Curriculum Structure & Syllabi

of

B. Tech

In

IT (Information Technology)

(w.e.f. 2019-20)

Vision
Mission
Program Educational Objectives
Program Outcomes
Program Specific Outcomes
Overall Credit Structure
Curriculum
Syllabus

Offered By

DEPARTMENT OF ITCA
M. M. M. UNIVERSITY OF TECHNOLOGY,
GORAKHPUR-273010, UP

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VISION

To become pioneer in the field of Information Technology and Computer Applications at global level by imparting quality education with excellent teaching-learning processes and research methodologies.

MISSION

Mission-1 To offer state-of-art education in Information Technology to keep pace with industry requirements.

Mission-2 To promote quality research in the field of IT and its applications.

Mission-3 To ensure the holistic development of the students by inculcating value based socially committed professionalism.

B. Tech (Information Technology)

PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

PEO-1 To inculcate the fundamental knowledge of Mathematics, Science & Engineering disciplines for developing the ability to formulate, solve and analyse the problems of Information Technology field and to provide them the skills for the pursuit of under-graduate studies, research & development and higher education.

PEO-2 To provide the understanding of the prerequisite of the software, technical aspects, and design for coming up with the novel engineering solutions and efficient product developments.

PEO-3 To assist the students in the pursuit of the successful career by adopting the ethical practices and social responsibility.

PEO-4 To provide students the technical as well as soft skills required by the national as well as international organizations.

PEO-5 To elevate cognizance in the students towards the lifelong learning and to inculcate the ethical and moral values.

PEO-6 To give students the knowledge of the contemporary technologies, practical experiences, and possibilities in the field of Information Technology to provide the multidisciplinary knowledge to develop the team spirit and leadership qualities by working on multidisciplinary projects.

PROGRAMME OUTCOMES (POs)

PO-1 The students will develop the ability towards the application of fundamental knowledge of hardware, computing, algorithms, and programming for developing the solutions of the critical problems of computer applications. **(Rudimentary analytical skills)**

PO-2 The students will be able to model and carry out the experiments by using the fundamental knowledge of computing techniques and derive the conclusions by analysing and interpreting the data. **(Computing skills)**

PO-3 The students will be able to analyze, design, implement and assess a computer-based information system, procedure, module, or program to fulfill the requirements along with the consideration of economical, privacy and reliability constraints. **(Innovative skills)**

PO-4 The students will be able to perform efficiently in teams. **(Team spirit)**

PO-5 The students will develop the analytical skills to critically analyze, recognize, formulate, and devise solutions to the computing problems by using the adequate computing skills and knowledge. **(Problem solving skills)**

PO-6 The students will have the awareness towards the professional, legal, and ethical practices. **(Professional integrity)**

PO-7 The students will have the efficient speaking and written/interpersonal communication skills. **(Oral and written communication skill)**

PO-8 To impart the exhaustive education in the students required to understand and analyze the local and global consequences of computing solutions ranging from individuals and organizations to society. **(Computing consequences assessment skills)**

PO-9 The students will develop the realization of the requirements and the ability to indulge in maintaining professional growth and lifelong learning. **(Continuing education cognizance)**

PO-10 The students will have the cognition towards the current issues and problems of the society. **(Societal awareness)**

PO-11 The students will possess the ability to utilize the knowledge of innovative programming and computing equipment required for the problem-solving tasks. **(Pragmatic skills)**

PO-12 The students will be able to apply the design and evolution precepts in the development of software and hardware systems. **(Software hardware interface)**

PROGRAMME SPECIFIC OBJECTIVES (PSOs)

PSO-1 To produce strong Engineers with the latest knowledge and thinking.

PSO-2 To produce the strong engineers having decision-making, design, and development abilities.

PSO-3 To produce Engineers to serve the IT industries with strong analytical bent of mind, research, and innovative thinking.

PSO-4 To promote the students for higher studies and lifelong learning.

PSO-5 To develop the skill of implementing the interdisciplinary application software projects to meet the demands of industry requirements using latest tools and technologies.

PSO-6 To develop analytical skills in the Engineers for analysing the societal needs and providing the novel solutions through technological based research.

PSO-7 To get the knowledge for appearing in the National and International level Exams GRE/GATE, Public-Private sectors, and further higher studies in India and abroad.

PSO-7 To develop professional skills and latest technical knowledge time to time by conducting Board of Studies (BOS), updating syllabus to keep pace with the demands of industries for maximising the employability.

Credit Structure for B.Tech. (Information Technology)

(For newly admitted students from session 2020-21)

Credit Courses											
	Category Semesters	I	II	III	IV	V	VI	VII	VIII	Total	Min. Req.
Undergraduate Core Courses (158 min. credits)	Basic Sciences & Maths (BSM)	9	14	9	4	-	-	-	-	**36**	**36**
	Engineering Fundamentals (EF)	11	7	6	2	-	-	-	-	**26**	**24**
	Department Core (DC)	-	-	10	15	19	24	10	4	**82**	**78**
	Management (M)	-	-	-	3	3	-	-	-	**6**	**6**
	Humanities & Social Science Core (HSSC)	4	-	-	-	-	-	-	-	**4**	**4**
	Project (P)	-	-	-	-	-	-	5	5	**10**	**10**
Undergraduate Programme Electives (22 min. credits)	Programme Electives (PE)	-	-	-	-	-	-	8	8	**16**	**16**
	Open Electives (OE)	-	-	-	-	-	-	-	4	**4**	**3**
	Humanities & Social Science Electives (HSSE)	-	3	-	-	-	-	-	-	**3**	**3**
Min. Credits Required (158+22=180)	**Total**	**24**	**24**	**25**	**24**	**22**	**24**	**23**	**21**	**187**	**180**

Audit Courses		
	Total	Min. Req.
(Min. 3 Credits audit subjects from other departments will be offered during Semester I-V)	21	15
Seminar	3	3
Industrial/Practical Training (IPT)	1	1

Course Structure of BTech (Information Technology)

Credit Value

1 Period Lecture=1 Credit **1 Period Tutorial=1 Credit** **2 Period Practical=1 Credit**

Freshman Year, Semester-I

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	BSM	BMS-01 / BAS-01	Engineering Mathematics-I	3	1	0	4
2.	BSM	BPM-01 / BAS-02	Engineering Physics-I	3	1	2	5
3.	EF	BIT-01	Fundamentals of Information Technology	3	1	-	4
4.	EF	BEE-01	Principles of Electrical Engineering	3	1	2	5
5.	HSSC	BHM-01 /BAS-03	Professional Communication	3	1	0	4
6.	EF	BIT-02	Software Tools-I	0	0	4	2
7.	AC		Audit Course				-
			Total	**15**	**5**	**8**	**24**

Freshman Year, Semester-II

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	BSM	BMS-02 / BAS-07	Engineering Mathematics-II	3	1	0	4
2.	BSM	BPM-02 / BAS-08	Engineering Physics-II	3	1	2	5
3.	BSM	BMS-06 / BAS-24	Applied Computational Methods	3	1	2	5
4.	EF	BIT-03	Programming Fundamentals	3	1	2	5
5.	HSSE	BAS-**	Humanities & Social Science Electives	2	1	0	3

6.	EF	BCE-10	Engineering Graphics	0	0	4	2
7.	AC		Audit Course				-
			Total	**14**	**5**	**10**	**24**

Sophomore Year, Semester-III

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	BSM	BMS- 05 /BAS-01	Discrete Mathematics	3	1	0	4
2.	BSM	BMS-03 / BAS-14	Graph Theory	3	1	2	5
3.	EF	BIT-11	Switching Theory & Logic Design	3	1	-	4
4.	DC	BIT-12	Data Structures	3	1	2	5
5.	DC	BIT-13	Object Oriented Programming	3	1	2	5
6.	EF	BIT-14	Software Tools-II	0	0	4	2
7.	AC		Audit Course				-
			Total	**15**	**5**	**10**	**25**

Sophomore Year, Semester-IV

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	BSM	BMS-09 / BAS-26	Optimization Techniques	3	1	0	4
2.	M	MBA-113	Management Information System	2	1	-	3
3.	DC	BIT-15	Design & Analysis of Algorithm	3	1	2	5
4.	DC	BIT-16	Computer Organization & Architecture	3	1	2	5
5.	DC	BIT-17	Database Management System	3	1	2	5
6.	EF	BIT-18	Software Tools-III	0	0	4	2
7.	AC		Audit Course				-
			Total	**14**	**5**	**10**	**24**

Junior Year, Semester-V

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	M	MBA-02	Engineering & Managerial Economics	2	1	0	3
2.	DC	BIT-26	Operating System	3	1	2	5
3.	DC	BIT-27	Computer Networks	3	1	2	5
4.	DC	BIT-28	Software Engineering	3	1	2	5
5.	DC	BIT-29	Automata Theory	3	1	-	4
6.	AC		Audit Course				-
			Total	**14**	**5**	**06**	**22**

Junior Year, Semester-VI

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	DC	BIT-31	Data Mining & Ware Housing	3	1	0	4
2.	DC	BIT-32	Artificial Intelligence	3	1	2	5
3.	DC	BIT-33	Machine Learning	3	1	2	5
4.	DC	BIT-34	Wireless Sensor Network & IoT	3	1	2	5
5.	DC	BIT-35	Network Security & Cryptography	3	1	2	5
6.	AC	BIT-30	Seminar	-	-	6	-
			Total	**15**	**5**	**08**	**24**

Senior Year, Semester-VII

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	DC	BIT-41	Graphics & Visual Computing	3	1	2	5
2.	DC	BIT-42	Mobile Computing	3	1	2	5
3.	PE-1	BIT-*	Programme Elective-1	3	1	0	4
4.	PE-2	BIT-*	Programme Elective-2	3	1	0	4
5.	P	BIT-40	Project Part-1	0	0	10	5
6.	AC	BIT-45	Industrial/Practical Training	0	0	2	-
			Total	**12**	**4**	**14**	**23**

Senior Year, Semester-VIII

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	DC	BIT-43	Distributed System	3	1	0	4
2.	PE-3	BIT-*	Programme Elective-3	3	1	0	4
3.	PE-4	BIT-*	Programme Elective-4	3	1	0	4
4.	OE	BOE-*	Open Elective Offered by other dept.	3	1	0	4
5.	P	BIT-50	Project Part-2	0	0	10	5
			Total	**12**	**4**	**10**	**21**

Engineering Fundamentals & Departmental Core (Information Technology)

