Quadrature Phase Shift Keying, M-ary PSK, Binary Frequency Shift Keying, M-ary FSK, Quadrature Amplitude Modulation, Probability of error, bit error rate, Matched Filers.

Unit IV: Information,Amount of Information, Unit of Information, Average Information or Entropy, Information Rate, Joint and Conditional Entropy, Discrete Memoryless Channel-Channel representation, channel matrix, properties of channel matrix, Special channels-(Lossless, Deterministic, Noiseless, Binary Symmetric Channel, Binary Channel, Binary Erasure Channel), Mutual Information and Channel Capacity, Mutual Information and Channel Capacity for Special Channels. Coding to increase Average Information per Bit, Shannon's Theorem & Its Application, Capacity of Gaussian Channel, Shannon Hartley Theorem, Bandwidth & S/N Trade off.

Unit V: Source Coding Techniques: Shannon Fano and Huffman Coding Algorithms and Coding Efficiency , Fixed Length Codes, Variable Length Codes, Distinct Code, Prefix-free Codes, Uniquely Decodable Codes, Error Control Coding : Linear Block Codes, Systematic Linear Blocks Codes, Parity Check Matrix, Syndrome Testing, Cyclic code, Hamming Code, Error Detection and Correction Codes, Convolution Codes: State Diagram, Tree Diagram and Trellis Diagram, Maximum Likelihood Decoding, Viterbi decoding.

Text Books:
[1] Taub & Schilling: Principles of Communication system, TMH.
[2] Lathi B.P.: Modern Analog and Digital Communication systems, Oxford Uni. Press.
References:
[1] Haykin Simon: Digital Communication, Wiley Publication.
[2] B. Sklar: Digital Communication, Pearson Education
[3] Proakis: Digital communication, McGraw Hill
[4] Schaum's Outline series: Analog and Digital Communication.
[5] Tomasi: Advanced Electronics Communication Systems, 6th Edition, PHI
[6] Singh and Sapre: Communication System, TMH
[7] Couch: Digital and Analog Communication, Pearson Education.

II-YEAR (IV-SEMESTER)

SOFTWARE ENGINEERING		Course Code: CS202	Credits:4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

UNIT I SOFTWARE ENGINEERING

Introduction to software engineering: definitions, role of software engineering, planning a software project, defining the problem, developing a solution strategy, planning the development process, software engineering process paradigms, principles of software engineering, software engineering activities.

UNIT II REQUIREMENT ANALYSIS AND DESIGN

Software Requirement Specification (SRS): Introduction, need of SRS, significance, characteristics of SRS, Structure of SRS, IEEE standards for SRS design, functional and non-functional requirements, Requirement gathering and analysis, requirement engineering and management.

UNIT III SOFTWARE DESIGN PROCESS

Software Design: Introduction, design process activities: architectural design, Abstract specification, Interface design, component design, data structure design, algorithm design modular approach, top-down design, bottom-up design, design methods: data-flow model: data flow diagram, entity-relation-attribute model: E-R diagram, structural model: structure charts, context diagrams, objectmodels: use case modeling, use case diagrams, sequence diagrams, cohesion and coupling.

UNIT IV SOFTWARE LIFE CYCLE MODELS

Software Development Life Cycle (SDLC), SDLC models, waterfall model and its variations, prototype model, iterative enhancement model, spiral model, RAD model, comparison of these models, software development teams, software development environments, validation and traceability, maintenance, prototyping requirements, Software project management.

UNIT V SOFTWARE TESTING AND MAINTENANCE

Testing Methods: unit testing, integration testing, system testing, acceptance testing, testing techniques: white box testing, black box testing, thread testing, regression testing, alpha testing, beta testing, static testing, dynamic testing, Evolution of software products, economics of maintenance, category of software maintenance, Role of product development life cycle, deployment model, adaptive maintenance, corrective maintenance, perfective maintenance, enhancement request, proactive defect prevention, problem reporting, problem resolution, software maintenance from customers' perspective, maintenance standard: IEEE-1219, ISO-12207.

Text Books:

1. Pankaj Jalote, An Integrated Approach to Software Engineering, Narosa Publishing House, New Delhi 1997.
2. Ian Sommerville, Software Engineering, Pearson Education, 2009.

Reference Books:

3. Pressman Roger S., Software Engineering: Practitioner's Approach, McGraw-Hill Inc., 2004.
4. Nasib S. Gill,Software Engineering: Software Reliability, Testing and Quality Assurance, Khanna Book Publishing Co (P) Ltd., 2002.

II-YEAR (IV-SEMESTER)

DISCRETE STRUCTURE		**Course Code: CS204**	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

UNIT I MATHEMATICAL LOGIC

Statements and notations, connectives, well formed formulas, truth tables, tautology, equivalence implication, normal forms, predicates: predicative logic, free & bound variables, rules of inference, consistency, proof of contradiction, automatic theorem proving.

UNIT II SET THEORY

Properties of binary relations, equivalence, compatibility and partial ordering relations, hasse diagram. functions: inverse function comports of functions, recursive functions, lattice and its properties, pigeon hole principles and its application, algebraic structures: algebraic systems examples and general properties, semi groups and monads, groups sub groups' homomorphism, isomorphism.

UNIT III ELEMENTARY COMBINATORICS

Basis of counting, combinations & permutations, with repetitions, constrained repetitions, binomial coefficients, binomial multinomial theorems, the principles of inclusion – exclusion.

UNIT IV RECURRENCE RELATION

Generating functions, function of sequences calculating coefficient of generating function, recurrence relations, solving recurrence relation by substitution and generating funds, characteristics roots solution of in homogeneous recurrence relation.

UNIT V GRAPH THEORY

Representation of graph, DFS, BFS, spanning trees, planar graphs. graph theory and applications, basic concepts isomorphism and sub graphs, multi graphs and euler circuits, hamiltonian graphs, chromatic numbers

Text Books:

[1].Ralph. P.Grimaldi, Discrete and Combinational Mathematics- An Applied Introduction-5th Edition, Pearson Education

[2]. Trembly J.P. & ManoharP. Discrete Mathematical Structures with applications to computer science, TMH
[3].Kenneth H. Rosen, Discrete Mathematics and its Applications, Fifth Edition.TMH.

Reference Books:

[4].Thomas Koshy, Discrete Mathematics with Applications, , Elsevier
[5]. Bernand Kolman, Roberty C. Busby, Sharn Cutter Ross,Discrete Mathematical Structures, Pearson Education/ PHI.
[6]. Garry Haggard and others, Discrete Mathematics for Computer science, , Thomson.
[7] J.L. Mott, A. Kandel, T.P. Baker,Discrete Mathematics for Computer Scientists & Mathematicians, Prentice Hall.

II-YEAR (IV-SEMESTER)

(Effective from session: 2018-19)

DATABASE MANAGEMENT SYSTEM		**Course Code: CS206**	**Credits:** 4
No. of Lectures (Hrs./Week): 4	**No. of Lectures (Sem.):** 60	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

UNIT I DATA BASE SYSTEM

Data base system vs. file system, view of data, data abstraction, instances and schemas, data models, ER model, relational model, database languages, DDL, DML, database access for applications programs, data base users and administrator, transaction management, data base system structure, storage manager, query processor, history of data base systems, data base design and ER diagrams, beyond ER design entities, attributes and entity sets, relationships and relationship sets, additional features of ER model, concept design with the ER model, and conceptual design for large enterprises.

UNIT II RELATIONAL MODEL

Introduction to the relational model, integrity constraint over relations, enforcing integrity constraints, querying relational data, and logical data base design, destroying /altering tables and views. relational algebra and calculus: relational algebra, selection and projection set operations, renaming, joins, division, relational calculus, tuple relational calculus, domain relational calculus, expressive power of algebra and calculus.

UNIT III BASIC SQL QUERY

Examples of basic SQL queries, nested queries, correlated nested queries set, comparison operators, aggregative operators, NULL values, comparison using null values, logical connectivity's, AND, OR and NOTR, impact on SQL constructs, outer joins, disallowing NULL values, complex integrity constraints in SQL triggers and active data bases.

UNIT IV SCHEMA REFINEMENT

Problems caused by redundancy, decompositions, problem related to decomposition, reasoning about FDS, FIRST, SECOND, THIRD normal form, BCNF, forth normal form, lossless join decomposition, dependency preserving decomposition, schema refinement in data base design, multi valued dependencies.

UNIT V OVERVIEW OF TRANSACTION MANAGEMENT

ACID properties, transactions and schedules, concurrent execution of transaction, lock based concurrency control, performance locking, and transaction support in SQL, crash recovery, concurrency control, Serializability and recoverability, lock management, lock conversions, dealing with dead locks, specialized locking techniques, concurrency without locking, crash recovery: ARIES, log, other recovery related structures, the write, ahead log protocol, check pointing, recovering from a system crash, media recovery, other approaches and interaction with concurrency control.

Text Books:

1. Elmasri Navrate, Data Base Management System, Pearson Education, 2008.
2. Raghurama Krishnan, Johannes Gehrke, Data Base Management Systems, TMH, 3rd edition, 2008.

References Books:

3. C. J. Date, Introduction to Database Systems, Pearson Education, 2009.
4. Silberschatz, Korth, Database System Concepts, McGraw hill, 5th edition, 2005.
5. Rob, Coronel & Thomson, Database Systems Design: Implementation and Management, 2009.

II-YEAR (IV-SEMESTER)

FUNDAMENTALS OF DIGITAL ELECTRONICS CIRCUITS		**Course Code: EC221**	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

UNIT I

Number systems & codes, Binary arithmetic Boolean algebra and switching function. Minimization of switching function, concept of prime implecant etc. Karnaugh's map method, Quine & McCluskey's method, cases with don't care terms and multiple outputs switching function. Logic gates, NAND, NOR realization of switching function; half-adder half-subtractor full-adders full-subtractor circuits. Series & parallel addition and BCD adders, look-ahead carry generator.

UNIT II

Linear wave shaping circuits, Bistable, monostable & astable multivibrators, Schmitt trigger circuits .Introduction to D/A converters. Various types of Analog to Digital & Digital to Analog converters sample & hold circuits and V-F converters.

UNIT III

Logic families: RTL, DTL, all types of TTL circuits, ECL, 12 L and PMOS, NMOS &CMOS logic etc. Gated flip-flops and gated multivibrators etc; Interfacing between TTL to MOS, vice-versa.

UNIT IV

Introduction to shift registers / ring counters synchronous & asynchronous counters and designing of combinational circuits like code converters & counters etc.

UNIT V

Semiconductor memories & designing with ROM and PLA: Decoders Encoders multiplexers & demultiplexers**.**

Text Books:

1. Tocci, "Digital Systems Principles & Applications".
2. M. Mano, "Digital Logic & Computer Design", (PHI).
3. Dr. A K Gautam, Digital Electronics, Khanna Publication

Reference Books:

1. John F. Wakerly, Digital Design: Principles & Practices, Pearson Education.2003
2. Richard F.Tinder, Engineering Digital Design, 2/e, Harcourt India Private Ltd., 2001
3. William I. Fletcher, An Engineering Approach to Digital Design, Pearson Education
4. William H.Gothmann, Digital Electronics: An Introduction to Theory and Practice, Eastern Economy Edition, Prentice-Hall of India Private Limited, New Delhi. 2001.
5. Jacob Millman & Herbert Taub,Pulse,Digitaland Switching Waveforms,13th Reprint,Tata McGraw Hill Publishing Company Ltd., 1999

DIGITAL ELECTRONIC CIRCUITS LAB		Course Code:EC273	Credits:1
No. of Lab (Hrs./Week): 2	No. of Lab Sessions (Sem.):15	Mid Sem. Exam (Hrs.): 0	End Sem. Exam (Hrs.):2

NOTE: Suggested list of experiments but not limited to these only.

List of Experiments:

1. To verify the De-Morgan's theorems using NAND/NOR gates.
2. To design the full adder and half adder using AND, OR and X- OR gates.
3. To implement the logic circuits using decoder.
4. To implement the logic circuits using multiplexer.
5. To design parity generator and checker circuits.
6. To design and implement RS FLIP FLOP using basic latches.
7. Realization and testing of basic logic gates using discrete components.
8. Realization and testing of CMOS IC characteristics.
9. Realization and testing of TTL IC characteristics.
10. Realization and testing of RAM circuit using IC 7489.
11. Realization and testing of Interfacing of CMOS- TTL and TTL- CMOS ICS.

II-YEAR (IV-SEMESTER)
(Effective from session: 2018-19)

SOFTWARE ENGINEERING LAB		**Course Code: CS282**	**Credits:**1
No. of Lab (Hrs./Week): 2	**No. of Lab Sessions (Sem.):** 10	**Mid Sem. Exam (Hrs.):** 0	**End Sem. Exam (Hrs.):** 2

NOTE: Suggested list of experiments but not limited to these only.

List of Experiments

1. Introduction and project definition.
2. Software process overview with configuration management tool.
3. Design the software requirements by using Requisite Pro.
4. Introduction to UML and use case diagrams with the help of Rational Rose.
5. System modeling and design of DFD and ER diagram.
6. Design of Flow of events and activity diagram by using Rational Rose.
7. OO analysis and discovering classes with the help of Requisite Pro.
8. Design the Interaction diagrams, sequence and collaboration diagrams with the help of software engineering tool.
9. Software architecture and object-oriented design by using Rational Rose.
10. Draw the traceability matrix with the help of designing the requirements and feature matrix

II-YEAR (IV-SEMESTER)

DATABASE MANAGEMENT SYSTEM LAB		**Course Code: CS284**	**Credits:**1
No. of Lab (Hrs./Week): 2	**No. of Lab Sessions (Sem.):** 10	**Mid Sem. Exam (Hrs.):** 0	**End Sem. Exam (Hrs.):** 2

(Effective from session: 2018-19)

NOTE: Suggested list of experiments but not limited to these only.

List of Experiments:

1. Introduction to MySQL, an exercise of data types in MySQL & Data Definition Language Commands
2. Exercise on Data Manipulation Language and Transaction Control Commands
3. Exercise on Types of Data Constraints
4. Exercise on JOINS (Single-Table) Using Normalization
5. Exercise on JOINS (Multiple-Table) Using Normalization
6. Exercise on GROUP BY/ORDER BY Clause and Date Arithmetic
7. Exercise on different Functions (Aggregate, Math and String)
8. Exercise on different types of sub queries
9. Procedures
10. View
11. Triggers

II-YEAR (IV-SEMESTER)

WEB TECHNOLOGIES LAB II		**Course Code:** IT282	**Credits:**1
No. of Lab (Hrs./Week): 2	**No. of Lab Sessions (Sem.):** 12	**Mid Sem. Exam (Hrs.):** 0	**End Sem. Exam (Hrs.):** 2

(Effective from session: 2018-19)

NOTE: Suggested list of experiments but not limited to these only.

Note: Experiments of this lab will be based on Implementation through .NET/PHP.

List of Experiments

1. WAP to demonstrate the string handling.

2. WAP to demonstrate array handling.

3. WAP to demonstrate the form handling.

4. WAP to demonstrate the file handling and uploading.

5. WAP to demonstrate the exception handling.

6. WAP to demonstrate the cookie handling and session handling.

7. WAP to demonstrate the E-mail sending.

8. WAP to demonstrate the database connectivity (MS-Access, Sql Server, MySQL).

9. WAP to demonstrate the use of filter in PHP.

10. WAP to demonstrate the OOPs concepts.

11. WAP to create a login page and authenticate login credentials with backend.

12. Design a web page using PHP and host it to hosting server (may be used hostinger server).

V-SEMESTER

III-YEAR (V-SEMESTER)
(Effective from session: 2018-19)

THEORY of AUTOMATA		Course Code: CS301	Credits: 4
No. of Lectures (Hrs./Week): 4	**No. of Lectures (Sem.):** 60	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

UNIT I AUTOMATA

Introduction; alphabets, strings and languages; automata and grammars, deterministic finite automata (DFA)-formal definition, simplified notation: state transition graph, transition table, language of DFA, Nondeterministic finite Automata (NFA), NFA with epsilon transition, language of NFA, equivalence of NFA and DFA, minimization of finite automata, distinguishing one string from other, Myhill-Nerode Theorem

UNIT II REGULAR EXPRESSIONS AND LANGUAGES

Regular expression (RE), definition, operators of regular expression and their precedence, algebraic laws for regular expressions, Kleen‟s theorem, regular expression to FA, DFA to regular expression, arden theorem, non regular languages, pumping lemma for regular languages. application of pumping lemma, closure properties of regular languages, decision properties of regular languages, FA with output: moore and mealy machine, equivalence of moore and mealy machine, applications and limitation of FA.

UNIT III CONTEXT-FREE GRAMMAR AND LANGUAGES

Context Free Grammar (CFG) and Context Free Languages (CFL): definition, examples, derivation, derivation trees, ambiguity in grammar, inherent ambiguity, ambiguous to unambiguous CFG, useless symbols, simplification of CFGs, normal forms for CFGs: CNF and GNF, closure properties of CFLs, decision properties of CFLs: emptiness, finiteness and membership, pumping lemma for CFLs.

UNIT IV PUSH DOWN AUTOMATA

Push Down Automata (PDA): description and definition, instantaneous description, language of PDA, acceptance by final state, acceptance by empty stack, deterministic PDA, equivalence of PDA and CFG, CFG to PDA and PDA to CFG, two stack PDA

UNIT V TURING MACHINES (TM)

Basic model, definition and representation, instantaneous description, language acceptance by TM, variants of turing machine, TM as computer of integer functions, universal TM, church‟s thesis recursive and recursively enumerable languages, halting problem, introduction to undecidability, undecidable problems about TMs. Post Correspondence Problem (PCP), modified PCP, introduction to recursive function theory.

Text Books:

1. Hopcroft, Ullman, “Introduction to Automata Theory, Languages and Computation”, Pearson Education
2. K.L.P. Mishra and N.Chandrasekaran, “Theory of Computer Science : Automata, Languages and Computation”, PHI

References Books:

3. Martin J. C., “Introduction to Languages and Theory of Computations”, TMH
4. Papadimitrou, C. and Lewis, C.L., “Elements of the Theory of Computation”, PHI

III-YEAR (V-SEMESTER)

COMPUTER NETWORKS		Course Code:IT303	Credits:4
No. of Lectures (Hrs./Week):4	No. of Lectures (Sem.):60	Mid Sem. Exam (Hrs.):1.5	End Sem. Exam (Hrs.):3

(Effective from session: 2018-19)

UNIT I INTRODUCTION ANDPHYSICALLAYER

Key concepts of computer network, transmission media, network devices, network topology, topology design issues, types of network: LAN, MAN, WAN, PAN, ISDN systems and ATM network, OSI-reference model, open system standards, characteristics of network, TCP/IP model, protocols and standards, encoding technique.

UNIT II SWITCHING ANDDATALINKLAYER

Circuit switching, packet switching, message switching, hybrid switching, and ATM switching, multiplexing techniques: TDMA, FDMA, WDMA, CDMA, data link layer: LLC &MAC level protocols and design issues, issues IEEE 802 LAN Standards, framing, CRC, error control, flow control, HDLC, ALOHA and performance issues. Frames relay networks and performance parameters.

UNIT III NETWORK LAYER

Network layer design issues, overview of IPv4 and IPv6, addressing: class full and classless, static and dynamic, subnet and super net, auto configuration through DHCP, routing protocols: RIP, DVR,LSR, OSFP, BGP, congestion control algorithm, subnet concept, virtual LAN, ICMP, multicasting, mobile IP.

UNIT IV TRANSPORT LAYER

Port addressing schemes, connectionless and connection oriented services: TCP and UDP, wireless TCP, Congestion control, queue management, NAT, PAT, socket format at transport level, socket interface and programming.

UNIT V APPLICATION LAYER

Client server architecture, domain name services, application services: HTTP, TELNET, RLOGIN, FTP, CBR, NFS, SMTP, POP, IMAP, MIME, voice and video over IP, social issues- privacy, freedom of speech, copy right.

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Text Books:

[1]. S. Tanenbaum, Computer Networks, 4th edition, Prentice Hall, 2008

[2]. Forouzan, B.A., Data Communication and Networking, Tata McGraw-Hill.

References Books:

[3].W. Stallings, Data and Computer Communications, 8th edition, Prentice Hall, 2007

[4]. Douglus E. ComerTCP/IP Principles, Protocols and Architecture, Pearson Education

[5]. F. Haball ,Data Communication, Computer network & open systems - Computer Networks : An Engineering approach - S. Keshav

[6]. Kurose, J.F. & Ross, K.W., Computer Networking: A Top-Down Approach Featuring the Internet, Addison Wesley.

III-YEAR (V-SEMESTER)

Compiler Design		Course Code: IT305	Credits:4
No. of Lectures (Hrs./Week):4	No. of Lectures (Sem.):60	Mid Sem. Exam (Hrs.):1.5	End Sem. Exam (Hrs.):3

(Effective from session: 2018-19)

UNIT I INTRODUCTION TO COMPILER

Phases of Compilation – Lexical Analysis, Regular Grammar and regular expression for common programming language features, pass and Phases of translation, interpretation, bootstrapping, data structures in compilation – LEX lexical analyzer generator.

UNIT II PARSING TECHNIQUE

Context free grammars, Top down parsing – Backtracking, LL (1), recursive descent parsing, Predictive parsing, Preprocessing steps required for predictive parsing.

Bottom up parsing: Shift Reduce parsing, LR and LALR parsing, Error recovery in parsing , handling ambiguous grammar..

UNIT III SYNTAX-DIRECTED TRANSLATION

Semantic analysis : Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes, Syntax directed translation, Conversion of popular Programming languages language Constructs into Intermediate code forms, Type checker.

Symbol Tables: Symbol table format, organization for block structures languages, hashing, tree structures representation of scope information. Block structures and non-block structure storage allocation: static, Runtime stack and heap storage allocation, storage allocation for arrays.

UNIT IV SYMBOL TABLES

Code optimization: Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation.

Data flow analysis: Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation.

UNIT V CODE GENERATION

Object code generation: Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms, DAG for register allocation.

Text Books:

[1]. Aho, Sethi & Ullman, "Compilers: Principles, Techniques and Tools", PearsonEducation
[2]. V Raghvan, " Principles of Compiler Design", TMH

Reference Books:

[3]. Kenneth Louden," Compiler Construction", Cengage Learning.
[4]. Charles Fischer and Ricard LeBlanc," Crafting a Compiler with C", Pearson

III-YEAR (V-SEMESTER)

COMPUTER PROGRAMMING III		**Course Code:IT307**	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

UNIT I JAVA BASICS REVIEW

Java history, Java features, Java streaming, Java and Internet, Java contribution to Internet: Java applets, security, portability; Java environment, Java library, Java program structure, Java Virtual Machine (JVM)

architecture, Just In Time compiler (JIT), data type, variables and arrays, operators, control statements, object-oriented paradigms: abstraction, encapsulation, inheritance, polymorphism; Java class and OOP implementation, packages and interfaces, multithreading.

UNIT II DISTRIBUTED COMPUTING

Collection framework, custom sockets, Remote Method Invocation (RMI), activation, object serialization, distributed garbage collection, RMI-IIOP (Internet Inter ORB (Object Request Broker) Protocol), interface definition language, JINI, Common Object Request Broker Architecture (CORBA), Java Data Base Connectivity (JDBC), Servlets.

UNITIII JAVA BEANS AND SWING

Bean concepts, bean writing process, bean to build application: packaging beans in Java Archive (JAR) file, composing beans in a builder environment; naming patterns for bean properties and events, bean property types, files events in bean box, bean customization, persistence, application, origin of swing, swing and Abstract Window Toolkit (AWT), deployment using swing, advanced swing techniques, JAR file handling, exploring swings, advanced swing.