Sr. No.	Paper Code	Subject	Prerequisite	L	T	P	Credit
1.	BIT-01	Fundamentals of Information Technology	-	3	1	0	4
2.	BIT-02	Software Tools-I	-	0	0	4	2
3.	BIT-03	Programming Fundamentals	-	3	1	2	5
4.	BIT-11	Switching Theory & Logic Design	-	3	1	0	4
5.	BIT-12	Data Structures	-	3	1	2	5
6.	BIT-13	Object Oriented Programming	-	3	1	2	5
7.	BIT-14	Software Tools-II	-	0	0	4	2
8.	BIT-15	Design & Analysis of Algorithm	-	3	1	2	5
9.	BIT-16	Computer Organization & Architecture	-	3	1	2	5
10.	BIT-17	Database Management System	-	3	1	2	5
11.	BIT-18	Software Tools-III	-	0	0	4	2
12.	BIT-26	Operating System	-	3	1	2	5
13.	BIT-27	Computer Networks	-	3	1	2	5
14.	BIT-28	Software Engineering	-	3	1	2	5
15.	BIT-29	Automata Theory	-	3	1	0	4
16.	BIT-31	Data Mining & Ware Housing	-	3	1	0	4
17.	BIT-32	Artificial Intelligence	-	3	1	2	5
18.	BIT-33	Machine Learning	-	3	1	2	5
19.	BIT-34	Wireless Sensor Network & IoT	-	3	1	2	5
20.	BIT-35	Network Security & Cryptography	-	3	1	2	5
21.	BIT-30	Seminar	-	0	0	6	0
22.	BIT-41	Graphics & Visual Computing	-	3	1	2	5
23.	BIT-42	Mobile Computing	-	3	1	2	5
24.	BIT-40	Project Part-1	-	0	0	10	5
25.	BIT-45	Industrial/Practical Training	-	0	0	2	1
26.	BIT-43	Distributed System	-	3	1	0	4
27.	BIT-50	Project Part-2	Project-1	0	0	10	5

Programme Electives (Information Technology)

Sr. No.	Paper Code	Subject	Prerequisite	L	T	P	Credit
		PE-1 & PE-2					
1.	BIT-51	.Net Technology	-	3	1	0	4
2.	BIT-52	Advanced JAVA	-	3	1	0	4
3.	BIT-53	Real Time System	-	3	1	0	4
4.	BIT-54	Artificial Intelligence Search Methods for problem Solving	-	3	1	0	4
5.	BIT-55	Aspect Oriented Programming	-	3	1	0	4
6.	BIT-56	Big Data Computing	-	3	1	0	4

7.	BIT-57	Blockchain Architecture Design and Use Cases	-	3	1	0	4
8.	BIT-58	Cloud Computing and Distributed Systems	-	3	1	0	4
9.	BIT-59	Compiler Design	-	3	1	0	4
10.	BIT-60	Computer Vision: Foundations and Applications	-	3	1	0	4
11.	BIT-61	Functional Programming	-	3	1	0	4
12.	BIT-62	Data Science for Engineers	-	3	1	0	4
13.	BIT-63	Database Administration with ORACLE	-	3	1	0	4
14.	BIT-64	Deep Learning	-	3	1	0	4
		PE-3 & PE-4					
15.	BIT-65	Android Programming	-	3	1	0	4
16.	BIT-66	Embedded System	-	3	1	0	4
17.	BIT-67	Hardware Modelling using Verilog	-	3	1	0	4
18.	BIT-68	Hardware Security	-	3	1	0	4
19.	BIT-69	High Performance Computing	-	3	1	0	4
20.	BIT-70	Introduction to Parallel Programming in Open MP	-	3	1	0	4
21.	BIT-71	Linux Administration & Networking	-	3	1	0	4
22.	BIT-72	Digital Signal Processing	-	3	1	0	4
23.	BIT-73	Multi-Core Computer Architecture – Storage and Interconnects	-	3	1	0	4
24.	BIT-74	Network Programming	-	3	1	0	4
25.	BIT-75	Parallel Algorithms	-	3	1	0	4
26.	BIT-76	Scalable Data Science	-	3	1	0	4
27.	BIT-77	Software Design, Construction & Quality Management	-	3	1	0	4
28.	BIT-78	Software Verification & Validation	-	3	1	0	4

Open Electives for other department

S.N.	Paper Code	Subject	Prerequisite	L	T	P	Credit
1.	BOE-25	Linux & Shell Programming	-	3	1	0	4
2.	BOE-26	Web Technology	-	3	1	0	4
3.	BOE-27	Digital Forensic & Cyber Laws	-	3	1	0	4
4.	BOE-28	Network Security	-	3	1	0	4

Audit Courses for BTech (IT)

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	AC	BCY-04 / BAS-05	Environment & Ecology	2	1	0	-
2.	AC	BEC-01	Fundamentals of Electronics Engineering	2	1	0	-
3.	AC	BCS-13	Internet & Java Programming	3	1	2	-
4.	AC	BCS-53	LAMP Technology	3	1	0	-
5.	AC	BCS-73	Neural Network & Fuzzy System	3	1	0	-
6.	AC	BEE-15A	Microprocessor: Architecture, Programming, and Interfacing	3	1	2	-
7.	AC	MHM-104 /MAS-109	Foreign Language- French	2	1	0	-
8.	AC	MHM-105 /MAS-110	Foreign Language- German	2	1	0	-
9.	AC	MHM-106 /MAS-111	Foreign Language- Spanish	2	1	0	-

Humanities & Social Science Electives (HSSE)

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	AC	BHM-02 / BAS-10	Technical Writing	2	1	0	3
2.	AC	BHM-04 / BAS-11	Human Values & Professional Ethics	2	1	0	3
3.	AC	BHM-05 / BAS-12	Industrial Psychology	2	1	0	3
4.	AC	BHM-06 / BAS-13	Industrial Sociology	2	1	0	3

Computer Fundamental (CF)courses for BBA

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	CF	BIT-81	Fundamentals of Computer Applications	2	0	0	2
2.	CF	BIT-82	IT Tools for Business	2	0	2	3

Syllabus

BIT-01 FUNDAMENTALS OF INFORMATION TECHNOLOGY

Course category : Engineering Fundamentals (EF)

Pre-requisite Subject : NIL

Contact hours/week : Lecture: 3, Tutorial: 1, Practical: 0

Number of Credits : 4

Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. understand the basics of computers Hardware/Software
2. understand the importance of data compression and the algorithms for lossy and lossless data compression
3. understand the concept of operating system and fundamentals of computer networking

Topics Covered

UNIT-I **9L**

Introduction to Computer Hardware/Software: Processor, Motherboard, I/O Devices, peripherals, Memory Types & Hierarchy: Cache, Primary & Secondary memories with examples, Concept of Computer Languages: Low-Level, Assembly and High-Level, System Software: Assembler, Compiler, Interpreter, Loader/Linker

UNIT-II **9L**

Data & Information, Digital representation of Information, Number Systems & Comparisons: Binary, Octal, Decimal, Hexadecimal, Text Representation: ASCII, EBCDIC, Unicode, Multimedia Data, Data Compression Types and Techniques: Lossy / Lossless, Huffman, Shannon-Fano, Dictionary Based Compression techniques

UNIT-III **9L**

Operating System: Concept, Functions, Types, Single-user/Multi-user operating system, Architectural differences, Shell fundamentals, Exemplary commands: Internal & External, Basics of Primary and Secondary Memory Management

UNIT-IV **9L**

Network Basics: Concept, Types, Transmission modes, Topologies, OSI & TCP/IP Models: Functions of different Layers, concept of MAC, IP (Private/Public) and TCP addresses, Basic Introduction to CSMA/CD, IP & TCP/UDP and HTTP Protocols, Current Internet Applications

Books & References

1. Mark Nelson and Jean-Loup Gailly"The Data Compression Book", M&T Books, A Division of MIS: Press,Inc.
2. K Sayood, "Introduction to Data Compression" 3/e, Elsevier 2006
3. Forouzan, Data Communication and Networking, TMH
4. Silberschatz, A., Galvin, P. and Gagne, G., Applied Operating Systems Concepts, John Wiley& Sons Inc.

BIT-02 **SOFTWARE TOOLS-I**

Course category : Engineering Fundamentals (EF)

Pre-requisite Subject : NIL

Contact hours/week : Lecture: 0, Tutorial: 0 , Practical: 4

Number of Credits 2

Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Understanding of Booting Process and installation of Operating system
2. Usage of Operating system commands
3. Understanding of Shell and its usage as a programming language
4. Understanding of Computer Networking concepts

EXPERIMENTS

1. Understanding CMOS settings of operating system
2. Installation of Linux operating system using virtualization technique
3. Understanding and practice of various Linux commands
4. Creation/usage of various types of files supported by Linux
5. Practice of Computer networking commands
6. Programs using shell programming

BIT-03 PROGRAMMING FUNDAMENTALS

Course category : Engineering Fundamentals (EF)

Pre-requisite Subject : NIL

Contact hours/week : Lecture: 3, Tutorial: 1, Practical: 2

Number of Credits : 5

Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Describing the basics of terminologies used in computer programming.
2. Practicing C language programming by writing, compiling and debugging the code.
3. Designing programs involving simple statements, conditional statements, iterative statements, array, strings, functions, recursion and structure.
4. Discussing the dynamic memory allocations and use of the pointers.
5. Applying basic operations on files through programs.
6. Studying and implementing the codes using macros, pre-processor directives and command line arguments

Topics Covered

UNIT-I **9L**

Basics of Computers and Programming: Functional diagram of computer; Language Processors; Approaches to problem solving, Concept of algorithm and flow charts. **Simple Statements:** Datatypes; Tokens and its types; Variable declaration and initialization; User defined type declaration: typedef, enum; Comments; Format specifiers; Standard I/O: taking input and displaying output; **Operators:** types, precedence and associativity; Expressions; Type conversion, C short-hands.

UNIT-II **9L**

Conditional Statements: Simple if, if-else, nested if-else, else-if ladder, switch statements, nested switch, advantages of switch over nested if, restrictions on switch values. **Iterative Statements:** Concepts of entry and exit controlled loops; Uses of for, while and do while loops; Nested Loops; Printing various patterns using nested loops; Using break, continue and goto statements.

UNIT-III **9L**

Arrays: Single-dimensional, multi-dimensional array and their applications; declaration and manipulation of arrays; strings and string handling functions. **Pointers:** Pointer and address arithmetic; dereferencing; pointers and arrays; dynamic memory allocation and de-allocation. **Functions:** Function prototype; Arguments and its types: actual, formal and default arguments; Scope of a variable; Argument passing methods; Passing pointer as the function argument; Recursion: types, advantages and disadvantages; Storage class specifies; Character test functions.

UNIT-IV **9L**

Structure: Declaring and defining structures; Array within structure; Array of structure; Defining and using some data structures: Stack, Queue, and Linked lists. **File Handling:** Types of files; Text files and different operations on text files, opening a file, closing a

file; Data structure of a file; EOF; I/O operations on files; Random access to the files. **Standard C Preprocessors & C Library:** Pre-processor, Directives, Macro, Macro substitution; Conditional Compilation; Command Line Arguments; Standard C Library.