UNIT IV JAVA ENTERPRISE APPLICATIONS

Java Native Interface (JNI) technology, Java Servlet, Java Server Pages (JSP), JDBC, session beans, entity beans, Enterprise Java Beans (EJB), programming and deploying EJB, Java transactions, Java 2 Enterprise Editions (J2EE), J2EE design pattern, J2EE architecture, J2EE components and containers, J2EE services, Unified Modeling Language (UML), Extensible Markup Language (XML).

UNIT V STRUTS, HIBERNATE AND SPRING

Struts 2 frameworks, working with struts 2 actions, adding workflow with interceptors, data transfer, struts tags, user interface tags, integration with spring and hibernate, exploring the validation framework, internationalization, hibernate, hibernate architecture, hibernate configuration, creating persistent classes, mapping inheritance with Java classes, working with collections, persistent objects, scalar queries and hibernate query language, hibernate caching, hibernate transactions and locking, hibernate and XDOCLET, hibernate and eclipse, spring, basic bean wiring, advanced bean wiring, spring and EJB, spring with JDBC.

Books:

1. Core JAVA: Advance Features, Hortsmann, Cornell, Pearson Education, 2009.
2. Programming with JAVA, E. Balagurusawamy, Tata McGraw Hill, 1998.

Reference Books:

3. JAVA Beginner's guide, Herbert Schildt, Tata McGraw Hill, 2007.
4. Java How to Program, Deitel & Deitel, Prentice-Hall, 1999.
5. The Complete Reference JAVA 2, Herbert Schildt, 7th Edition, Tata McGraw Hill, 2009.
6. The Complete Reference J2EE, James Keogh, Tata McGraw Hill, 2002
7. The Complete Reference Struts, James Holmes, Tata McGraw Hill, 2007.
8. Swings: A Beginners' Guide, Herbert Schildt, Tata McGraw Hill, 2006.
9. Hibernate: A Developer's Notebook, James Elliott, O'Reily Media Inc, 2004.
10. The JAVA Handbook, Patrick Naughton, Michael Morrison, Osborne/McGraw-Hill, 1996.
11. The Java Programming Language, Ken Arnold, James Gosling, Addison-Wesley, 1996.
12. Professional Java Development with the Spring Framework, Rod Johnson, Jorgen Hoeller, Alef Arendsen, Thomas Risberg, Colin Sampaleanu, Wrox, 2005.

III-YEAR (V-SEMESTER)

COMPUTER NETWORKS LAB		**Course Code:IT385**	**Credits:**1
No. of Lab (Hrs./Week): 2	**No. of Lab Sessions (Sem.):** 10	**Mid Sem. Exam (Hrs.):**0	**End Sem. Exam (Hrs.):** 2

(Effective from session: 2018-19)

NOTE: Suggested list of experiments but not limited to these only.

List of Experiments:

1. Introduction to transmission media(CAT5, OFC, COAXIAL CABLE Wireless)
2. Introduces network interfaces(Wired and Wireless)
3. Configure and installing a Ethernet(10/100)
4. Performance evaluation of Ethernet(10/100)
5. Topology design(Ring, Bus)
6. Generation of data packet and measurement(CBR, VBR, Poison)
7. Router configuration
8. Switch configuration
9. Server configuration
10. Congestion control of network

11. QoS of network

12. Protocols and the configuration

13. Wireless systems

14. S3curity (WEP, WPA)

III-YEAR (V-SEMESTER)

Compiler Design LAB		**Course Code:**IT383	**Credits:**1
No. of Lectures (Hrs./Week): 2	**No. of Lab Sessions (Sem.):** 15	**Mid Sem. Exam (Hrs.):**0	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

NOTE: Suggested list of experiments but not limited to these only.

List of Experiments:

1. Define LEX and YACC tools in detail.
2. Write a programto check whether a string belongs to the grammar or not.
3. Write a programto generate a parse tree.
4. WAP to convert regular expression into NFA.
5. WAP to generate tokens for a given grammar.
6. Write a programto find leading terminals.
7. Write a programto find trailing terminals.

8. Write a programto compute FIRST of non-terminals.
9. Write a programto compute FOLLOW of non-terminals.
10. Write a programto check whether a grammar is left recursive and remove left recursion.
11. Write a programto remove left factoring.
12. Write a programto check whether a grammar is Operator precedent.
13. Write a Program to implement Push Down Automata.
14. Write a program to implement Thomson's construct

III-YEAR (V-SEMESTER)

COMPUTER ROGRAMMING IIILAB		**Course Code:**IT385	**Credits:**1
No. of Lab (Hrs./Week): 2	**No. of Lab Sessions (Sem.):** 15	**Mid Sem. Exam (Hrs.):**0	**End Sem. Exam (Hrs.):**2

(Effective From session: 2017-18)

NOTE: Suggested list of experiments but not limited to these only.

Program /Experiments List

1. To implement spell checker using dictionary.
2. Write a java exception handling program to demonstrate checked exceptions.
3. Write a program to design a digital and analog clock using java swing/applet.
4. Write a Java program that reads a file and displays a file and displays the file on the screen, with a line number before each line.

5.Write a java networking program to demonstrate client server interaction.

6.Write a java program to implement server interface using RMI.

7.Write a java program to implement insert and delete queries using JDBC.

8.Write a program to connect to URL and display Response header data and N-line requested data.

9. Write a JDBC program to connect the database and verify the username and password from the database.

10.To implement a calculator with functionality using java swing/applet.

11.Write a java applet using swings which displays Jlabel, Jchekbox, Jtogglebutton and Jscrollpane.

12.Write a java program for create a menuing model used in swings. The File menu should include new, open close, Edit menu should include copy and paste, and choice menu should include toggle, choice1, choice2 and choice3.

13.Implement a Notepad using java swing /applet.

14.Implement any game /puzzle using java.

15.Student mini project in java (Max 4 student in group).

III-YEAR (V-SEMESTER)

WEB TECHNOLOGIES LAB III		Course Code:IT387	Credits:1
No. of Lab (Hrs./Week): 2	No. of Lab Sessions (Sem.): 15	Mid Sem. Exam (Hrs.):0	End Sem. Exam (Hrs.):3

(Effective from session: 2017-18)

NOTE: Suggested list of experiments but not limited to these only.

List of Experiments:

1. Prepare use case diagrams for the Admission Management System using UML.

2. Prepare class diagrams for the School Office Management System using UML.

3. Prepare activity diagrams for the Hostel Management System using UML.

4. Prepare state chart diagrams for the Library Management System using UML.

5. Prepare sequence diagrams for theStudent Attendance Management System using UML.

6. Prepare component diagrams for the Department Timetable Management System using UML.

7. Prepare Use case, Class Diagram, Activity Diagram using UML for the following:

a. Online Examination System

b. Student Information System

c. e-book Management System

8. Prepare State Chart and sequence diagram using UML for the following:

a. ATM System

b. Health Center Record Management System

9. Design Component diagram using UML for the following:

a. Online Railway Ticket Reservation System

b. Online Book Shopping System

c. Course Registration System

10. Prepare Use case diagram, Class diagram, Sequence diagram and activity diagram using UML for the following:

a. E-Complain Management System

b. Credit card processing System

III-YEAR (V-SEMESTER)

INDUSTRIAL ECONOMICS AND MANAGEMENT		Course Code: IT311	Credits: 4
No. of Lectures (Hrs./Week): 4	No. of Lectures (Sem.): 60	Mid Sem. Exam (Hrs.): 1.5	End Sem. Exam (Hrs.): 3

(Effective from session: 2018-19) ****OPEN ELECTIVE 2**

Unit I: Analysis of Public Projects

Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost –effectiveness analysis.

Unit II: Introduction to Management

Theories of management: Traditional behavioral, contingency and systems approach, organization as a system.

Unit III: Motivation and Productivity

Theories of motivation, leadership styles and managerial grid. Co-ordination, monitoring and control in organizations, Techniques of control, Japanese management techniques.

Unit IV: Micro Economics

Basic concept of Micro Economics, Concept of demand, supply & price, the law pertaining to demand, supply & price indifference curve analysis, price effect, income effect & substitution effect.

Unit V: Money and Banking

Balance of payment disequilibrium in balance of payment, Functions of money, Value of money, Functions of bank: commercial banks & central banking in India. Monetary & fiscal policy: a brief introduction case study pertaining to macro economics, A brief description of Indian Financial system.

Text Books:

1. White, Engineering Economics,Wiley.
2. Riggs, J. L. Bedworth D. B. & Randhawa , S. U., Engineering Economics, McGraw Hill.

Reference Books:

3. Schemerhorn,Introduction to Management, John Wiley.
4. Draft, Principles of Management, Cengage Learning Publishers.
5. Peter Drucker, Harper & Row, The Practice of Management, HarperBussiness.
6. Bernadette Andreosso& David Jacobson,Industrial Economics and Organization: A European Perspective, McGraw Hill.
7. Peter Jochumzen, Essentials of Macroeconomics,bookboon.com.
8. Ken Heather,The Economics of Industries and Firms, Pearson.
9. Bruce Allen, Neil Doherty, Keith WeigeltManagerial Economics; Edwin Mansfield, W W Norton & Co Inc..

III-YEAR (V-SEMESTER)
(Effective from session: 2018-19) ****OPEN ELECTIVE 2**

INTRODUCTION TO SOCIAL WORK	Course Code: SW505	Credits: 4

No. of Lectures (Hrs./Week): 4	No. of Lectures (Sem.): 60	Mid Sem. Exam (Hrs.): 1.5	End Sem. Exam (Hrs.): 3

Unit I: Introduction
Conceptual Framework of Social Work, Definition, Meaning, Scope, Goals and Values, Ethics in Social Work, Principles, and Methods of Social Work Practice.

Unit II: Basic Concepts
Social Welfare, Social Service, Social Reform, Social Development,Social Defence, Social Security, Social Justice, Fundamental Rights Directive Principles and Human Right, Social Work and Human Rights.

Unit III: History of Social Work
History and development of Social Work in UK, USA, History of Social Work in India; Social Reform Movements in 19th and 20TH Century, Gandhian Ideology, Sarvodays, Antyodaya.

Unit IV: Contemporary ideologies for social change
Neo-liberalism and globalization, post modernism, feminism, Resurgence of civil society, Ideology of Non-Government organization.

Unit V: Social Work Profession
Attributes of a profession, Attributes of a professional social worker,Social Work education in India. Interface between Professional and, Voluntary Social Work. Professional ethics, ProfessionalOrganizations- National/ International, Goals/Functions of Social Work: remedial, ameliorative, andrehabilitative, supportive, preventive, developmental and promotional, System and Integrated Approach to Social Work Practice. Evidence basedpractice.

III-YEAR (V-SEMESTER)

RIGHT TO INFORMATION AND PUBLIC ACCOUNTABILITY		Course Code: LB411	Credits: 4
No. of Lectures (Hrs./Week): 4	No. of Lectures (Sem.): 60	Mid Sem. Exam (Hrs.): 1.5	End Sem. Exam (Hrs.): 3

(Effective from session: 2018-19) ****OPEN ELECTIVE 2**

1. Evolution of the RTI Act 2005 in India, The Official Secrets Act 1923, Movement for right to freedom of information, role of Mazdoor Kisan Shakthi Sanghtana (MKSS) and other civil society organizations.
2. .Freedom of Information- International perspective and the Indian context, the Freedom of Information Act- 2002, Constitutional basis of RTI, the Right to Information as a Fundamental Right
3. RTI and Judiciary
4. Right to Information: Preamble, scope and limitations of the Act, definition of Public Authority, obligations of Public Authorities, role of Public Information Officers: PIOs and APIOs
5. Request for obtaining information, disposal of requests, the time limits for disposal of information requests, the fees and costs to be charged for providing information
6. Exemptions from disclosure of Information, partial disclosure and "Third Party" information, denial of third party information, Severability, channels of appeal, action in "Good Faith" , Information Commissions.
7. Right to Information conflict with Right to Privacy, RTI and protection of individual privacy.
8. RTI and Civil society: Concept of civil society, role of civil society organizations.
9. RTI and Good Governance: Concept of Good Governance, principles of good governance, Right to Information Act as an anti- corruption tool.
10. RTI and strengthening participatory democracy: Accountability and good governance, Transparency and Good Governance, Social justice and good governance, Right to Information and Media, public accountability and Lokpal.
11. RTI as a tool for Social Audit of Public Service Delivery: Social Audit in India; RTI and Public ServiceDelivery.
12. RTI and Panchayati Raj Institutions in Uttar Pradesh, disclosure of information at the Gram Panchayat, Kshettra Panchayat and Jila Panchayat level.

Recommended Readings:

1. C.P Bharthwal, Good Governanace in India (New Delhi: Sundeep Pub, 2003).
2. J. N. Barowalia, Commentary on the Right to Information Act (New Delhi: Jain Book Depot, 2010).
3. K. K. Jain, Right to Information (New Delhi: Regal Publication, 2010).
4. K.M Srivastava, Right to Information: A Global Perspective (New Delhi: Lancer Pubisher 2009).
5. P. K. Das, Handbook on Right to Information Act, 2005 (New Delhi: Universal Publication, 2005).
6. P.K. Saini & R.K Gupta, Right to Information Act, 2005 (New Delhi: Deep and Deep Publication).
7. Rajveer S. Dhaka, Right to Information and Good Governance (New Delhi: South Asia Book, 2010).
8. S. K Kataria, Right to Information lessons and Implications (New Delhi: National Publication, 2010).
9. S. L. Goel, Right to information and Good Governance (New Delhi: Deep and Deep publication 2007).
10. S. P. Sathe, Right to Information (New Delhi: LexisNexis: Butterworth, 2006).
11. Sudhir Naib, The Right to Information Act-2005 (New Delhi: OUP, 2011).

IT Forensics	**Course Code: IT309**	**Credits:** 4

No. of Lectures (Hrs./Week): 4	No. of Lectures (Sem.): 60	Mid Sem. Exam (Hrs.): 1.5	End Sem. Exam (Hrs.): 3

****OPEN ELECTIVE 2**

UNIT I
Overview of Biometrics, Biometric Identification, Biometric Verification, Biometric Enrollment, Biometric System Security. Authentication and Biometrics: Secure Authentication Protocols, Access Control Security Services, Matching Biometric Samples, Verification by humans. Common biometrics: Finger Print Recognition, Face Recognition, Speaker Recognition, Iris Recognition, Hand Geometry, Signature Verification

UNIT II
Introduction to Information Hiding: Technical Steganography, Linguistic Steganography, Copy Right Enforcement, Wisdom from Cryptography Principles of Steganography: Framework for Secret Communication, Security of Steganography System, Information Hiding in Noisy Data , Adaptive versus non-Adaptive Algorithms, Active and Malicious Attackers, Information hiding in Written Text.

UNIT III
A Survey of Steganographic Techniques: Substitution systems and Bit Plane Tools, Transform Domain Techniques: - Spread Spectrum and Information hiding, Statistical Steganography, Distortion Techniques, Cover Generation Techniques. Steganalysis: Looking for Signatures: - Extracting hidden Information, Disabling Hidden Information.

UNIT IV
Watermarking and Copyright Protection: Basic Watermarking, Watermarking Applications, Requirements and Algorithmic Design Issues, Evaluation and Benchmarking of Watermarking system. Transform Methods: Fourier Transformation, Fast Fourier Transformation, Discrete Cosine Transformation, Mellin-Fourier Transformation, Wavelets, Split Images in Perceptual Bands. Applications of Transformation in Steganography.

UNIT V
Computer Forensics, Rules of evidence, Evidence dynamics, Evidence collection, Data recovery, Preservation of digital evidence, surveillance tools for future warfare,

Text Books:
[1]. Katzendbisser, Petitcolas, " Information Hiding Techniques for Steganography and Digital Watermarking", Artech House.
[2]. Peter Wayner, "Disappearing Cryptography: Information Hiding, Steganography and Watermarking 2/e", Elsevier

Reference Books:

[3]. Bolle, Connell et. al., "Guide to Biometrics", Springer
[4]. John Vecca, “Computer Forensics: Crime scene Investigation”, Firewall Media 5. Christopher L.T. Brown, “Computer Evidence: Collection and Preservation”, Firewall Media

VI-SEMESTER

III-YEAR (VI-SEMESTER)
(Effective From session: 2018-19)

ARTIFICIAL INTELLIGENCE		**Course Code: IT300**	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

UNIT I INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Basic concept of artificial intelligence (AI), history of AI, AI and consciousness, weak and strong AI, physical symbol system hypothesis, comparison of computer and human skills, practical systems based on AI, development of logic, components of AI.

UNIT II PROBLEM SOLVING THROUGH AI

Defining problem as state space search, analyzing the problem, representing the problems from AI viewpoint, production system, developing production rules, characteristics of production system, algorithm for problem solving using AI technique.

UNIT III SEARCH TECHNIQUES

Use of search in AI problem solution, blind search techniques, heuristic search techniques, concept of heuristic knowledge, designing of the heuristic function, types of heuristic search techniques: generate and test, best first search, problem reduction using AND – OR graph, local search technique, branch and bound search, memory bounded search technique, local beam search, properties of heuristic search techniques, overestimation and underestimation of heuristic function, hill climbing search, simulated annealing search, constraint satisfaction, means ends analysis.

UNIT IV INTRODUCTION TO LOGIC

Introduction, propositional calculus, syntax of propositional calculus, semantics of propositional calculus, well formed formula, properties of statements, inferencing of propositional logic, predicate logic, syntax of predicate logic, semantics of predicate logic, representation of facts First Order Predicate Logic (FOPL), inferencing in predicate logic, concept of resolution, resolution algorithm, skolemization, Types of resolution, unit resolution, binary resolution.

UNIT V PROLOG and LISP

Basic concept of programming languages related to artificial intelligence problems, concept of programming in Logic, basic prolog constructs, atoms, defining the rules, writing small programs in prolog, concept of list processing, basic LISP constructs, writing functions in LISP, some simple programs of LISP.

Text books:

1. Elanie Reich, Artificial Intelligence, Tata mcgraw Hill publishing house, 2008.
2. Peterson, Artificial intelligence, TataMcGraw Hill, 2008.

Reference books:

3. Russel and Norvig, Artificial intelligence, Pearson Printice Hall Publication, 2006.
4. Winston, Artificial Intelligence, PHI publication, 2006.

III-YEAR (VI-SEMESTER)

Algorithm Design & Analysis		**Course Code:IT302**	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective From session: 2018-19)

UNIT I BASIC CONCEPTS OF ALGORITHMS

Introduction, notion of algorithm, fundamentals of algorithmic solving, important problem types, fundamentals of the analysis framework, asymptotic notations and basic efficiency classes.

UNIT II MATHEMATICAL ASPECTS AND ANALYSIS OF ALGORITHMS

Mathematical analysis of non-recursive algorithm, mathematical analysis of recursive algorithm, example: fibonacci numbers, empirical analysis of algorithms, algorithm visualization.

Unit III ANALYSIS OF SORTING ANDSEARCHING ALGORITHMS

Brute force, selection sort and bubble sort, sequential search and brute-force string matching, divide and conquer, merge sort, quick sort, binary search, binary tree, traversal and related properties, decrease and conquer, insertion sort, depth first search and breadth first search.

UNIT IV ALGORITHMIC TECHNIQUES

Transform and conquer ,presorting, balanced search trees, avl trees, heaps and heap sort, dynamic programming, Warshall's and Floyd's algorithm, optimal binary search trees, greedy techniques, Prim's algorithm, Kruskal's algorithm, Dijkstra's algorithm, Huffman trees.

UNIT V ALGORITHM DESIGN METHODS

Backtracking, n-Queen's problem, Hamiltonian circuit problem, subset-sum problem, branch and bound, assignment problem, knapsack problem, traveling salesman problem.

Text Books:

[1]. Anany Levitin, "Introduction to the Design and Analysis of Algorithm", Pearson Education Asia,2003.

References Books:

[2]. T.H. Cormen, C.E. Leiserson, R.L. Rivest and C. Stein, "Introduction to Algorithms", PHI Pvt.Ltd., 2001
[3]. Sara Baase and Allen Van Gelder, "Computer Algorithms - Introduction to Design and Analysis", Pearson Education Asia, 2003.
[4]. A.V.Aho, J.E. Hopcroft and J.D.Ullman, "The Design and Analysis of Computer Algorithms",Pearson Education Asia, 2003.

III-YEAR (VI-SEMESTER)

(Effective From session: 2018-19)

COMPUTER ORGANISATION		**Course Code:IT304**	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

UNIT I COMPUTER ARITHMETIC AND NUMBER SYSTEM
Number representation; number system, fixed and floating point number representation, arithmetic algorithms (addition, subtraction, booth multiplication).

UNIT II REGISTER TRANSFER AND MICROOPERATION
Register transfer language, bus and memory transfers, bus architecture, bus arbitration, arithmetic logic, shift microoperation, arithmetic logic shift unit, design of fast address.

UNIT II PROCESSOR DESIGN
Processor organization: general register organization, stack organization, addressing mode, instruction format, data transfer & manipulations, program control, reduced instruction set computer.

UNIT IV INPUT-OUTPUT ORGANIZATION
I/O interface, synchronous and asynchronous data transfer, strobe, handshaking schemes, modes of transfer, interrupts & interrupt handling, direct memory access, input-output processor.

UNIT V MEMORY ORGANIZATION

Memory hierarchy, main memory (RAM and ROM Chips), organization of 2d and 2$^{1/2}$ d, auxiliary memory, cache memory, virtual memory, memory management hardware.

Books:

[1]. Patterson, Computer Organisation and Design, Elsevier Pub. 2009
[2]. William Stalling, " Computer Organization", PHI

Reference Books:

[3]. Vravice,Hamacher & Zaky, "Computer Organization", TMH
[4]. Mano," Computer System Architecture", PHI
[5]. John P Hays, " Computer Organization", McGraw Hill
[6]. Tannenbaum," Structured Computer Organization', PHI
[7]. P Pal chaudhry, ' Computer Organization & Design', PHI

III-YEAR (VI-SEMESTER)

Information & Network Security		**Course Code:IT306**	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective From session: 2018-19)

UNIT I: Introduction to Information Security: Definition of information, security, need of information security,CIA triad, principles of information security, Information Security Life, Risk management, Physical security; Asset definition, types of assets, asset classification,Security goals, attacks, services and mechanisms, cryptography:Classical encryption techniques-substitution ciphers and transposition ciphers.

UNIT II:Cryptography: Stream and block ciphers. Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard (DES), Idea of differential cryptanalysis, Triple DES, Introduction to group, field, finite field of the form GF (p), modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption Fermat's and Euler's theorem, Primarily testing, Principals of public key crypto systems, RSA & DHKE algorithm.

UNIT III: Message Authentication: Authentication requirements, authentication code & functions, message authentication code, hash functions, security of hash functions, Secure hash algorithm(SHA)Digital Signatures: Digital signature standards(DSS), Key Management and distribution: Symmetric key distribution, Public key distribution, X.509 Certificates, Public key Infrastructure.

UNIT IV: Network Security: Authentication Applications: Kerberos, Electronic mail security: pretty good privacy (PGP), S/MIME. IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Secure Socket Layer, Secure electronic, transaction (SET) System Security: Intrusion & Intrusion detection, Viruses and related threats, firewalls.

UNIT V: Information Security Standards & Laws: Policy, Types of policies, Need of an Information Security Policy., Standards, Procedures, Guidelines; Information Security Management System (ISMS) & itsimplementation process, ISO 27001Standard.**C**yber-crime, Types of cyber-crimes, IT ACT 2000, Evidence Act 1872-Admisibility electronic evidence in the court of law,

Text Books:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education.
2. Behrouz A. Frouzan: Cryptography and Network Security, Tata McGraw Hill.