Books & References

1. Brian W. Kernighan and Dennis M. Ritchie, "The C programming language", Pearson
2. E. Balagurusamy, "Programming in ANSI C", McGraw Hill Education
3. Yashavant Kanetkar, "Let Us C", bpb publication
4. Jeri R. Hanly, Elliot B. Koffman, "Problem Solving and Program Design in C", Pearson
5. Herbert Schildt,"C: The Complete Reference",McGraw Hill Education

EXPERIMENTS

Implementing programs in following categories using programming language 'C':

1. Programs of simple statements, conditional statements and iterative statements with their applications.
2. Programs of single and multi dimensional arrays and their applications.
3. Programs of strings and their applications
4. Programs of pointer and their applications
5. Programs of function and their applications
6. Programs of structure and their applications
7. Codes of file handling and management
8. Codes with Preprocessor, Macro, Conditional Compilation and Command Line Arguments

BIT-11 SWITCHING THEORY & LOGIC DESIGN

Course category :	Engineering Fundamentals (EF)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits :	4
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Design a finite state machine and sequential logic design.
2. Synthesize a logic design from a natural language description of a problem.
3. Realize a complete arithmetic and logic unit.
4. Generate a realization of combinational logic in a programmable gate array.
5. Simulate a complete design to evaluate functional correctness and timing.

Topics Covered

UNIT- I: 9L

Binary Codes - Weighted and Non-Weighted - Binary Arithmetic Conversion Algorithms - Error Detecting and Error Correcting Codes - Canonical and Standard Boolean Expressions - Truth Tables.

UNIT- II: **9L**

K-Map Reduction - Don't Care Conditions - Adders / Subtractors- Carry Look-Ahead Adder - Code Conversion Algorithms - Design of Code Converters - Equivalence Functions. Binary/Decimal Parallel Adder/Subtractor for Signed Numbers - Magnitude Comparator - Decoders / Encoders - Multiplexers / Demultiplexers- Boolean Function Implementation using Multiplexers.

UNIT- III: **9L**

Sequential Logic - Basic Latch - Flip-Flops (SR, D, JK, T and Master-Slave) - Triggering of Flip-Flops - Counters - Design Procedure - Ripple Counters - BCD and Binary - Synchronous Counters.

UNIT- IV: **9L**

Registers - Shift Registers - Registers with Parallel Load - Memory Unit - Examples of RAM, ROM, PROM, EPROM - Reduction of State and Flow Tables - Race-Free State Assignment - Hazards.

Books & References:

1. Morris Mano, Digital Design, Prentice Hall of India
2. W. H. Gothmann, Digital Electronics -An Introduction to Theory and Practice, Prentice Hall of India

BIT-12 **DATA STRUCTURES**

Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Write the algorithms and understand their complexities
2. Learn various linear data structures such as stack and queue
3. Learn various non-linear data structures such as such as tree and graph
4. Know applications of linear and non-linear data structures
5. Implement the different data structures statically (using array)
6. Implement the different data structures dynamically (using pointer or linked list)
7. Understand various searching and sorting techniques
8. Understand different hashing techniques

Topics Covered

UNIT- I : Introduction **9L**

Basics: Data and Information, Need of data structure, Algorithms and their complexities, Time complexity, Space Complexity, Time Space Trade-off, Big Oh notation. **Array:** Definition, Different representations – row major, column major, address calculation, Basic operations on matrix, Sparse matrix and its types, Basic array operations (Creation, Insertion into and Deletion from an array), Applications of array, Array representation of polynomials. **Linked List:** Definition and its types, Singly linked list, Circular linked list, Doubly linked list, Basic linked list operations (Creation, Insertion into and Deletion from a linked list), Applications of linked list, Linked list representation of polynomial.

UNIT II : Linear Data Structures **9L**

Stack: Definition and its implementations (static using array and dynamic using linked list), PUSH and POP operations, Applications of stack, Infix, Prefix and Postfix Expressions and their inter-conversions, Evaluation of Postfix expressions using stack, Recursion, Types of recursion, difference between recursion and iteration, Tower of Hanoi Problem. **Queue**: Definition and its types, Circular queue, Double ended queue, Implementation of queue (static using array and dynamic using linked list), Basic operation (Creation, Insertion into and Deletion from a queue), Applications of queue.

UNIT III : Nonlinear Data Structures **9**L

Trees: Definition, Basic terminologies, difference between tree and forest, tree representation, Types of tree, Implementation of tree (static using array and dynamic using linked list), Basic operations (Creation, Insertion into and Deletion from a tree), Traversal techniques (Inorder, Preorder and Postorder), Applications of tree, Binary trees, B Tree, B+ Tree, Binary Search Tree, Height balanced binary tree – AVL Tree, Threaded binary tree. **Graph**: Definitions, Graph representations – adjacency matrix, adjacency list, Basic operations (Creation, Insertion into and Deletion from a graph), Traversal techniques (Depth first search - DFS, Breadth first search - BFS), Applications of graph. Minimum spanning tree – Prim‘s algorithm, Kruskal algorithm.

UNIT IV : Searching, Sorting and Hashing **9L**

Searching Algorithms: Sequential or Linear search, Binary search. **Sorting Algorithms:** Bubble sort, Insertion sort, Merge sort, Quick sort, Heap sort (concept of max heap, and Min Heap), Radix sort. **Hashing Techniques:** Definition, Difference between Searching and Hashing, Hash functions, Collision.

EXPERIMENTS:

Write C/C++ programs to illustrate the concept of the following:

1. Arrays
2. Linked List
3. Stack
4. Queue
5. Tree

6. Graph
7. Searching
8. Sorting
9. Hashing
10. Applications of various data structures

Books & References:

1. "Fundamentals of Data Structures of C", Ellis Horowitz, Sartaj Sahni, Susan Anderson-freed.
2. "Data Structures", S. Lipschutz.
3. "Introduction to Algorithms", T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein.
4. "Data Structures and Program Design in C", Robert L. Kruse, Bruce P. Leung.
5. "Data Structures in C", Aaron M. Tenenbaum.

BIT-13 OBJECT ORIENTED PROGRAMMING

Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Write basic and advance object oriented programs
2. Create and use classes and objects
3. Write code for Constructors and Destructors
4. Write code for Inheritance
5. Write code for Function Overloading
6. Write code for Operator Overloading
7. Write code for Dynamic or Run-time Polymorphism (Overriding)
8. Write code for Exception handling
9. Write code for file handling and various file operations

Topics Covered

UNIT I **9L**

Tokens, Keywords, Identifiers and Constants, Basic Data Types, User-Defined and Derived Data Types, Type Casting, Implicit Conversion, Operators and Expressions, Operator Precedence, Simple statements, Conditional statements, Iterative statements, Array, Function, Pointer, Structure

UNIT II **9L**

Basic Concepts of Object Oriented Programming, Object Oriented Programming Paradigm, Benefits of OOP, Object Oriented Languages, Class and Objects, Scope Resolution Operator, Access specifiers, Data members, Accessing class members, Data hiding, Member function, Inline function, Friend function, Passing objects as arguments, Returning objects from functions

UNIT III **9L**

Constructors and its types, Destructor, Constructor overloading, Order of construction and destruction, Inheritance, Single, Multilevel, Multiple, Hierarchical, Hybrid Inheritance, Base class, Derived class, Virtual function, Polymorphism: Function Overloading, Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Overriding

UNIT IV **9**

Exception Handling, Throwing and Catching Mechanism, Templates, File handling, Types of files, End of File, Basic file operations: creating, opening, closing, reading, writing and appending a file, copying a file to another, Object oriented system development

EXPERIMENTS:

Write programs to illustrate the following concepts:

1. Operators and expressions
2. Simple statements, Conditional statements and Iterative statements
3. Arrays
4. Functions
5. Pointers
6. Structures
7. Objects and Classes
8. Inline Function, Friend function and Virtual Functions
9. Scope Resolution Operator
10. Constructors and Destructors
11. Inheritance
12. Function Overloading
13. Operator Overloading
14. Dynamic or Run-time Polymorphism (Overriding)
15. Exception Handling
16. File operations

Books & References:

1. P. Deitel and H. Deitel, “C++ How to Program”, Pearson.
2. E. Balagurusamy, “Object Oriented Programming with C++”, TMH Publication.
3. Yashavant Kanetkar, “Let us C++”, BPB Publications
4. Robert Lafore, “Object Oriented Programming in Turbo C++”, Galgotia Publication.
5. B. Trivedi, "Programming with ANSI C++", Oxford University Press.
6. Ira Pohl, "Object Oriented Programming using C++", Pearson Education, Second Edition Reprint
7. B. Stroustrup, "The C++ Programming language", Pearson Education.

8. Timthy Budd, "An Introduction to Object Oriented Programming with C++," Addition-Wesley.
9. Kip R. Irvine, "C++ and Object-Oriented Programming," Prentice Hall.

BIT-14 **SOFTWARE TOOLS-II**

Course category :	Engineering Fundamentals (EF)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 0, Tutorial : 0, Practical: 4
Number of Credits :	2
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Understanding of process handling in Operating system
2. Usage of kernel system calls
3. Understanding of multiprogramming function of operating system using system calls

EXPERIMENTS:

1. Programs related to advanced C programming (command line arguments & file handling)
2. Understanding and usage of various LINUX kernel system calls
3. System call programming (programs based on LINUX kernel system calls using C language)

BIT-15 **DESIGN & ANALYSIS OF ALGORITHM**

Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Analyze the time and space complexity of a given algorithm
2. Apply the techniques of algorithm in solving real world problems
3. Systematic development of an algorithm for solving a problem

Topics Covered

UNIT I **9L**

Introduction: Algorithms, Analyzing Algorithms, Asymptotic Notation, Complexity of Algorithms, Growth of Functions, Performance Measurements, Solving Recurrence Equations Sorting and Order Statistics - Shell Sort, Heap Sort, Comparison of Sorting Algorithms, Sorting in Linear Time

UNIT II **9L**

Divide and Conquer with examples such as Sorting- Quick Sort, Merge Sort, Matrix Multiplication, Convex hull and Searching.

Advanced Data Structures: Red-Black trees, B – trees, 2-3 Trees, Binomial Heaps, and Fibonacci Heaps

UNIT III **9L**

Greedy methods with examples such as Optimal Reliability Allocation, Knapsack, Minimum Spanning Trees – Prim's and Kruskal's algorithms, Single Source Shortest Paths - Dijkstra's and Bellman Ford algorithms. Dynamic programming with examples such as Fibonacci Numbers, Multistage Graphs, Resource Allocation, Kanpsack, All Pair Shortest Paths – Warshal's and Floyd's algorithms

UNIT IV **9L**

Backtracking Algorithms- Graph Coloring, n-Queen Problem, Hamiltonian Cycles and Sum of Subsets.

Selected Topics: String Matching, Theory of NP-completeness, Polynomial Time, Polynomial time Verification and Reducibility, NP – Hard - NP-Complete problems with examples. Approximation Algorithms Randomized Algorithms

EXPERIMENTS:

1. To analyze time complexity of Insertion Sort, Merge Sort and Quick Sort.
2. To Implement Strassen's Matrix Multiplication.
3. To implement Merge Sort using Divide and Conquer approach.
4. To implement Quick Sort using Divide and Conquer approach.
5. To implement Knapsack Problem.
6. To implement Activity Selection Problem
7. To implement Dijkstra's Algorithm
8. To implement Bellman Ford's Prim's
9. To implement Kruskal's Algorithms.
10. To implement Largest Common Subsequence.
11. To implement Matrix Chain Multiplication.
12. To implement Multistage Graph Algorithms
13. To implement n-Queen Algorithms.
14. To implement Naïve String-Matching Algorithm.
15. To implement Rabin Karp String Matching Algorithm.