Reference Books:

1. Merkow, "Information Security Principles & Practices"
2. Christof Paar & Jan Pelzel, Understanding Cryptography , Springer.
3. **Bare Act Information Technology ACT 2000.**
4. C K Shyamala, N Harini, Dr. T.R. Padmnabhan Cryptography and Security, Wiley.
5. Bruce Schiener, "Applied Cryptography". John Wiley & Sons.
6. Bernard Menezes," Network Security and Cryptography", Cengage Learning.
7. Atul Kahate, "Cryptography and Network Security", Tata McGraw Hill.
8. **Thomas R. Peltier, Justin Peltier, John Blackley, Information Security** Fundamentals.

III-YEAR (VI-SEMESTER)

Information Retrieval & Management		**Course Code:IT308**	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):** 60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

UNIT I: Basic Concepts of IR, Data Retrieval & Information Retrieval, IR system block diagram. Automatic Text Analysis, Luhn's ideas, Conflation Algorithm, Indexing and Index Term Weighing, Probabilistic Indexing, Automatic Classification. Measures of Association, Different MatchingCoefficient, Classification Methods, Cluster Hypothesis. Clustering Algorithms, Single Pass Algorithm, Single Link Algorithm, Rochhio's Algorithm and Dendograms

UNIT II: File Structures, Inverted file, Suffix trees &suffix arrays, Signature files, Ring Structure, IR Models, Basic concepts, Boolean Model, Vector Model, and Fuzzy Set Model. Search Strategies, Boolean search, serial search, and clusterbased retrieval, Matching Function. Performance Evaluation- Precision and recall, alternative measures reference collection (TREC Collection), Libraries & Bibliographical system-Online IR system, OPACs, Digital libraries - Architecture issues,document models, representation & access, Prototypes, projects & interfaces, standards.

UNIT III: Taxonomy and Ontology: Creating domain specific ontology, Ontology life cycle Distributed and Parallel IR: Relationships between documents, Identify appropriate networked collections, multiple distributed collections simultaneously, Parallel IR - MIMD Architectures, Distributed IR
Collection Partitioning, Source Selection, Query Processing.

UNIT IV: Multimedia IR models & languages- data modeling, Techniques to represent audio and visual document, query languages Indexing & searching- generic multimedia indexing approach, Query databases of multimedia documents, Display the results of multimedia searches, onedimensional time series, two dimensional color images, automatic feature extraction.

UNIT V : Searching the Web, Challenges, Characterizing the Web, Search Engines, Browsing, Mata searchers, Web crawlers, robot exclusion, Web data mining, Metacrawler, Collaborative filtering, Web agents (web shopping, bargain finder), Economic, ethical, legal and political issues.

Text Books :

[1]. Yates & Neto, "Modern Information Retrieval", Pearson Education, ISBN 81-297-0274-6
[2]. I. Witten, A. Moffat, and T. Bell, “Managing Gigabytes” 4. D. Grossman and O. Frieder
“Information Retrieval: Algorithms and Heuristics”

Reference Books :

[3]. Mark leven, “Introduction to search engines and web navigation”, John Wiley andsons Inc., ISBN 9780-170-52684-2.
[4]. V. S. Subrahamanian, Satish K. Tripathi “Multimedia information System”,Kulwer Academic Publisher
[5]. Chabane Djeraba, ”Multimedia mining A highway to intelligent multimedia

III-YEAR (VI-SEMESTER)

Algorithm Design & Analysis Lab		**Course Code:IT382**	**Credits:**1
No. of Lab (Hrs./Week): 2	**No. of Lab Sessions (Sem.):**15	**Mid Sem. Exam (Hrs.):**0	**End Sem. Exam (Hrs.):**2

(Effective from session: 2018-19)

NOTE: Suggested list of experiments but not limited to these only.
List of Experiments:

1. Implement the minimum cost spanning tree algorithm.
2. Implement the single source shortest path algorithm.
3. Implement the algorithm for optimal binary search tree.
4. Implement the algorithm for Job sequencing with deadlines.
5. Implement the algorithm for sum of subsets problem.
6. Implement the algorithm for travelling sales person problem.
7. Implement the algorithm for knapsack problem.
8. Implement the algorithm for n-queen problem.
9. Implement the algorithm for graph coloring.
10. Implement the algorithm for all pair shortest path.
11. Implement all types of sorting techniques and analyze time complexity.
12. Implement matrix multiplication.

III-YEAR (VI-SEMESTER)

Concepts of Artificial Intelligence Lab	**Course Code:**IT384	**Credits:**1

No. of Lab (Hrs/Week):2	No. of Lab Sessions (Sem.): 15	Mid Sem. Exam (Hrs):0	End Sem. Exam (Hrs): 2

(Effective from session: 2018-19)

NOTE: Suggested list of experiments but not limited to these only.

Experiments based on the Programming Languages such as PROLOG & LISPand

1. Write a prolog program to find the maximum of two numbers.
2. Write a prolog program to calculate the factorial of a given number.Write a prolog program to calculate the nth Fibonacci number.
3. Write a prolog program, insert_nth(item, n, into_list, result) that asserts that result is the list into_list with item inserted as the n'th element into every list at all levels.

a) Write a Prolog program to remove the Nth item from a list.
b) Write a Prolog program, remove-nth (Before, after) that asserts the after list is the before list with the removal of every n'th item from every list at all levels.
c) Write a Prolog program to implement append for two lists.

5. Write a Prolog program to implement palindrome (List).

a) Write a Prolog program to implement max(X,Y,Max) so that Max is the greater of two numbers X and Y.
b) Write a Prolog program to implement maxlist(List,Max) so that Max is the greatest number in the list of numbers List.
c) Write a Prolog program to implement sumlist(List,Sum) so that Sum is the sum of a given list of numbers List.

6.Write a Prolog program to implement two predicates evenlength(List) and oddlength(List) so that they are true if their argument is a list of even or odd length respectively.

a) Write a Prolog program to implement reverse (List,ReversedList) that reverses lists.
b) Write a Prolog program to implement maxlist (List,Max) so that Max is the greatest number in the list of numbers List using cut predicate.

7.

a) Create an agent in Jade that responds with the statistics of number of active agents in a system and the related information about those agents.
b) Write a program in Jade to exchange arguments between two agents.
c) Create four agents in Jade where each agent requests information from the remaining agents on a given topic.
d) Create an agent in Jade that reports about any communication going around other agents.

III-YEAR (VI-SEMESTER)

Information& Network Security LAB		Course Code:IT386	Credits:1
No. of Lab (Hrs./Week):2	No. of Lab Sessions (Sem.): 10	Mid Sem. Exam (Hrs.):0	End Sem. Exam (Hrs.):2

(Effective from session: 2018-19)

NOTE: Suggested list of experiments but not limited to these only.

The following programs should be implemented preferably on 'UNIX' platform using 'C' language (for 1-5) and other standard utilities available with 'UNIX' systems (for 6-8) :-

1. Implement the encryption and decryption of 8-bit data using 'Simplified DES Algorithm'
2. Implement 'Linear Congruential Algorithm' to generate 5 pseudo-random numbers in'C'.
3. Implement Rabin-Miller Primality Testing Algorithm in 'C'.
4. Implement the Euclid Algorithm to generate the GCD of an array of 10 integers in 'C'.
5. Implement RSA algorithm for encryption and decryption in 'C'.
6. Configure a mail agent to support Digital Certificates, send a mail and verify the correctness of this system using the configured parameters.
7. Configure SSH (Secure Shell) and send/receive a file on this connection to verify the correctness of this system using the configured parameters.

8. Configure a firewall to block the following for 5 minutes and verify the correctness of this system using the configured parameters:

(a) Two neighborhood IP addresses on your LAN.

9. Make an information security policy for the organization/institute

VII-SEMESTER

IV-YEAR (VII-SEMESTER)

Ad-Hoc & Sensor Networks		**Course Code:**IT401	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

UNIT I INTRODUCTION : Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel - mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs) :concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

UNIT II MAC PROTOCOLS FOR AD HOC WIRELESS NETWORKS

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols- Contention based protocols with Reservation Mechanisms- Contention based protocols with Scheduling Mechanisms – Multi channel MAC-IEEE 802.11

UNIT III ROUTING PROTOCOLS AND TRANSPORT LAYER IN AD HOC WIRELESS NETWORKS Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCP over Ad hoc wireless Networks.

UNIT IV WIRELESS SENSOR NETWORKS (WSNS) AND MAC PROTOCOLS : Single node architecture: hardware and software components of a sensor node – WSN Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

UNIT V WSN ROUTING, LOCALIZATION &QOS: Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation- QOS in WSN-Energy Efficient Design-Synchronization-Transport Layer issues.

TEXT BOOKS:

[1]. C. Siva Ram Murthy, and B. S. Manoj, “Ad Hoc Wireless Networks: Architectures and Protocols “, Prentice Hall Professional Technical Reference, 2008.

REFERENCES BOOKS:

[2]. Carlos De Morais Cordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Publishing Company, 2006.
[3]. Feng Zhao and Leonides Guibas, “Wireless Sensor Networks”, Elsevier Publication – 2002.
[4]. Holger Karl and Andreas Willig “Protocols and Architectures for Wireless Sensor Networks”, Wiley, 2005
[5]. Kazem Sohraby, Daniel Minoli, & Taieb Znati, “Wireless Sensor Networks-Technology, Protocols, and Applications”, John Wiley, 2007.

IV-YEAR (VII-SEMESTER)

Cloud Computing		**Course Code: IT**403	**Credits:**4
No. of Lectures (Hrs./Week):4	**No. of Lectures (Sem.):**60	**Mid Sem. Exam (Hrs.):**1.5	**End Sem. Exam (Hrs.):**3

(Effective from session: 2018-19)

Unit 1: Introduction to Cloud Computing: Definition, Characteristics, Components, Cloud provider, SAAS, PAAS, IAAS and Others, Organizational scenarios of clouds, Administering & Monitoring cloud services, benefits and limitations, Deploy application over cloud, Comparison among SAAS, PAAS, IAAS Cloud computing platforms: Infrastructure as service: Amazon EC2,Platform as Service: Google App Engine, Microsoft Azure, Utility Computing, Elastic Computing

Unit 2: Introduction to Cloud Technologies: Study of Hypervisors Compare SOAP and REST Webservices, AJAX and mashups-Web services: SOAP and REST, SOAP versus REST, AJAX: asynchronous 'rich' interfaces, Mashups: user interface services Virtualization Technology: Virtual machine technology, virtualization applications in enterprises, Pitfalls of virtualization Multitenant software:Multi-entity support, Multi-schema approach, Multi-tenance using cloud data stores, Data access control for enterprise applications,

Unit 3: Data in the cloud: Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. Map-Reduce and extensions: Parallel computing, The map-Reduce model, Parallel efficiency of Map-Reduce, Relational operations using Map-Reduce, Enterprise batch processing using Map-Reduce, Introduction to cloud development, Example/Application of Mapreduce, Features and comparisons among GFS,HDFS etc, Map-Reduce model Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud Cloud computing security architecture:Architectural Considerations- General Issues, Trusted Cloud computing, Secure Execution Environments and Communications, Micro-architectures; Identity Management and Access control-Identity management, Access control, Autonomic Security
Cloud computing security challenges: Virtualization security management- virtual threats, VM Security Recommendations, VM-Specific Security techniques, Secure Execution Environments and Communications in cloud

Unit 4: Issues in cloud computing, Implementing real time application over cloud platform Issues in Intercloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computing environment. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring in Cloud

Unit 5: Cloud computing platforms, Installing cloud platforms and performance evaluation Features and functions of cloud platforms: Xen Cloud Platform, Eucalyptus, OpenNebula, Nimbus, TPlatform, Apache Virtual Computing Lab (VCL), Enomaly Elastic Computing Platform

Text Books:

1. Judith Hurwitz, R.Bloor, M.Kanfman, F.Halper, Cloud Computing for Dummies by (Wiley India Edition)

Reference Books:

[2]. Gautam Shroff, Enterprise Cloud Computing by,Cambridge
[3]. Ronald Krutz and Russell Dean Vines, Cloud Security by, Wiley-India

IV-YEAR (VII-SEMESTER)

Software/Project Development Lab		**Course Code:** IT481	**Credits:** 1
No. of Lab (Hrs./Week): 2	**No. of Lab Sessions (Sem.):** 10	**Mid Sem. Exam (Hrs.):** 0	**End Sem. Exam (Hrs.):** 2

(Effective from session: 2018-19)

In this lab the students will make small software applications/projects.