Books & References:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, Computer Algorithms/ C++, Second Edition, Universities Press, 2007.
2. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "Introduction to Algorithms", MIT Press, 3rd Edition, 2009.
3. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "The Design and Analysis of Computer Algorithms", Pearson Education, 1999.
4. S. Arora and B. Barak. Computational Complexity: A Modern Approach. Cambridge University Press, 2009.
5. S. Skiena. The Algorithm Design Manual. Springer, 2nd edition, 2008.
6. M. T. Goodrich and R. Tamassia. Data Structures and Algorithms in Java, Wiley, 5th edition, 2010.
7. J. Edmonds. How to Think About Algorithms. Cambridge University, Press, 2008.
8. M. R. Garey and D. S. Johnson. Computers and Intractability: A Guide to the Theory of NP-Incompleteness. V.H. Freeman, 1979.

BIT-16 COMPUTER ORGANIZATION & ARCHGITECTURE

Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Discuss the basic concepts and structure of computers.
2. Understand concepts of register transfer logic and arithmetic operations.
3. Explain different types of addressing modes and memory organization.
4. Explain the function of each element of a memory hierarchy.
5. Identify and compare different methods for computer I/O.

Topics Covered

UNIT I **9L**

Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Micro-operation, Arithmetic Logic Shift Unit, Design of Fast address, IEEE standard for Floating point numbers.

UNIT II **9L**

Control Design: Hardwired & Micro Programmed Control Unit. **Processor Design:** Processor Organization: General register organization, Stack organization, Addressing mode, Instruction

format, Data transfer & manipulations, Program Control, Reduced Instruction Set Computer, Pipelining.

UNIT III **9L**

Arithmetic - Addition & subtraction of signed numbers - Multiplication - Integer division - Floating point operations, Decimal Arithmetic Unit, Decimal arithmetic operations.

UNIT IV **9L**

Input-Output Organization: I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output Processor, Serial Communication. **Memory Organization:** Memory Hierarchy, Main Memory (RAM and ROM Chips), Auxiliary memory, Cache memory, Virtual Memory

EXPERIMENTS:

1. Implementing half adder, full adder using basic logic gates
2. Implementing Binary -to -Gray, Gray -to -Binary code conversions.
3. Implementing 3-8 line decoder.
4. Implementing 4x1 and 8x1 multiplexers.
5. Verify the excitation tables of various flip-flops.
6. Design of an 8-bit input/output system with four 8-bit internal registers.
7. Design of an 8-bit arithmetic logic unit.
8. Design the data path of a computer from its register transfer language description.
9. Implement a simple instruction set computer with a control unit and a data path.
10. Design the control unit of a computer using either hardwiring or microprogramming based on its register transfer language description.

Books & References:

1. Computer System Architecture, by M. Mano
2. Computer Organization, by Vravice, Zaky&Hamacher
3. Structured Computer Organization, by Andrew S. Tanenbaum
4. Computer Organization and Architecture: Designing for Performance by William Stallings

BIT-17 DATABASE MANAGEMENT SYSTEM

Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Understand the basic concepts, techniques and terminology of the database management system.
2. Know and understand the basic syntax, semantics, and pragmatics of SQL & PL/SQL.
3. Analyse problems and apply DBMS concepts and techniques for developing the programs to solve them,
4. Evaluate alternative database designs to determine which are better according to selected criteria,
5. Know the concepts of Normalization and apply it to solve various problems related to database design
6. Know and understand the basic features of database transactions and concurrency control.
7. Reason about and manipulate concurrency control techniques.

Topics Covered

UNIT I **9L**

Introduction to DBMS: An overview of database management system, database system Vs file system, Database system concepts, Three-Level Architecture of DBMS, data models: Hierarchical Data Model, Network Data Model and Relational Data Model, schema and instances, data independence and data base language, Data definitions language, DML, Overall Database Structure. **Entity Relationship Model:** ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, Specialization and aggregation, Translating E-R diagrams into tables and relational model, extended ER model, relationships of higher degree.

UNIT II **9L**

Relational data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus. **Introduction to SQL:** Characteristics of SQL, Advantage of SQL. SQL data types and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries: Insert, update, delete, Joins, Unions, Intersection, Minus operations, SQL Functions: Number function, Character function, Aggregate functions, Conversion function, Date function.

UNIT III **9L**

Data Base Design & Normalization: Functional dependencies and Multivalued dependency, Closure of a set of FDs, Minimal or Canonical cover of FDs, Normal form: first, second, third, BCNF, fourth and fifth normal forms along with examples, inclusion dependences, loss less join decompositions, dependency preserving decomposition, normalization using FD, MVD, and JDs, alternative approaches to database design.

UNIT IV **9L**

Transaction Processing Concepts: Transaction system, Schedule, types of schedule, testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log-based recovery, checkpoints,

deadlock handling, Deadlock detection, deadlock prevention, Concurrency Control Techniques: Concurrency control, locking techniques for concurrency control, Time stamping protocols for concurrency control, validation-based protocol, multiple granularity, Multi version schemes, Recovery with concurrent transaction.

EXPERIMENTS:

1. Creation and querying of database tables for the following cases.
    a. Write SQL queries using relational operations (=, <,>, etc)
    b. Write SQL queries using SQL operators.
    c. Write SQL query using character, number, date and group functions.
    d. Write SQL queries for relational algebra.
    e. Write SQL queries for extracting data from more than one table.
    f. Write SQL queries for sub queries and nested queries.
    g. Write programme by using PL/SQL.
    h. Concepts for ROLL BACK, COMMIT & CHECK POINTS
    i. Create VIEWS, CURSORS and TRGGERS & write ASSERTIONS.
    j. Create FORMS and REPORTS.
2. Development of applications involving vendor development systems, stores management system, finance management, Hotel management system, Hospital management system, Hostel management system etc.
3. Design of tables by normalization and dependency analysis.
5. Write application software with host language interface

Books & References:

1. Date C J, "An Introduction to Database System", Addision Wesley Publication.
2. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill Publication.
3. Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley Publications
4. Leon & Leon, "Database Management System", Vikas Publishing House.
5. Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication.
6. Majumdar & Bhattacharya, "Database Management System", TMH.
7. Ramakrishnan, Gehrke, "Database Management System", McGraw Hill.
8. Kroenke, "Database Processing: Fundamentals, Design and Implementation", Pearson Education.
9. Maheshwari Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi.

BIT-18	**SOFTWARE TOOLS-III**
Course category :	Engineering Fundamentals (EF)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 0, Tutorial : 0 Practical: 4
Number of Credits :	2

Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Understanding the various functions of Linux Operating System
2. Usage of Apache Web Server, MySQL and PHP for creating different kinds of websites
3. Developing ability to create the desktop based and mobile based web applications

EXPERIMENTS:

Students should install Linux and understand its various functions. Using Apache Web Server, MySQL and PHP, they can create the desktop based and mobile based web applications from following list of projects or any other creative projects with the concern of associated faculty in Lab.

1. University Management System
2. Attendance Management System
3. Examination Management System
4. Library Management System
5. Academic Registration Management System
6. Employee Management System
7. Student Management System
8. Grievance Management System
9. Hostel Management System
10. Mess Management System
11. Canteen Food Ordering and Management System
12. University Hospital Management System
13. Students' Departmental Society Portal
14. Students' Technical Event Management Portal
15. Students' Cultural Event Management Portal
16. Students' Sports Management Portal
17. Online Learning Management System
18. University Guest House Booking System
19. Online Faculty Staff Directory for Multi University
20. Security System using Biometric Authentication
21. Online Medicine Shopping
22. Online Food Ordering System
23. Online Auction System (for different valuables of the students who are leaving hostel)
24. Online Second-hand Book Buying and Selling Portal
25. Chatting and messaging system
26. Web-based chat application with webcam using PHP
27. Internet based Discussion Forum
28. University Alumni Portal
29. Online Book Recommendation System
30. Online Hotel Recommendation System
31. Advanced Intelligent Tourist Guide

32. Online Shopping
33. Online Banking System
34. Hotel Management System
35. Online Ticket Booking System
36. Online Hotel Booking System
37. Online Voting System
38. Online Mobile Recharge Portal
39. Online TV Recharge Portal
40. Creating Social Networking Site
41. Webpage ranking search engine

BIT-26 **OPERATING SYSTEM**

Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1, Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To understand the structure and functions of OS.
2. To learn about Processes, Threads and Scheduling algorithms.
3. To understand the principles of concurrency and Deadlocks.
4. To learn various memory management schemes.
5. To study I/O management and File systems.

Topics Covered

UNIT I **9L**

Introduction: Basic architectural concepts, Operating System Services, interrupt handling, concepts of batch processing, multiprogramming, time-sharing, real-time operations; Resource Manager view, process view and hierarchical view of an OS. **Memory management**: Partitioning, paging, concepts of virtual memory demand paging, page replacement algorithms, segmentation, Segmentation and demand-paging, Cache memory management.

UNIT II **9L**

Processor management: CPU scheduling – short-term, medium term and long term scheduling, non-preemptive and preemptive algorithms, performance analysis of multiprogramming, multiprocessing and interactive systems, Concurrent processes, precedence graphs, critical section problem, semaphores; Classical process, co-ordination problems, Producer consumer

problem, Reader-writer problem, Dining philosophers problem, Barber's shop problem, Inter-process communication.

UNIT III **9L**

Concurrent Programming: Critical region, conditional critical region, monitors, Deadlocks: prevention, avoidance, detection and recovery. Device Management: Scheduling algorithms – FCFS, shortest-seek-time-first, SCAN, CSCAN, LOOK, C-LOOK algorithms, spooling, spool management algorithm

UNIT IV **9L**

Information Management: File concept, file support, directory structures, symbolic file directory, basic file directory, logical file system, physical file system, access methods, file protection, file allocation strategies. Protection: Goals, policies and mechanisms, domain of protection, access matrix and its implementation, access lists, capability lists, Lock/Key mechanisms, passwords, dynamic protection scheme, security concepts and public and private keys, RSA encryption and decryption algorithms. A case study: A UNIX OS file system, shell, filters, shell programming, programming with the standard I/O, UNIX system calls.