IV-YEAR (VII-SEMESTER)

Simulation Lab		**Course Code: IT483**	**Credits:** 1
No. of Lab (Hrs./Week): 2	**No. of Lab Sessions (Sem.): 10**	**Mid Sem. Exam (Hrs.): 0**	**End Sem. Exam (Hrs.):** 2

(Effective from session: 2018-19)

List of Experiments:

Note: Experiments of this lab will be based on Implementation & Design using MATLAB & Qualnet.

IV-YEAR (VII-SEMESTER)

Advanced Communication Systems		**Course Code: EC445**	**Credits:** 3
No. of Lectures (Hrs./Week): 3	**No. of Lectures (Sem.):** 45	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

(Effective from session: 2018-19) ****ELECTIVE 1**

1. Introduction: Electromagnetic Spectrum, Need of Communication systems, Types of communication systems, Advantages and drawbacks of wireless and wired communication system.

2. Digital Communication Systems:

Baseband modulation and demodulation: Detection of binary signals in Gaussian noise, ISI, Equalization, Carrier and symbol synchronization, Signal design for band limited channels. Band pass modulation and demodulation: Modulation techniques, Coherent and Non coherent detection, Error performance for binary system, Symbol error performance, Communication link Analysis: Link budget analysis, Simple link analysis, System trade-offs. Modulation and coding trade-offs.

3. Satellite communication systems

Origin of Satellite Communications, Historical Back-ground, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications. INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite Navigational System. Direct Broadcast satellites (DBS)- Direct to home Broadcast (DTH), Digital audio broadcast (DAB)- Worldspace services, Business TV(BTV), GRAMSAT, Specialized services – E –mail, Video conferencing, Internet

4. Optical Communication Systems: Optical fibre-step index, graded index, material, preparation, measurement of propagation, properties, jointing, connectors and couplers. Fibre optic communication systems. System model. Optical channel-space, fibre optic, sources-lasers, LEDs. Fibre laser for optical communication through guided media.
Modulation techniques—direct modulation and indirect modulation—injection modulation, A/O, E/O modulation techniques. Optical detection—PIN diodes and APDs. Optical communication systems

5. Advanced Communication networks: Mobile Communication system, Wireless Communication, Optical communication Networks, Hybrid communication systems, Spread Spectrum.

Text Books:

[1]. Bernard Sklar, Digital Communication.
[2]. Simon Haykin, Digital Communication.

Reference Books:

[3]. Satellite Communication by D.C.Aggarwal
[4]. Optical Communication by John M Senior .

IV-YEAR (VII-SEMESTER)

BIO-INFORMATICS		**Course Code:** IT405	**Credits:** 3
No. of Lectures (Hrs./Week): 3	**No. of Lectures (Sem.):** 45	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

(Effective from session: 2018-19) ****ELECTIVE 1**

UNIT I: Bioinformatics objectives and overviews, Interdisciplinary nature of Bioinformatics, Data integration, Data analysis, Major Bioinformatics databases and tools. Metadata: Summary & reference systems, finding new type of data online.
Molecular Biology and Bioinformatics: Systems approach in biology, Central dogma of molecular biology, problems in molecular approach and the bioinformatics approach, overview of the bioinformatics applications.

UNIT II: Basic chemistry of nucleic acids, Structure of DNA, Structure of RNA, DNA Replication, Transcription-Translation, Genes- the functional elements in DNA, Analyzing DNA,DNA sequencing. Proteins: Amino acids, Protein structure, Secondary, Tertiary and Quaternary structure, Protein folding and function, Nucleic acid-Protein
interaction.

UNIT III: Perl Basics, Perl applications for bioinformatics- Bioperl, Linux Operating System, mounting/ unmounting files, tar, gzip / gunzip, telnet, ftp, developing applications on Linux OS, Understanding and Using Biological Databases, Overview of Java, CORBA, XML, Web deployment concepts.

UNIT IV: Genome, Genomic sequencing, expressed sequence tags, gene expression, transcription factor binding sites and single nucleotide polymorphism. Computational representations of molecular biological data storage techniques: databases (flat, relational and object oriented), and controlled vocabularies, general data retrieval techniques: indices, Boolean search, fuzzy search and neighboring, application to biological data warehouses.

UNIT V: Macromolecular structures, chemical compounds, generic variability and its connection to clinical data. Representation of patterns and relationships: sequence alignment algorithms, regular expressions, hierarchies and graphical models, Phylogenetics. BLAST.

Text Books:

[1]. D E Krane & M L Raymer, ” Fundamental concepts of Bioinformatics”, Perason Education.
[2]. Rastogi, Mendiratta, Rastogi, “Bioinformatics Methods & applications, Genomics, Proteomics & Drug Discovery” PHI, New Delhi

Reference Books:

[3]. Shubha Gopal et.al. " Bioinformatics: with fundamentals of genomics and proteomics", Mc Graw Hill.
[4]. O'Reilly, " Developing Bio informatics computer skills", CBS
[5]. Forsdyke, "Evolutionary Bioinformatics",

IV-YEAR (VII-SEMESTER)

Distributed Databases		**Course Code: IT407**	**Credits:** 3
No. of Lectures (Hrs./Week): 3	**No. of Lectures (Sem.):** 45	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

(Effective from session: 2018-19) ****ELECTIVE 1**

UNIT I : Transaction and schedules, Concurrent Execution of transaction, Conflict and View Serializability, Testing for Serializability,Concepts in Recoverable and Cascadeless schedules.

UNIT II : Lock based protocols, time stamp based protocols, Multiple Granularity and Multiversion Techniques, Enforcing serializablity byLocks, Locking system with multiple lock modes, architecture forLocking scheduler.

UNIT III : Distributed Transactions Management, Data Distribution, 8Fragmentation and Replication Techniques, Distributed Commit,Distributed Locking schemes, Long duration transactions, MossConcurrency protocol.

UNITIV: Issues of Recovery and atomicity in Distributed Databases, Traditional recovery techniques, Log based recovery, Recovery withConcurrent Transactions, Recovery in Message passing systems,Checkpoints, Algorithms for recovery line, Concepts in Orphan andInconsistent Messages.

UNIT V : Distributed Query Processing, Multiway Joins, Semi joins, Cost based query optimization for distributed database, Updatingreplicated data, protocols for Distributed Deadlock Detection, Eagerand Lazy Replication Techniques.

Text Books:

[1]. Silberschatz,korth and Sudershan, Database System Concept', Mc Graw Hill
[2]. Ramakrishna and Gehrke,' Database Management System, Mc Graw Hill

References Books:

[3]. Garcia-Molina, Ullman,Widom,' Database System Implementation' Pearson Education
[4]. Ceei and Pelagatti,'Distributed Database', TMH
[5]. Singhal and Shivratri, 'Advance Concepts in Operating Systems' MC Graw Hill

****ELECTIVE 1**

IV-YEAR (VII-SEMESTER)

Data Warehousing and Data Mining		**Course Code: IT411**	**Credits:** 3
No. of Lectures (Hrs./Week): 3	**No. of Lectures (Sem.):** 45	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

(Effective from session: 2018-19)

Unit-1: Data warehousing Definition, usage and trends. DBMS vs. data warehouse, Data marts, Metadata, Multidimensional data mode, Data cubes, Schemas for Multidimensional Database: stars, snowflakes and fact constellations.

Unit-2: Data warehouse process & architecture, OLTP vs. OLAP, ROLAP vs. MOLAP, types of OLAP, servers, 3-Tier data warehouse architecture, distributed and virtual data warehouses, data warehouse manager.

Unit-3: Data warehouse implementation, computation of data cubes, modelling OLAP data, OLAP queries manager, data warehouse back end tools, complex aggregation at multiple granularities, tuning and testing of data warehouse.

Unit-4: Data mining definition & task, KDD versus data mining, data mining techniques, tools and applications. Data mining query languages, data specification, specifying knowledge, hierarchy specification, pattern presentation & visualization specification, data mining languages and standardization of data mining.

Unit-5: Data mining techniques: Association rules, Clustering techniques, Decision tree knowledge discovery through Neural Networks & Genetic Algorithm, Rough Sets, and Support Victor Machines and Fuzzy techniques. Mining complex data objects, Spatial databases, Multimedia databases, Time series and Sequence data; mining Text Databases and mining Word Wide Web.

TEXT BOOKS:

1. Sam Anahory & Dennis Murray, Data Warehousing In the Real World, Pearson, 1997
2. Jiawei Han & Micheline Kamber, Data Mining- Concepts & Techniques, Morgan Kaufmann, 2001.
3. Arun Pujar, Data Mining Techniques, University Press; Hyderbad, 2001,.

REFERENCE BOOKS:

4. Pieter Adriaans & Dolf Zantinge, Data Mining, Pearson, 1997.
5. Alex Berson, Data Warehousing, Data Miniing and OLTP, Mc Graw Hill, 1997.
6. Mallach, Data warehousing System, Mc Graw Hill, 2000.
7. W.H. Inman, Building the Data Warehouse, John Wiley & Sons, 1996.
8. W.H Ionhman, C.Klelly, Developing the Data Warehouses, John Wiley & Sons.
9. W.H.Inman, C.L.Gassey, Managing the Data Warehouses, John Wiley & Sons.

IV-YEAR (VII-SEMESTER)

Fuzzy & Soft Computing Techniques		**Course Code: IT413**	**Credits:** 3
No. of Lectures (Hrs./Week): 3	**No. of Lectures (Sem.):** 45	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

UNIT I **Fuzzy logic:** Introduction to fuzzy logic, classical and fuzzy sets, overview of fuzzy sets, membership function, fuzzy rule generation, operations on fuzzy sets: compliment, intersection, union, combinations on operations, aggregation operation.

UNIT II **Fuzzy arithmetic**: Fuzzy numbers, linguistic variables, arithmetic operations on intervals & numbers, uncertainty based information, information and uncertainty, no specificity of fuzzy and crisp sets, fuzziness of fuzzy sets.

UNIT III **Neural network**: Overview of biological neurons, computational neuron, mathematical model of neurons, ANN architecture, single layer and multilayer architectures, activation function, threshold value, self-learning and forced learning algorithms, feed forward and feedback architectures.

UNIT IV **Learning fundamentals:** Learning paradigms, supervised and unsupervised learning, reinforced learning, ANN training, algorithms perceptions, training rules, delta, back propagation algorithm, multilayer perception model, Hopfield networks, associative memories, applications of artificial neural networks,

UNIT V **Genetic algorithms:** History of genetic algorithm, terminology of genetic algorithm, biological background, creation of offspring, working principles of genetic algorithms, fitness function, reproduction: Roulette wheel selection, Boltzmann selection, cross over mutation, inversion, deletion, and duplication, generation cycle.

Text Books:

1. Peteus J. Braspenning, Artificial Neural Networks: An introduction to ANN Theory and Practice, PHI publication, 2005.
2. Paul P. Wang, Fuzzy Logic: A spectrum of Theoretical and Practical issues, Pearson publication 2004.

Reference Books:

3. Lotfi, Asker Zadeh, George J. Kilr, Bo yuan , Fuzzy Sets, Fuzzy logic, and Fuzzy Systems: Selected Papers-2005.
4. Foundations of Fuzzy logic and Soft Computing: 12th International Fuzzy conference proceeding, 2005.
5. Neural Networks Theory, Particia Melin, Oxford University press, 2003.
6. Oscar Castillo, Neural Networks Theory and Application, Wiley Eastern publication.