EXPERIMENTS:

Write C programs for following:

1. CPU Scheduling Algorithms
2. File Allocation Strategies
3. Memory Management Techniques
4. File Organization Techniques
5. Deadlock Management Techniques
6. Page Replacement Algorithms
7. Process Synchronization

Books & References:

1. Silberschatz, Galvin And Gagne, Operating System Concepts (2012).
2. J. L. Peterson and A. Silberschatz: Operating Systems Concepts, Addison-Wesley, 1987.
3. M Deitel, Operating System
4. Andrew S. Tanenbaum,Modern Operating Systems (3rd Edition) (GOAL Series)
5. Charles Crowley, Operating Systems: A Design-Oriented Approach
6. Lubomir F. Bic and Alan C. Shaw, Operating Systems Principles
7. D Irtegov, Operating System Fundamentals (Programming Series)
8. Ramez Elmasri, A. Gil Carrick, and David Levine, Operating Systems: A Spiral Approach
9. Jean Bacon and Tim Harris,Operating Systems
10. William Stallings, Operating System

BIT-27 **COMPUTER NETWORKS**

Course category : Department Core (DC)

Pre-requisite Subject : NIL

Contact hours/week :	Lecture : 3, Tutorial : 1, Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Provide insight about networks, topologies, and the key concepts
2. Know the basic concepts of network security and its various security issues related with each layer
3. Identify different types of communication mediums and techniques
4. Define and identify different types of multiplexing, data encoding, modulation and switching techniques
5. Illustrate different standards of Local Area Network in terms of technologies and hardware used
6. Illustrate network addressing and analysis techniques
7. Understand the Wide Area Network technologies
8. Understand the network routing concepts
9. Understand the internetworking concepts and architectures
10. Understand the TCP/IP protocols and design architectures

Topics Covered

UNIT I **9L**

Introductory Concepts - Network Hardware - Network software, Networks Topologies. Layering and Protocols, Switching Methods, LAN Inter Connection Devices - Physical Layer - Different types of Transmission Media, Errors in Transmission: attenuation, noise

UNIT II **9L**

MAC Layer: Channel Allocation Problem – Aloha, CSMA, CSMA/CD, CSMA/CA Protocols. Examples: Ethernet, including Gigabit, IEEE standards, FDDI.

Data Link Layer: Framing, Error Detection (Parity, CRC), Sliding Window, Stop and Wait protocols

UNIT III **9L**

Network Layer - Design issues, Routing Algorithms: Congestion Control Algorithms - Quality of Service, Distance Vector, Link State, Inter-domain Routing. Internet Protocol, IPv6, ARP, DHCP, ICMP, Subnetting, Classless Addressing, Network Address Translation

UNIT IV **9L**

Transport Layer - Design issues, Elements of Transport Protocols - User Datagram Protocol -Transmission Control Protocol, Connection Establishment and Termination.

Session, Presentation, and Application Layers - Examples: DNS - Electronic mail - World Wide Web - Multimedia - Network Security

EXPERIMENTS:

1. To create scenario and study the performance of CSMA/CD protocol through simulation.
2. To create scenario and study the performance of token bus and token ring protocols through simulation.
3. Implementation of Error detection and correction algorithms.
4. Implementation and study of 1-bit sliding window viz., stop and wait protocol.
5. Implementation and study of Go-BackN protocol.
6. Implementation and study of selective repeat protocol.
7. To get the MAC or Physical address of the system using Address Resolution Protocol.
8. Implementation of distance vector routing algorithm.
9. Implementation of link state routing algorithm.
10. To write a clientserver application for chat using TCP.
11. To write a C program to develop a DNS client server to resolve the given hostname.

Books & References:

1. S. Tanenbaum, "Computer Networks", Pearson Education, Fourth Edition, 2003
2. Behrouz A. Foruzan, “Data Communication and Networking”, Tata McGraw Hill, 2004
3. LL Peterson, BS Davie, Computer Networks: A Systems Approach, 5th Ed., Morgan-Kauffman, 2011.
4. Comer, Computer Networks & Internet with Internet Applications by Pearson Education
5. JF Kurose, KW Ross, Computer Networking: A Top-Down Approach, 5th Ed., Addison-Wesley, 2009.
6. W Stallings, Cryptography and Network Security, Principles and Practice, 5th Ed., Prentice-Hall, 2010
7. W. Stallings, "Data and Computer Communication", Pearson Education, Fifth Edition.

BIT-28	**SOFTWARE ENGINEERING**
Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1, Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. List and define the fundamental concepts of Software Engineering and its applications.
2. Design and develop the DFD, E-R Diagram, Flow Chart etc for a project.
3. Design and develop the SRS for a project, ISO 9000 Models, SEI-CMM Model etc.
4. List and define the test cases, fundamental concepts of testing to be applied on various projects

5. Implement and analyse the various model of software development for a project.
6. Design and define the cost estimations, size estimations using various techniques.
7. List and define the fundamental concepts of Software maintenance
8. Explain the CASE tool, Reverse Engineering, Re-Engineering, Software risk analysis and management

Topics Covered

UNIT I **9L**

Introduction: Introduction to Software Engineering, Evolution and impact of Software engineering, Software Components, Software Characteristics, Software Crisis, Similarity and Differences from Conventional Engineering Processes, Feasibility study, Functional and Non-functional requirements, Requirements gathering, Requirements analysis, Software Development Life Cycle (SDLC) Models: Waterfall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

UNIT II **9L**

Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis, Documentation, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS, Basic issues in software design: modularity, Top-Down and Bottom-Up Design, Cohesion and Coupling, Structure chart, Object-oriented software development, Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

UNIT III **9L**

Software Testing: Fundamental of testing, Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Software Reliability Metrics.

UNIT IV **9L**

Software Maintenance and Software Project Management: Need of Software Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools, Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

EXPERIMENTS:

Design and draw the SRS, ER diagram, DFD and develop the software project for the followings:

1. Hospital Management
2. Hotel management
3. University Management
4. Library Management
5. Time Table Management
6. Student Result Management
7. Attendance Management
8. Hostel Management
9. Mess Management
10. Banking Management
11. Inventory Management

Books & References:

1. RS Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Pankaj Jalote, Software Engineering, Wiley
3. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
4. KK Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
5. Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
6. Ian Sommerville, Software Engineering, Addison Wesley.
7. Kassem Saleh, "Software Engineering", Cengage Learning.
8. P fleeger, Software Engineering, Macmillan Publication

BIT-29 **AUTOMATA THEORY**

Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits :	4
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Understand, design, construct, analyze and interpret Regular languages, Expression and Grammars.
2. Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.
3. Understand, design, analyze and interpret Context Free languages, Expression and Grammars.
4. Understand, design, analyze and interpret Context Free languages, Expression and Grammars
5. Design different types of Push down Automata as Simple Parser.

6. Design different types of Turing Machines (Acceptor, Verifier, Translator & Basic computing machine).
7. Compare, understand and analyze different languages, grammars, Automata and Machines and appreciate their power and convert Automata to Programs and Functions

Topics Covered

UNIT I **9L**

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, Equivalence of NFA and DFA, Minimization of Finite Automata, Myhill-Nerode Theorem

UNIT II **9L**

Chomsky Classification of Grammars, Regular Expression, 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 **9L**

Context Free Grammar (CFG) and Languages: Definition, Examples, Parsing, 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 Proper ties of CFLs, Decision Properties of CFLs: Emptiness, Finiteness and Membership, Pumping Lemma for CFLs. Context Sensitive Grammar and Language. **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.

UNIT IV **9L**

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 Undesirability, Undecidable Problems about TMs. Post Correspondence Problem (PCP), Modified PCP, Multi-Tape Turing Machine.

Books & References:

1. Introduction to Automata Theory, Languages, and Computation, 3nd Edition, John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Pearson Education
2. Micheal Sipser, Introduction to the Theory of Computation, Thomson Learning
3. Theory of Computer Science – Automata languages and computation, Mishra and Chandrashekaran, 2nd edition, PHI.
4. H R. Lewis and Christos H. Papadimitriou, Elements of the theory of Computation, PHI Ltd
5. Introduction to Formal languages Automata Theory and Computation Kamala Krithivasan, Rama R, Pearson.

BIT-31 **DATA MINING & WARE HOUSING**

Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits :	4
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Understand the concept of Data Mining and Warehousing.
2. Design a data mart or data warehouse for any organization
3. Develop skills to write queries using DMQL and extract knowledge using data mining techniques.
4. Adapt new data mining tools and apply the techniques of clustering, classification, association finding, feature selection and visualization to real world data.

Topics Covered

UNIT – I **9L**

Introduction to data mining: Definition of Data Mining, Motivation, Need and its importance, Kind of Data, Functions of Data Mining, Kinds of Patterns, Classification of Data Mining Systems, Data Mining Task Primitives, Major Issues in Data Mining, Types of Data Sets and Attribute Values, Basic Statistical Descriptions of Data, Data Visualization, Measuring Data Similarity. Data Quality, Major Tasks in Data Pre-processing, Data Reduction, Data Transformation and Data Discretization, Data Cleaning and Data Integration.

UNIT - II **9L**

Introduction to data warehousing: Basic Concepts of Data Warehouse, Data Warehouse Modelling, Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute-Oriented Induction, Efficient Methods for Data Cube Computation, Exploration and Discovery in Multidimensional Databases.

UNIT – III **9L**

Frequent patterns, associations and correlations: Basic Concepts of Patterns, Association and Correlations, Efficient and Scalable Frequent Item set Mining Methods, Methods of Pattern Evaluation, Applications of frequent pattern and associations, Various Kinds of Association Rules, Constraint-Based Frequent Pattern Mining, Extended Applications of Frequent Patterns.

UNIT - IV **9L**

Classification and cluster analysis: Basic Concepts, Decision Tree Induction, Bayesian Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy: Ensemble Methods, Handling Different Kinds of Cases in Classification, Classification by Neural Networks, Support Vector Machines, Pattern-Based Classification, Lazy Learners (or Learning from Your Neighbours). Basic Concepts of Cluster Analysis, Clustering structures, Major Clustering Approaches, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Model Based Clustering, Link-Based Cluster Analysis, Semi-Supervised Clustering and Classification, Bi-Clustering, Collaborative Clustering.

Books & References:

1. Jiawei Han, Micheline Kimber, Jian Pei (2012), Data Mining: Concepts and Techniques, 3rd edition, Elsevier, United States of America
2. Margaret H Dunham (2006), Data Mining Introductory and Advanced Topics, 2nd edition, Pearson Education, New Delhi, India.
3. Amitesh Sinha (2007), Data Warehousing, Thomson Learning, India.
4. Xingdong Wu, Vipin Kumar (2009), the Top Ten Algorithms in Data Mining, CRC Press, UK.