IV-YEAR (VII-SEMESTER)

Service Oriented Architecture		**Course Code: IT415**	**Credits:** 3
No. of Lectures (Hrs./Week): 3	**No. of Lectures (Sem.):** 45	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

(Effective from session: 2018-19) ****ELECTIVE 2**

UNIT I : Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate -Principles of service Orientation.

UNIT II: Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination –Atomic Transactions – Business activities – Orchestration Choreography - Service layer abstraction – Application Service Layer – Business Service Layer –

Orchestration Service Layer

UNIT III: Service oriented analysis – Business-centric SOA – Deriving business services- service modeling -Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design – Taskcentric business service design

UNIT IV: SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) – Javaarchitecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML basedRPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE).

UNIT V: WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WSSecurity

Text Books:

[1]. Thomas Erl, "Service-Oriented Architecture: Concepts, Technology, andDesign", Pearson Education, 2005.
[2]. Newcomer, Lomow"Understanding SOA with Web Services", Pearson Education, 2005.

References Books:

[3]. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services, AnArchitect's Guide",Pearson Education, 2005.
[4]. Dan Woods and Thomas Mattern," Enterprise SOA Designing IT for BusinessInnovation" O'REILLY, First Edition, 2006
[5]. Kambhampaty Service Oriented Architecture for Enterprise and cloud applications , Wiley

IV-YEAR (VII-SEMESTER)

Formal Methods		**Course Code:** C405	**Credits:** 3
No. of Lectures (Hrs/Week): 3	**No. of Lectures (Sem.):** 45	**Mid Sem. Exam (Hrs):** 1.5	**End Sem. Exam (Hrs):** 3

(Effective from session: 2018-19) ****ELECTIVE 2**

UNIT I INTRODUCTION

formal methods development and need, problems in natural language specifications, formal versus informal programming, advantages of formal methods, requirements of formal system, types, prepositionallogic, predicatelogic, relationships and functions.

UNIT II FORMALSPECIFICATIONSTYLE

Model-oriented, specifications, concurrency-based specifications, example specification languages.

UNIT III VDM

Introduction to VDM, basic types, quote types, compound types, optional types, functions, operations, additional

constructs, modules.

UNIT IV THE Z NOTATION
Interchange language, user-defined identifiers, datatypes, basictypes, compound types, schemas, additional constructs.

UNIT V FORMAL SEMANTICS AND TOOLS
Operational semantics, denotationa, semantics, axiomatic semantics proof editors, proof analyzer, symbolic simulators, translators, testg eneration tools.

Text Books:

1. Andrew Harry, "Formal Methods: Fact File VD Mand Z" , John Wiley and Sons,1996.

Reference Books

2. Jim Woodcock, Jim Davies, "Using Z Specification ,Refinement and Proof", Prentice Hall International, 1996.

IV-YEAR (VII-SEMESTER)

SOFTWARE PROJECT MANAGEMENT		**Course Code:** CS441	**Credits:** 3
No. of Lectures (Hrs./Week): 3	**No. of Lectures (Sem.):** 45	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

(Effective from session: 2018-19) ****ELECTIVE 2**

UNIT-I: Introduction and Software Project Planning
Fundamentals of Software Project Management (SPM), Need Identification, Vision and Scope document, ProjectManagement Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning,Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan,Software project estimation, Estimation methods, Estimation models, Decision process.

UNIT-II: Project Organization and Scheduling
Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project LifeCycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building theproject schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: MilestoneCharts, Gantt Charts.

UNIT-III: Project Monitoring and Control
Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost forWork Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), SchedulePerformance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types ofReview: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.

UNIT-IV: Software Quality Assurance and Testing

Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies,Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept ofSoftware Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI CapabilityMaturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical qualityassurance, Cleanroom process.

UNIT-V: Project Management and Project Management Tools

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, ChangeControl, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk BreakdownStructure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, CostBenefit Analysis, Software Project Management Tools: CASE Tools, Planning and Scheduling Tools, MS-Project.

Text Books:

[1]. M. Cotterell, Software Project Management, Tata McGraw-Hill Publication.
[2]. Royce, Software Project Management, Pearson Education

Reference Books:

[3]. Kieron Conway, Software Project Management, Dreamtech Press
[4]. S. A. Kelkar, Software Project Management, PHI Publication.
[5]. Harold R. Kerzner, Project Mangment "A Systems Approach to Planning, Scheduling, and Controlling" Wiley.

IV-YEAR (VII-SEMESTER)

OPERATION RESEARCH TECHNIQUES		**Course Code:** MA406	**Credits:** 4
No. of Lectures (Hrs/Week): 4	**No. of Lectures (Sem.):** 60	**Mid Sem. Exam (Hrs):** 1.5	**End Sem. Exam (Hrs):** 3

(Effective from session: 2018-19) ****GENERIC ELECTIVE 1**

IV-YEAR (VII-SEMESTER)

OPTIMIZATION TECHNIQUES		**Course Code:** MA507	**Credits:** 4
No. of Lectures (Hrs/Week): 4	**No. of Lectures (Sem.):** 60	**Mid Sem. Exam (Hrs):** 1.5	**End Sem. Exam (Hrs):** 3

(Effective from session: 2018-19) ****GENERIC ELECTIVE 1**

IV-YEAR (VII-SEMESTER)

NUMBER THEORY		**Course Code:** MA417	**Credits:** 4
No. of Lectures (Hrs/Week): 4	**No. of Lectures (Sem.):** 60	**Mid Sem. Exam (Hrs):** 1.5	**End Sem. Exam (Hrs):** 3

(Effective from session: 2018-19) ****GENERIC ELECTIVE 1**

IV-YEAR (VII-SEMESTER)

DIGITAL COMMERCE	**Course Code:**IT409	**Credits:** 4

No. of Lectures (Hrs/Week): 4	No. of Lectures (Sem.): 60	Mid Sem. Exam (Hrs): 1.5	End Sem. Exam (Hrs): 3

(Effective from session: 2018-19) ****GENERIC ELECTIVE 1**

UNIT I: Electronic Commerce Environment and Opportunities: Background – The Electronic Commerce Environment – Electronic Marketplace Technologies – Modes of Electronic Commerce: Overview – Electronic Data Interchange – Migration to Open EDI –Electronic Commerce with WWW/Internet – Commerce Net Advocacy – Web Commerce going forward.

UNIT II: Approaches to Safe Electronic Commerce: Overview – Secure Transport Protocols – Secure Transactions – Secure Electronic PaymentProtocol(SEPP) – Secure Electronic Transaction (SET)-Certificates forAuthentication – Security on Web Servers and Enterprise Networks –Electronic cash and Electronic payment schemes: Internet Monetarypayment and security requirements – payment and purchase order process -Online Electronic cash.

UNIT III:Internet/Intranet Security Issues and Solutions: The need for Computer Security – Specific Intruder Approaches – Security strategies – Securitytools – Encryption – Enterprise Networking and Access to the Internet –Antivirus programs – Security Teams.

UNIT IV:MasterCard/Visa Secure Electronic Transaction: Introduction – Business Requirements – Concepts – Payment processing – E-mail andsecure e-mail technologies for electronic commerce. Introduction – TheMean of Distribution – A model for message handling – Working of Email -MIME: Multipurpose Internet Mail Extensions – S/MIME: Secure
Multipurpose Internet Mail Extensions – MOSS: Message Object SecurityServices.

UNIT V: Internet and Website Establishment: Introduction – Technologies for web servers – Internet tools relevant to Commerce – Internet Applicationsfor Commerce – Internet charges –Internet Access and Architecture –Searching the Internet- Case study.

TEXT BOOKS:

[1]. Daniel Minoli and Emma Minoli, “Web CommerceTechnology Handbook”, Tata McGraw-Hill, 2005.

REFERENCE BOOKS:

[2]. Andrew B. Whinston, Ravi Kalakota, K. Bajaj and D. Nag,“Frontiers of Electronic Commerce”, Tata McGraw-Hill, 2004.
[3]. Bruce C. Brown,“How to Use the Internet to Advertise, Promote and Market Your Business orWebsite with Little or No Money”, Atlantic Publishing Company, 2006.

VIII-SEMESTER

IV-YEAR (VIII-SEMESTER)

Big Data Analytics		**Course Code: IT402**	**Credits:** 4
No. of Lectures (Hrs/Week): 4	**No. of Lectures (Sem.):** 60	**Mid Sem. Exam (Hrs):** 1.5	**End Sem. Exam (Hrs):** 3

(Effective from session: 2018-19)

UNIT I: UNDERSTANDING BIG DATA: What is big data,why big data,convergence of key trends, unstructured data, industry examples of big data, web analytics,big data andmarketing,fraud and big data, risk and big data,credit risk management, big data and algorithmic trading,big data and healthcare,big data in medicine,advertising and big data,big data technologies, introduction to Hadoop,open source technologies,cloud and big data mobile business intelligence,Crowd sourcing analytics ,inter and trans firewall analytics.

UNIT II : NOSQL DATA MANAGEMENT :Introduction to NoSQL , aggregate data models ,aggregates ,key-value and document data models, relationships, graph databases, schema less databases ,materialized views,distribution models ,sharding , masterslave
replication, peer-peer replication , sharding and replication , consistency , relaxing consistency , version stamps , mapreduce, partitioning and combining , composing map-reduce calculations

UNIT III: BASICS OF HADOOP :Data format , analyzing data with Hadoop , scaling out , Hadoop streaming , Hadoop pipes , design of Hadoop distributed file system (HDFS) , HDFS concepts , Java interface , data flow ,Hadoop I/O , data integrity , compression , serialization , Avro file-based data structures

UNITIV: MAP REDUCE APPLICATIONS : Map Reduce workflows , unit tests with MRUnit , test data and local tests – anatomy of Map Reduce job run , classic Map-reduce , YARN , failures in classic Map-reduce and YARN , job scheduling , shuffle and sort , task execution , MapReduce types , input formats , output formats.

UNIT V: HADOOP RELATED TOOLS: Hbase,data model and implementations, Hbase clients, Hbase examples – praxis.Cassandra ,cassandra data model , cassandra examples, cassandra clients , Hadoop integration. Pig, Grunt, pig data model, Pig Latin , developing and testing Pig Latin scripts. Hive , data types and file formats , HiveQL data definition, HiveQL data manipulation – HiveQL queries

Text Books:

[1]. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
[2]. Big-Data Black Book, DT Editorial Services, Wily India

Reference Books:

[3]. P. J. Sadalage and M. Fowler, "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence", Addison-Wesley Professional, 2012.
[4]. Tom White, "Hadoop: The Definitive Guide", Third Edition, O'Reilley, 2012. 5. Eric Sammer, "Hadoop Operations", O'Reilley, 2012.
[5]. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilley, 2012. 7. Lars George, "HBase: The Definitive Guide", O'Reilley, 2011.
[6]. Eben Hewitt, "Cassandra: The Definitive Guide", O'Reilley, 2010.
[7]. Alan Gates, "Programming Pig", O'Reilley, 2011

IV-YEAR (VIII-SEMESTER)

Internet of Things		**Course Code:** IT404	**Credits:** 3
No. of Lectures (Hrs/Week): 3	**No. of Lectures (Sem.):** 45	**Mid Sem. Exam (Hrs):** 1.5	**End Sem. Exam (Hrs):** 3

(Effective from session: 2018-19)

UNIT I : M2M to IoT-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics.

UNIT II: M2M to IoT – A Market Perspective– Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. **M2M to IoT-An Architectural Overview**– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

UNIT III: M2M and IoT Technology Fundamentals- Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service(XaaS), M2M and IoT Analytics, Knowledge Management

UNIT IV: IoT Architecture-State of the Art – Introduction, State of the art,**Architecture Reference Model-** Introduction, Reference Model and architecture, IoT reference Model

UNIT V : IoT Reference Architecture- Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. **Real-World Design Constraints-** Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control.**Industrial Automation-** Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things,**Commercial Building Automation-** Introduction, Case study: phase one-commercial building automation today, Case study: phase two- commercial building automation in the future.

Textbook:

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

Reference Books:

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

IV-YEAR (VIII-SEMESTER)

Big Data Analytics LAB		**Course Code:IT482**	**Credits:** 1
No. of Lab (Hrs/Week): 2	**No. of Lab Sessions (Sem.):** 15	**Mid Sem. Exam (Hrs):** 0	**End Sem. Exam (Hrs):** 2

(Effective from session: 2018-19)

THE STUDENTS WILL BE TAUGHT ABOUT THE TOOLS AND APPLICATION OF BIG DATA.

IV-YEAR (VIII-SEMESTER)

Data Compression		**Course Code: IT408**	**Credits:** 3
No. of Lectures (Hrs./Week): 3	**No. of Lectures (Sem.):** 45	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

(Effective from session: 2018-19) **** ELECTIVE 3**

Unit - I:

Compression Techniques: Loss less compression, Lossy Compression, Measures of performance, Modeling and coding, Mathematical Preliminaries for Lossless compression: A brief introduction to information theory, Models: Physical models, Probability models, Markov models, composite source model, Coding: uniquely decodable codes, Prefix codes.

Unit – II:

The Huffman coding algorithm: Minimum variance Huffman codes, Adaptive Huffman coding: Update procedure, Encoding procedure, Decoding procedure. Golomb codes, Rice codes, Tunstall codes, Applications of Hoffman coding: Loss less image compression, Text compression, Audio Compression.

Unit-III:
Coding a sequence, Generating a binary code, Comparison of Binary and Huffman coding, Applications: Bi-level image compression-The JBIG standard, JBIG2, Image compression. Dictionary Techniques: Introduction, Static Dictionary: Diagram Coding, Adaptive Dictionary. The LZ77 Approach, The LZ78 Approach, Applications: File Compression-UNIX compress, Image Compression: The Graphics Interchange Format (GIF), Compression over Modems: V.42 bits, Predictive Coding: Prediction with Partial match (ppm): The basic algorithm, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-Wheeler Transform: Move-to-front coding, CALIC, JPEG-LS, Multi-resolution Approaches, Facsimile
Encoding, Dynamic Markoy Compression.

Unit – IV:
Distortion criteria, Models, Scalar Ouantization: The Quantization problem, Uniform Quantizer, Adaptive Quantization, Non uniform Quantization.

Unit-V:
Advantages of Vector Quantization over Scalar Quantization, The Linde-Buzo-Gray Algorithm, Tree structured Vector Quantizers. Structured VectorQuantizers.

Text Books:
[1]. Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Publishers
[2]. Drozdek , Elements of Data Compression, Cengage Learning
Reference Books:
[3]. Data Compression: The Complete Reference 4th Edition by David Salomon, Springer
[4]. Timothy C. Bell, T ext Compression1st Edition , Prentice Hall.

IV-YEAR (VIII-SEMESTER)

HIGHSPEED NETWORKS		**Course Code: IT410**	**Credits:** 3
No. of Lectures (Hrs./Week): 3	**No. of Lectures (Sem.):** 45	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

(Effective from session: 2018-19) **** ELECTIVE 3**

UNIT I
Frame Relay Networks – Asynchronous transfer mode–ATM Protocol Architecture, ATM logical Connection – ATM Cell – ATM Service Categories – AAL. High Speed LAN's: Fast Ethernet – GigabitEthernet– Fiber Channel – Wireless LAN's, WiFiand WiMax Networks applications, requirements – Architecture of 802.11.

UNIT II
Queuing Analysis – Queuing Models – Single Server Queues – Effects of Congestion CongestionControl – Traffic Management – Congestion Control in Packet SwitchingNetworks – FrameRelay Congestion Control.

UNIT III
TCP Flow control – TCP Congestion Control – Retransmission – Timer Management –Exponential RTObackoff – KARN's Algorithm – Window management – Performance ofTCP over ATM. Traffic andCongestion control in ATM – Requirements – Attributes –Traffic Management Frame work,

TrafficnControl – ABR traffic Management – ABR ratecontrol, RM cell formats – ABR Capacity allocations –GFR traffic management.

UNIT IV

Integrated Services Architecture – Approach, Components, Services- Queuing Discipline– FQ – PS –BRFQ – GPS – WFQ – Random Early Detection – Differentiated Services.

UNIT V

RSVP – Goals & Characteristics, Data Flow, RSVP operations – Protocol Mechanisms– MultiprotocolTransfer Protocol– RTCP. **TOTAL** Label Switching – Operations, Label Stacking – Protocol details – RTP– Protocol Architecture – Data

.

Text Books:

[1]. William Stallings, "High speed networks and internet", Second Edition, Pearson Education, 2002

[2]. Warland, Pravin Varaiya, "High performance communication networks", Second Edition , JeanHarcourt Asia Pvt. Ltd., , 2001

Reference Books:

[3]. Irvan Pepelnjk, Jim Guichard, Jeff Apcar, "MPLS and VPN architecture", Cisco Press, Volume 1and 2, 2003.

[4]. Abhijit S. Pandya, Ercan Sea, "ATM Technology for Broad Band Telecommunication Networks", CRC Press, New York, 2004.

IV-YEAR (VIII-SEMESTER)

Mobile Computing		**Course Code: IT412**	**Credits:** 3
No. of Lectures (Hrs./Week): 3	**No. of Lectures (Sem.):** 45	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

(Effective from session: 2018-19) **** ELECTIVE 3**

UNIT I

INTRODUCTION: Introduction to mobile applications – Embedded systems - Market and businessdrivers for mobile applications – Publishing and delivery of mobile applications – Requirementsgathering and validation for mobile applications

UNIT II

BASIC DESIGN: Introduction – Basics of embedded systems design – Embedded OS – Designconstraints for mobile applications, both hardware and software related – Architecting mobileapplications – User interfaces for mobile applications – touch events and gestures – Achieving qualityconstraints – performance, usability, security, availability and modifiability.

UNIT III

ADVANCED DESIGN: Designing applications with multimedia and web access capabilities –
Integration with GPS and social media networking applications – Accessing applications hosted in acloud computing environment – Design patterns for mobile applications.

UNIT IV

TECHNOLOGY I – ANDROID: Introduction – Establishing the development environment – Androidarchitecture – Activities and views – Interacting with UI – Persisting data using SQLite – Packaging anddeployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integrationwith social media applications.

UNIT V

TECHNOLOGY II – iOS: Introduction to Objective C – iOS features – UI implementation – Touchframeworks – Data persistence using Core Data and SQLite – Location aware applications using CoreLocation and Map Kit – Integrating calendar and address book with social media application – Using Wifi- iPhone marketplace. Swift: Introduction to Swift features of swift.

TEXT BOOKS:

[1]. Charlie Collins, Michael Galpin and Matthias Kappler, "Android in Practice", DreamTech, 2012
[2]. AnubhavPradhan , Anil V Despande Composing Mobile Apps,Learn ,explore,apply.

Reference Books:

[3]. James Dovey and Ash Furrow, "Beginning Objective C", Apress, 2012
[4]. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox, 2012
[5]. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, "Beginning iOS 6 Development:Exploring the iOS SDK", Apress, 2013.

IV-YEAR (VIII-SEMESTER)

MOBILE COMMUNICATION		**Course Code: EC430**	**Credits:** 3
No. of Lectures (Hrs./Week): 3	**No. of Lectures (Sem.):** 45	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

(Effective from session: 2018-19) **** ELECTIVE 3**

Unit I:

Cellular concept, frequency reuse, channel assignment schemes, handoff strategies, interference and system capacity, trunking, grade of service, coverage and capacity enhancement techniques

Unit II: Mobile radio propagation-free space propagation model, two ray model, link budget using path loss models, outdoor and indoor propagation models, small scale fading-multipath propagation, IR model, multipath measurements, parameters of multipath channels, small scale fading, statistical models for multipath fading channels

Unit III:

Modulation techniques-overview of digital modulation, line coding, pulse shaping techniques, spread spectrum modulation-PN sequence, DS-SS, FH-SS, modulation performance in fading and multipath channels, speech coding-vocoder, LPC.

Unit IV:

Multiple access techniques-FDMA, TDMA, spread spectrum multiple access- FHMA, CDMA, SDMA, packet radio-protocols, CSMA protocols, reservation protocols, capacity of cellular systems.

Unit V:

GSM-services and features, architecture, radio sub systems, channels types, frame structure and signal processing, CDMA-specifications, forward and reverse CDMA channels, CT2, DECT, PACS, PDC, PHS.

Text Books:

1. Theodore S. Rappaport, Wireless Communication, Principles and Practice, Pearson.

2. Kaveh Pahlavan, Prashant Krishnamurthy, Principles of Wireless Networks, PHI

Reference Books:

3. W.C. Jakes, Microwave Mobile Communication, IEEE Press
4. Kaveh Pahlavan & Allen H. Levesque, Wireless Information Networks, Wiley series in Telecommunications and signal processing.
5. Kamilo Feher, Wireless Digital communications, Modulation and Spread Spectrum Applications. PHI

IV-YEAR (VIII-SEMESTER)

GRAPH THEORY		**Course Code: IT416**	**Credits:** 4
No. of Lectures (Hrs./Week): 4	**No. of Lectures (Sem.):** 60	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

(Effective from session: 2018-19) ****GENERIC ELECTIVE 2**

Unit-I: INTRODUCTION

Graphs, sub graphs, vertex degrees, walks, path, cycles and trails, connected graphs, disconnected graphs and components, matrix representation of graphs, isomorphism, Euler graphs, Hamiltonian paths and circuits, bipartite graphs.

Unit-II: TREES AND CONNECTIVITY

Trees–rooted, binary trees and spanning trees, bridges, fundamental circuits, distance, center, diameter, eccentricity, radius and pendent vertices, Prim's, Kruskal's and Dijkstra's Algorithms, cut vertices, blocks and connectivity,

Unit-III: PLANARITY, EULER TOURS AND HAMILTONIAN CYCLES

Planer graphs – Different representation of a planer graph, discussion on criterion of planarity, thickness and crossings, Euler's formula, Platonic bodies, combinatorial and geometric dual: Kuratowski's graphs, detection of planarity, geometric dual, Euler tours, Hamiltonian cycles and travelling salesman problem.

Unit –IV: DIRECTED GRAPH AND COLORING

Directed graphs–definitions, in-degree, out-degree, orientations and tournaments, Coloring–vertex coloring, edge coloring, covering and partitioning of a graph, chromatic number, chromatic partitioning, chromatic polynomials, and four color problem.

Unit –V: EXTREMAL PROBLEMS

Enumeration of graphs, Ramsey's theorem, Ramsey numbers, edge Ramsey numbers, a generalization of party problem, Sperner's lemma and their applications.

Text Books:

1. West, Douglas Brent. *Introduction to graph theory*. Vol. 2. Upper Saddle River: Prentice hall, 2001.
2. Clark, John, and Derek Allan Holton. *A first look at graph theory*. Vol. 1. Teaneck, NJ: World Scientific, 1991.

Reference Books:

1. Deo, Narsingh. *Graph theory with applications to engineering and computer science*. Courier Dover Publications, 2016.
2. Chartrand, Gary. *Introduction to graph theory*. Tata McGraw-Hill Education, 2006.
3. Harary, Frank.*Graph Theory*, Narosa Book Distributors Pvt.
5. Bondy and Murthy,*Graph theory and application*. Addison Wesley.

IV-YEAR (VIII-SEMESTER)

PROBABILITY AND STOCHASTIC PROCESS		**Course Code: MA416**	**Credits:** 4
No. of Lectures (Hrs./Week): 4	**No. of Lectures (Sem.):** 60	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3

(Effective from session: 2018-19) ****GENERIC ELECTIVE 2**

IV-YEAR (VIII-SEMESTER)
(Effective from session: 2018-19) ****GENERIC ELECTIVE 2**

MODELING AND SIMULATION		**Course Code: MA402**	**Credits:** 4
No. of Lectures (Hrs./Week): 4	**No. of Lectures (Sem.):** 60	**Mid Sem. Exam (Hrs.):** 1.5	**End Sem. Exam (Hrs.):** 3