BIT-32 **ARTIFICIAL INTELLIGENCE**

Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and One Minor tests and One Major Theory & Practical Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

3. Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4. Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.
5. Demonstrate proficiency in applying scientific method to models of machine learning.
6. Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications

Topics Covered

UNIT I: **9L**

Introduction: The Foundations of Artificial Intelligence, The History of Artificial Intelligence Intelligent Agents, Agents and Environments, Good Behaviour, The Nature of Environments, The Structure of Agents, Solving Problems by Searching Problem-Solving Agents Searching for Solutions, Infrastructure for search algorithms, Measuring problem-solving performance. Uninformed Search Strategies, Informed (Heuristic) Search strategies, Greedy best-first search. A* search Heuristic Functions, Local Search Algorithms and Optimization Problem, Local Search in Continuous Spaces, Searching with Nondeterministic Actions, Searching with Partial Observations, Online Search Agents and Unknown Environments

UNIT II: **9L**

Adversarial Search, Games, Optimal Decisions in Games, Alpha--Beta Pruning, Imperfect Real-Time Decisions, Stochastic Games, Partially Observable Games, State-of-the-Art Game Programs, Alternative Approaches, Defining Constraint Satisfaction Problems, Constraint Propagation: Inference in CSPs, Backtracking Search for CSPs, Variable and value ordering, Interleaving search and inference, Intelligent backtracking: Looking backward, Local Search for CSPs, The Structure of Problems, Knowledge, reasoning, and planning Logical Agents Propositional vs. First-Order Inference Backward Chaining and Forward Chaining, Unification and Lifting

UNIT III: **9L**

Planning and Acting in the Real World, Definition of Classical Planning, Algorithms for Planning as State-Space Search, Planning Graphs, Classical planning as Boolean satisfiability, representing temporal and resource constraints, Planning and Acting in Nondeterministic Domains, Knowledge Representation, Acting under Uncertainty, Probabilistic Reasoning, Time and Uncertainty

UNIT IV: **9L**

Forms of Learning, Supervised Learning, Decision Trees Evaluating and Choosing the Best Hypothesis, A Logical Formulation of Learning, Statistical Learning with Complete Data, Natural Language Processing

EXPERIMENTS:

Write programs for followings techniques

1. Various search algorithms
2. A* Algorithm
3. Heuristic Search Algorithm
4. Checking Predicate Logic on different issues

Books & References:

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education, 2012.
2. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence: a logical approach", Oxford University Press, 2012.
3. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2012
4. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998

BIT-33	**MACHINE LEARNING**
Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and One Minor tests and One Major Theory & Practical Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To explain theory underlying machine learning
2. To construct algorithms to learn linear and non-linear models
3. To implement data clustering algorithms
4. To construct algorithms to learn tree and rule-based models
5. To apply reinforcement learning techniques

Topics Covered

UNIT I: **9L**

FOUNDATIONS OF LEARNING: - Components of Learning, Learning Models, Geometric Models, Probabilistic Models, Logic Models, Grouping and Grading, Learning Versus Design, Types of Learning, Supervised, Unsupervised, Reinforcement, Theory of Learning, Feasibility of Learning, Error and Noise, Training versus Testing, Theory of Generalization, Generalization Bound, Approximation- Generalization Trade-offs, Bias and Variance, Learning Curve

UNIT II: **9L**

LINEAR MODELS: - Linear Classification, Univariate Linear Regression, Multivariate Linear Regression, Regularized Regression, Logistic Regression, Perceptron, Multilayer Neural Networks, Learning Neural Networks Structures, Support Vector Machines, Soft Margin SVM, Going Beyond Linearity, Generalization and Over Fitting, Regularization, Validation

UNIT III: **9L**

DISTANCE BASED MODELS: - Nearest Neighbour Models, K-Means, Clustering around Medoids, Silhouettes, Hierarchical Clustering, K-D Trees, Locality Sensitive Hashing, Non-Parametric Regression, Ensemble Learning, Bagging and Random Forests, Boosting, Meta Learning

TREE BASED MODELS: - Decision Trees, Learning Decision Trees, Ranking and Probability Estimation Trees, Regression Trees, Clustering Trees

UNIT IV: **9L**

RULE MODELS: – Learning Ordered Rule Lists, Learning Unordered Rule Lists, Descriptive Rule Learning, Association Rule Mining, First-Order Rule Learning

REINFORCEMENT LEARNING: - Passive Reinforcement Learning, Direct Utility Estimation, Adaptive Dynamic Programming, Temporal-Difference Learning, Active Reinforcement Learning, Exploration, Learning an Action, Utility Function, Generalization in Reinforcement Learning, Policy Search, Applications in Game Playing, Applications in Robot Control

EXPERIMENTS:

1. A simple *linear regression* attempts to draw a straight line that will best minimize the residual sum of squares between the observations and the predictions in python program language
2. Linear Regression Logistic Regression used in python program language
3. Decision Tree in python program language
4. SVM used in python program language
5. Naive Bayes used in python program language
6. KNN in python program language

7. K-Means in python program language
8. Random Forest in python program language
9. Dimensionality Reduction Algorithms in python program language
10. Gradient Boost &Ada boost in python program language

Books & References:

1. Ethem Alpaydın -Introduction to Machine Learning Third Edition, MIT Press, 2004
2. Y. S. Abu-Mostafa, M. Magdon-Ismail, and H.-T. Lin, Learning from Data, AML Book Publishers, 2012.
3. P. Flach, Machine Learning: The art and science of algorithms that make sense of data, Cambridge University Press, 2012.
4. K. P. Murphy, Machine Learning: A probabilistic perspective, MIT Press, 2012.
5. C. M. Bishop, Pattern Recognition and Machine Learning, Springer, 2007.
6. D. Barber, Bayesian Reasoning and Machine Learning, Cambridge University Press, 2012.
7. M. Mohri, A. Rostamizadeh, and A. Talwalkar, Foundations of Machine Learning, MIT Press, 2012.
8. T. M. Mitchell, Machine Learning, McGraw Hill, 1997.
9. S. Russel and P. Norvig, Artificial Intelligence: A Modern Approach, Third Edition, Prentice Hall, 2009.

BIT-34	**WIRELESS SENSOR NETWORK & IoT**
Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and One Minor tests and One Major Theory & Practical Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Understand the concepts of wireless sensor networks and its application areas
2. Analyze the basic protocols in wireless sensor network
3. Design WSN applications in different domains and be able to analyze their performance
4. Understand the concepts of Internet of Things and its application areas
5. Design IoT applications in different domains and be able to analyze their performance

Topics Covered

UNIT I: **9L**

Wireless Sensor Networks (WSN): Basic components of a sensor node, Types of sensors, Constraints on the sensor nodes, Characteristics of WSN, Nature of Data in Sensor Networks, Manual vs Randomized node deployment, Event aware topology management in WSN, Data Dissemination, Aggregation, Virtual Sensor Network, Operating Systems for WSN, Issues & challenges with WSN, Some applications of WSN

UNIT II: **9L**

Internet of Things (IoT): Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, Machine-to-Machine Communications, Difference between IoT and M2M, Software Defined Networking, SDN for IoT, Network Function Virtualization, Interoperability in IoT, Issues & Challenges with IoT, Some applications of IoT

UNIT III: **9L**

Applications of WSN: Military Applications, Environmental monitoring applications, Traffic Monitoring, Weather Monitoring, Fire Detection, Underwater Monitoring, Underground Monitoring, Agricultural Applications, Habitat Monitoring; **Applications of IoT:** Smart Cities, Smart Homes, Surveillance applications, Vehicular IoT, Smart Lighting System, Weather Monitoring System, Smart Agriculture, Healthcare System, Industry applications

UNIT IV: **9L**

Routing Protocols in WSN: Classification of routing protocols, Proactive routing vs Reactive routing, QoS routing, **Flat Protocols:** SPIN (Sensor Protocols for Information via Negotiation), Directed Diffusion, **Hierarchical or Cluster Based Protocols:** LEACH (Low Energy Adaptive Clustering Hierarchy), PEGASIS (Power-Efficient Gathering in Sensor Information Systems), **Location Based Protocols:** GEAR (Geographic and Energy Aware Routing)

EXPERIMENTS:

1. Installation of simulators of WSN & IoT
2. Creating basic programs of WSN & IoT
3. Creating any application of WSN & IoT

Books & References:

1. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice", Wiley Publishers, 2010, ISBN: 978-0-470-99765-9
2. Carlos De Morais Cordeiro, Dharma Prakash Agrawal, “Ad Hoc and Sensor Networks: Theory and Applications”, World Scientific Publishers, 2011, ISBN: 981-256-681-3
3. Dorothea Wagner and Roger Wattenhofer, “Algorithms for Sensor and Ad Hoc Networks”, Advanced Lectures, Springer, Lecture Notes in Computer Science 4621, 2007, ISBN-13 978-3-540-74990-5

4. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press, Taylor & Francis Group, 2017, ISBN: 9781498761284
5. AdrianMcEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN: 978-1-118-43062-0
6. VijayMadisetti, Arshdeep Bahga, "Internet of Things: A Hands-On Approach",2014,ISBN:9780996025515
7. Daniel Kellmereit, "The Silent Intelligence: The Internet of Things", 2013, ISBN: 0989973700
8. Waltenegus Dargie,Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice", Wiley Publishers, 2010, ISBN 978-0-470-99765-9

BIT-35 NETWORK SECURITY & CRYPTOGRAPHY

Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and One Minor tests and One Major Theory & Practical Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To understand Cryptography Theories, Algorithms and Systems.
2. To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
3. To understand necessary Approaches and Techniques to build protection mechanisms to secure computer networks.
4. To understand various protocols for network security to protect against the threats in the networks.

Topics Covered

UNIT-I **9L**

Introduction to Cryptography, Attacks, Services and Mechanism, Conventional Encryption Model, Classical Encryption Techniques- Substitution Ciphers and Transposition Ciphers, Cryptanalysis, Steganography, Stream and Block Ciphers, Modern Block Ciphers: Block Ciphers Principals, Data Encryption Standard (DES), Strength of DES, Differential and Linear Crypt Analysis of DES, Block Cipher Modes of Operations, Triple DES, IDEA Encryption and Decryption, Strength of IDEA, Confidentiality using Conventional Encryption, Traffic Confidentiality, Key Distribution, Random Number Generation.

UNIT-II **9L**

Introduction to Graph, Ring and Field, Prime and Relative Prime Numbers, Modular Arithmetic, Fermat‟s and Euler‟s Theorem, Euclid‟s Algorithm, Chinese Remainder Theorem. Principals of Public Key Crypto Systems,

RSA Algorithm, Security of RSA, Key Management, DiffleHellman Key Exchange Algorithm, Elganel Encryption.

UNIT-III **9L**

Message Authentication and Hash Function: Authentication Requirements, Authentication Functions, Message Authentication Code, Hash Functions, Birthday Attacks, Security of Hash Functions and MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA). Digital Signatures: Digital Signatures, Authentication Protocols, Digital Signature Standards (DSS), Authentication Applications: Kerberos, Electronic Mail Security-Pretty Good Privacy (PGP), S/MIME.

UNIT-IV **9L**

IP Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management. Web Security: Secure Socket Layer and Transport Layer Security, Secure Electronic Transaction (SET), System Security: Intruders, Viruses and Related Threads, Firewall Design Principals, Trusted Systems.

EXPERIMENTS:

1. Write a program to implement Mono alphabetic cipher.
2. Write a program to implement Ceaser and modified Ceaser cipher.
3. Write a program to implement Polyalphabetic cipher.
4. Write a program to implement Rail fence Cipher technique.
5. Write a program to implement double columnar transposition technique.
5. User A want to send the message **"Meet me very urgently"** to user B by using DES algorithms. Encrypt it at sender end and decrypt it at receiver end.
6. User C want to send message **"welcome to CSE department"** to user D by using AES algorithms. Encrypt it at sender end and decrypt it at receiver end.
7. User A want to communicate with user B, but it should be confidential by using Blowfish Algorithms. Encrypt it at sender end and decrypt it at receiver end.
8. Write a program to implement RSA Algorithm.
9. Write a program to implement MD5 and Secure Hash Algorithm.
10. Write a program to implement digital Signature

Books & References:

1. William Stallings, Cryptography and Network Security: Principals and Practice, Pearson Publication.
2. Atul Kahate, "Cryptography and Network Security" Tata McGraw Hill
3. Johannes A. Buchmann, Introduction to Cryptography, Springer-Verlag
4. Bruce Schiener, Applied Cryptography, John Wiley & Sons
5. Behrouz A. Frouzan, Cryptography & Network Security, Tata McGraw Hill
6. Charlie Kaufman, Radia Perlman, Mike Speciner, Network Security, Private communication in public world, PHI Second Edition, 2002
7. Douglas R Simson, Cryptography – Theory and practice, CRC Press, First Edition, 1995

BIT-41 **GRAPHICS & VISUAL COMPUTING**

Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and One Minor tests and One Major Theory & Practical Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Students will demonstrate an understanding of contemporary graphics hardware.
2. Students will create interactive graphics applications in C++ using one or more graphics application programming interfaces.
3. Students will write program functions to implement graphics primitives.
4. Students will write programs that demonstrate geometrical transformations.
5. Students will demonstrate an understanding of the use of object hierarchy in graphics applications.
6. Students will write program functions to implement visibility detection.
7. Students will write programs that demonstrate computer graphics animation.
8. Students will write programs that demonstrate 2D image processing techniques.

Topics Covered

UNIT I: **9L**

Graphics Primitives: Display Devices: Refresh Cathode Ray Tube, Raster Scan Display, Plasma display, Liquid Crystal display, Plotters, Printers. Input Devices: Keyboard, Trackball, Joystick, Mouse, Light Pen, Tablet, and Digitizing Camera. Input Techniques: Positioning techniques, Positioning Constraints, Scales & Guidelines, Rubber-Band techniques, Dragging, Dimensioning techniques and Graphical Potentiometers, Pointing and Selection: the use of selection points, defining a boundary rectangle, multiple selections, Menu selection.

Mathematics for Computer Graphics: Point representation, Vector representation, Matrices and operations related to matrices, Vector addition and vector multiplication, Scalar product of two vectors, Vector product of two vectors.

UNIT II: **9L**

Line Drawing Algorithms: DDA algorithms, Bresenham's algorithm (Line, Circle, ellipse and etc).

Segment & Display files: Segments, Functions for segmenting the display file, Posting and unposting a segment, segment naming schemes, Default error conditions, appending to segments, Refresh concurrent with reconstruction, Free storage allocation, Display file Structure

Graphics Operations: Clipping: Point Clipping, Line Clipping. Polygon Clipping. Filling: Inside Tests, Flood fill algorithm, Boundary-Fill Algorithm and scan-line polygon fill algorithm

UNIT III: **9L**

Conics, Curves and Surfaces: Quadric surfaces: Sphere, Ellipsoid, and Torus. Super quadrics: Superellipse, superellipsoid. Spline & Bezier Representations: Interpolation and approximation splines, parametric continuity conditions, Geometric Continuity Conditions, Spline specifications. Bezier curves and surfaces. Transformation: 2D transformation, Basic Transformations, Composite transformations: Reflection, Shearing, Transformation between coordinate systems. 3 D Graphics: 3 D Display Methods, 3 D modeling, 3 D transformations, Parallel projection, Perspective projection, Visible lines and surfaces identification, Hidden surface removal.

UNIT IV: **9L**

Animation: Introduction to Animation, Principles of Animation, Types of Animation, Types of Animation Systems: Scripting, Procedural, Representational Stochastic.

Image Transformations: Image representations: resolution, colour models. Image transformations: point transformations (windowing, histogram equalisation, colour transformations and colour spaces).

Image Enhancement: Local processes, convolution, image smoothing (local averaging, weighted averaging), size of support, Gaussian mask. Edge enhancement (unsharp masking). Edge detection, Thresholding, blob detection, simple measurement (geometric features). Rank order filters (median, max-min)

EXPERIMENTS:

Develop program to

1. Understand the basic concepts of computer graphics.
2. Design scans conversion problems using C/C++ programming.
3. Apply clipping and filling techniques for modifying an object.
4. Understand the concepts of different type of geometric transformation of objects in 2D and 3D.
5. Understand the practical implementation of modelling, rendering, viewing of objects.
6. Developing LRs using multimedia authoring tools.

Books & References:

1. Hearn and Baker Computer Graphics with OpenGL, 3e, Prentice Hall
2. Newman and Sproul, “Principle of Interactive Computer Graphics”, McGraw Hill
3. Rogers, “Procedural Elements of Computer Graphics”, McGraw Hill
4. Rogers and Adams, “Mathematical Elements of Computer Graphics”, McGraw Hill
5. Foley James D,”Computer Graphics”, AW Ed 2

BIT-42 **MOBILE COMPUTING**

Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits :	5
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and One Minor tests and One Major Theory & Practical Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Demonstrate the energy management in wireless mobile networks.
2. Outline knowledge on Mobile IP.
3. Be familiar with the network protocol stack
4. Learn the basics of mobile telecommunication system
5. Be exposed to Ad-Hoc networks
6. Gain knowledge about different mobile platforms and application development

Topics Covered

UNIT I: **9L**

Introduction, Issues in Mobile Computing, Overview of Wireless Telephony: Cellular Concept, GSM: Air-Interface, Channel Structure, Location Management: HLR, VLR, Hierarchical, Handoffs, Channel Allocation In Cellular Systems, CDMA, GPRS.

UNIT II: **9L**

Wireless Networking, Wireless LAN Overview: MAC Issues, IEEE 802.11, Blue Tooth, Wireless Multiple Access Protocols, TCP Over Wireless, Wireless Applications, Mobile IP, WAP: Architecture, Protocol Stack, Application Environment, Applications, Wirelessmark Up Language (WML).

UNIT III: **9L**

Data Management Issues, Data Replication for Mobile Computers, Adaptive Clustering for Mobile Wireless Networks, File System, Disconnected Operations, Mobile Agents Computing, Security and Fault Tolerance.

UNIT IV: **9L**

Adhoc Networks, Localization, MAC Issues, Routing Protocols, Global State Routing (GSR), Destination Sequenced Distance Vector Routing (DSDV), Dynamic Source Routing (DSR), Ad Hoc On Demand Distance Vector Routing (AODV), Temporary Ordered Routing Algorithm (TORA), QOS in Ad Hoc Network.

EXPERIMENTS:

1. Develop an application that uses GUI components, Font and Colours
2. Develop an application that uses Layout Managers and event listeners.
3. Develop a native calculator application.
4. Write an application that draws basic graphical primitives on the screen.
5. Implement an application that implements Multi threading
6. Develop a native application that uses GPS location information.
7. Implement an application that writes data to the SD card.
8. Implement an application that creates an alert upon receiving a message.
9. Write a mobile application that creates alarm clock

Books & References:

1. Asoke K Taukder,Roopa R Yavagal, Mobile Computing, Tata McGraw Hill Pub. Co., New Delhi, 2005.Higher Engineering Mathematics - B.V. Ramana, Tata McGraw Hill Education Pvt. Ltd., New Delhi
2. J.Schiller, Mobile Communication, Addison Wesley, 2000.
3. Ivan Stojmenovic, Handbook of Wireless Networks and Mobile Computing, JohnWiley& sons Inc, Canada, 2002.
4. William Stallings, "Wireless Communication and Networks", Pearson Education, 2003
5. Yi-Bing Lin &ImrichChlamtac, Wireless and Mobile Networks Architectures, John Wiley & Sons, 2001
6. Raj Pandya, "Mobile and Personal Communication systems and services", Prentice Hall of India, 2001
7. Hansmann, "Principles of Mobile Computing", Wiley Dreamtech, 2004
8. Ray Rischpater, "Wireless Web Development", Springer Publishing, 2000
9. P.Stavronlakis, "Third Generation Mobile Telecommunication systems", Springer Publishers, 2001
10. Burkhardt , Pervasive Computing, Pearson
11. P. Stavronlakis, Third Generation Mobile Telecommunication systems, Springer Publishers.

BIT-43 **DISTRIBUTED SYSTEM**

Course category :	Department Core (DC)
Pre-requisite Subject :	NIL
Contact hours/week :	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits :	4
Course Assessment methods:	Continuous assessment through tutorials, attendance, home assignments, quizzes, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Knowledge about advanced concepts in OS
2. Developing skill set in developing a distributed system.
3. Designing and evaluation of algorithms and protocols for various distributed systems

Topics Covered

UNIT I **9L**

Process Synchronization, Synchronization Mechanism, Process Deadlock, Architectural of Distributed system, Theoretical foundations: logical and vector clocks, causal ordering of messages, Chandy lamport global state recording algorithms, cuts of distributed computation, termination detection. Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, performance metric for distributed mutual exclusion algorithms

UNIT II **9L**

Distributed Deadlock Detection: deadlock handling strategies in distributed systems, Issues in deadlock detection & resolution, control organization for distributed dead lock detection, centralized dead lock detection algorithms, distributed dead lock detection algorithms, hierarchical dead lock detection algorithms. Agreement Protocols: system model, classification of agreement problem, Solution to Byzantine Agreement problem, Application of Agreement algorithms.

UNIT III **9L**

Distributed Resource Management: distributed file system, mechanism for building distributed file systems, design issues, sun network file system, sprite file system, log-structured file system, disk space management, system, Distributed shared memory: Algorithm for implementing DSM, Memory coherence, coherence protocols and design issues, Distributed Scheduling

UNIT IV **9L**

Failure recovery and Fault tolerance: backward and forward error recovery check pointing and recovery, recovery in concurrent systems, consistent set of checkpoints, synchronous check pointing and recovery, and asynchronous check pointing and recover. Fault tolerance: voting protocols, dynamic voting protocols, dynamic vote reassignment protocols.

Books & References:

1. Advanced Concept in Operating Systems-Singhal & Shivaratri (McGraw Hill)
2. Distributed Operating Systems and Algorithm Analysis - Randy Chow & Theodore Johnson (Pearson Education)
3. Distributed System: Concepts and Design - Coulouris, Dollimore, Kindberg (Pearson Education)
4. Distributed Algorithms - Gerald Tel (Cambridge University Press)

BIT-81 FUNDAMENTALS OF COMPUTER APPLICATIONS

Course category : Computer Fundamental (CF)
Pre-requisite Subject : NIL
Contact hours/week : Lecture: 2, Tutorial: 0, Practical: 0
Number of Credits : 2

Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

4. understand the basics of computers Hardware/Software
5. understand the importance of number systems
6. understand the concept of operating system
7. understand the fundamentals of computer networking

Topics Covered

Unit I **9L**

Defining computer; Input Devices: Keyboard, Mouse, Data Scanning Devices; Output Devices: Monitors, Printers; Processor; Primary Memory: RAM, ROM, PROM, EPROM, EEPROM; Internal Memory; Secondary Memory

Unit II **9L**

Number Systems: Decimal Number System, Binary Number System, Octal Number System and Hexa Decimal Number, Conversions from one Number System to another, Binary Arithmetic, 1's compliment, 2's compliment

Unit III **9L**

Operating System Concepts: Definition & Types of Operating System, Functions of Operating System, Introduction to Windows Operating System

Unit IV **9L**

Data Communication and Networks: Networking Models, Communication Channels, Types of Networks: LAN, MAN, WAN, Network Topologies, Introduction to Internet, latest trends in Web applications

Books & References

1. Govindraju, S. - Introduction to Computer Science
2. Jain, V.K. - Computer and Beginners
3. Sinha, P.K. - Fundamentals of Computers
4. Ram, B. - Computer Fundamentals
5. Rajaraman - Fundamental of Computers
6. Saxena, Vikas Publishing House: A first Course in Computers

BIT- 82 IT TOOLS FOR BUSINESS

Course category : Computer Fundamental (CF)
Pre-requisite Subject : NIL
Contact hours/week : Lecture: 2, Tutorial: 0, Practical: 2
Number of Credits : 3

Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, Minor test and Major Theory Examination

Course Outcomes: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. describing the basics IT tools for business.
2. practicing MS Office tools to be used in business.
3. designing documents, spreadsheets and presentations through MS Office.
4. explaining the use of Electronic Data Interchange in business applications.
5. understanding e commerce and its components.
6. applying basic IT tools in e commerce applications.

Topics Covered

UNIT I **9L**

MS Word: Formatting texts, inserting tables and pictures, working with headers and footers
MS Excel: Formatting excel worksheets, using functions in excel, making various charts and graphs
MS PowerPoint: Creating presentation, working with texts, inserting tables, pictures and charts

UNIT II **9L**

Electronic Data Interchange Basics: EDI model, Applications of EDI, Advantages and Drawbacks of EDI, Electronic Payment System, Types of Electronic Payment System (E-Cash, E-Cheque, Smart Card, Credit Card, Debit Card), Electronic Fund Transfer

UNIT III **9L**

Information Technology in Business: Application of Information Technology in Railways, Airlines, Financial Systems, Banking, Insurance, Inventory Control, Hotel Management, Education, Mobile Phones, Video Games, Special Effects in Movies

UNIT IV **9L**

Fundamentals of Electronic Commerce: Definition, Components of E-Commerce, Activities of E-Commerce, Goals of E-Commerce, Functions of E-Commerce, Applications of E-Commerce, Advantages and Drawbacks of E-Commerce, Different types of business models (B2B, B2C, C2C, C2B and B2G)

EXPERIMENTS

1. Formatting texts in a created word document
2. Inserting tables and pictures in any word document
3. Inserting headers and footers in the word document
4. Creating excel documents and its formatting
5. Using functions in any excel worksheet
6. Making various charts and graphs in the excel worksheet
7. Creating presentation using power point
8. Working with texts in any power point slide

9. Inserting tables, pictures and charts in the power point slides
10. Exploring the use of MS Office and other IT tools in business
11. Exploring various e commerce web applications which are available online

Books & References

1. Mansfield Ron, "Working in Microsoft Office", Tata McGraw-Hill, 2008
2. Miller M, "Absolute Beginners Guide to Computer Basics", Pearson Education, 2009
3. ITL Educational Society, "Introduction to IT", Pearson Education, 2009
4. Agarwala Kamlesh, N and Agarwala Deeksha, "Business on the Net: Introduction to the whats and hows of E-Com", Macmillan India
5. Ravi Kalakota & A.B. Winston, "Frontiers of Electronic Commerce", Pearson Education.
6. Bharat Bhaskar, "Electronic Commerce - Framework Technologies and Applications", Tata McGraw Hill.

BMS-01/ BAS-01 ENGINEERING MATHEMATICS-I

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 0
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and One Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of basic differential operators in various engineering problems.
2. Solve linear system of equations using matrix algebra.
3. Use vectors to solve problems involving force, velocity, work and real-life problems and able to analyze vectors in space
4. Evaluate and use double integral to find area of a plane region and us of triple integral to find the volume of region in 3rd dimension

Topics Covered

UNIT-I **9**

Differential Calculus: Leibnitz theorem, Partial derivatives, Euler's theorem for homogenous function, Total derivative, Change of variable. Taylor's and Maclaurin's theorem. Expansion of function of two variables, Jacobian, Extrema of function of several variables.

UNIT-II **9**

Linear Algebra: Rank of Matrix, Inverse of a Matrix, Elementary transformation, Consistency of linear system of equations and their solution. Characteristic equation, Eigen-values, Eigen-vectors, Cayley-Hamilton theorem.

UNIT-III **9**

Multiple Integrals: Double and triple integrals, change of order of integration, change of variables. Application of multiple integral to surface area and volume. Beta and Gamma functions, Dirichlet integral.

UNIT-IV **9**

Vector Calculus: Gradient, Divergence and Curl. Directional derivatives, line, surface and volume integrals. Applications of Green's, Stoke's and Gauss divergence theorems (without Proofs).

Books & References

1. B.S. Grewal: Higher Engineering Mathematics; Khanna Publishers.
2. B.V. Ramana: Higher Engineering Mathematics, Tata Mc. Graw Hill Education Pvt. Ltd., New Delhi.
3. H.K. Dass and Rama Verma: Engineering Mathematics; S. Chand Publications.
4. N.P. Bali and Manish Goel: Engineering Mathematics; Laxmi Publications.

BPM-01/ BAS-02 **ENGINEERING PHYSICS-I**

Course category : Basic Sciences & Maths (BSM)

Pre-requisite Subject : NIL

Contact hours/week : Lecture : 3, Tutorial : 1 , Practical: 2

Number of Credits : 5

Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Basics of relativity and its application in Engineering.
2. Quantum Mechanics and its application to understand material properties.
3. Statistical mechanics and its application in study of Macro and Micro scale properties of Matter.
4. Use of the principle of optics in the measurement.
5. Applications of Laser and holography in Engineering.
6. Basic Principles of optical Fibre and its application in Engineering.

Topics Covered

UNIT-I **9**

Relativistic Mechanics: Inertial and Non-inertial Frames of reference, Galilean transformation, Michelson-Morley Experiment, Postulates of special theory of relativity, Lorentz Transformation, Length contraction, Evidences of length contraction, Time dilation, Evidences for time dilation, Relativistic velocity transformation, Relativistic

variation of mass with velocity, Evidence of mass variation with velocity, Relativistic kinetic energy, Mass energy equivalence, Examples from nuclear physics, Relativistic energy-momentum relation.

UNIT-II **9**

Quantum Mechanics: De Broglie waves and Group velocity concept, Uncertainty principle and its application, Davisson-Germer experiment, Derivation of Schrodinger equation for time independent and time dependent cases. Postulates of quantum mechanics, Significance of wave function, Application of Schrodinger wave equation for a free particle (one dimensional and three dimensional case), Particle in a box (one dimensional), Simple harmonic oscillator (one dimensional).

UNIT-III **9**

Physical Optics:

Interference: Interference of light, Interference in thin films (parallel and wedge shaped film), Newton's rings. Refractive index and wavelength determination.

Diffraction: Single, double and N- Slit Diffraction, Diffraction grating, Grating spectra, dispersive power, Rayleigh's criterion and resolving power of grating.

Polarization: Phenomena of double refraction, Nicol prism, Production and analysis of plane, circular and elliptical polarized light, Retardation Plate, Polarimeter

UNIT-IV **9**

Modern Optics

Laser: Spontaneous and stimulated emission of radiation, population inversion, concept of 3 and 4 level Laser, construction and working of Ruby, He-Ne lasers and laser applications.

Fiber Optics: Fundamental ideas about optical fiber, Propagation mechanism, Acceptance angle and cone, Numerical aperture, Propagation Mechanism and communication in fiber Single and Multi Mode Fibers, step index and graded index fiber..

Holography: Basic Principle of Holography, Construction and reconstruction of Image on hologram and applications of holography.

EXPERIMENTS

1. To determine the wavelength of monochromatic light by Newton's Ring
2. To determine the specific rotation of cane sugar solution using polarimeter
3. To determine the wavelength of spectral lines using plane transmission grating.
4. To verify Brewster's law using rotating Nicol prism
5. To verify Stefan's law by electrical method
6. To Study resonance in LCR circuit with a c source.
7. To determine the height of a tower with a Sextant.
8. To determine the refractive index of a liquid by Newton's ring.

Books & References

1. Introduction to Special theory Relativity-Robert Resnick, Wiley Eastern Ltd.
2. Statistical Mechanics and Properties of Matter- E S R Gopal, John Wiley and Sons
3. Quantum Mechanics: Theory and Applications- Ajoy Ghatak, Tata McGraw-Hill
4. Optics- Ajoy Ghatak, Tata McGraw-Hill
5. Optics- N. Subrahmanyam, Brij Lal, M.N. Avadhanulu, S. Chand

6. Fiber optics and laser Principles and Applications-Anuradha De, New Age International
7. Concepts of Modern Physics-Arthur Beiser, Tata McGraw-Hill

BEE-01 PRINCIPLES OF ELECTRICAL ENGINEERING

Course category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce, One Minor test, and One Major Theory & Practical Examination.
Course Outcomes	:	The student are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Able to understand the basic concepts of network and circuit.
2. To solve the basic electrical circuits.
3. Familiarity with the basic concepts of AC circuits.
4. Introductory concept of measurement, instrumentation, working & performances of different kind of measuring instruments (PMMC, MI).
5. Able solve magnetic circuits.
6. Able to analyze three phase circuits.
7. Introduction and application to different electrical machines.

Topic Covered

UNIT I **9**

D C Circuit Analysis and Network Theorems:
Circuit Concepts: Concepts of network, Active and passive elements, Voltage and current sources, Concept of linearity and linear network, Unilateral and bilateral elements, R, L and C as linear elements, Source transformation Kirchhoff's laws; Loop and nodal methods of analysis; Star-delta transformation Network theorems: Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem.

UNIT II **9**

Steady- State Analysis of Single-Phase AC Circuits:
AC fundamentals: Sinusoidal, square, and triangular waveforms – Average and effective values, Form and peak factors, Concept of phasor, phasor representation of sinusoidally varying voltage and current, Analysis of series, parallel and series-parallel RLC Circuits, Resonance in series and Parallel circuit
Three Phase AC Circuits: Three phase system-its necessity and advantages, Star and

delta connections, Balanced supply and balanced load, Line and phase voltage/current relations, Three-phase power, and its measurement

UNIT III **9**

Measuring Instruments, Magnetic Circuit & 1 phase Transformers

Types of instruments, Construction and working principles of PMMC and Moving Iron type voltmeters & ammeters, Use of shunts and multipliers.

Magnetic circuit, concepts, analogy between electric & magnetic circuits, B-H curve, Hysteresis and eddy current losses.

Single Phase Transformer: Principle of operation, Construction, EMF equation, Power losses, Efficiency, Introduction to auto transformer.

UNIT IV **9**

Electrical Machines:

Concept of electromechanical energy conversion DC machines: Types, EMF equation of generators and torque equation of motor, Characteristics, and applications of DC Generators & motors

Three Phase Induction Motor: Types, Principle of operation, Torque-slip characteristics, Applications

Single Phase Induction motor: Principle of operation and introduction to methods of starting,

applications.

Three Phase Synchronous Machines: Principle of operation of alternator, emf equation, Principle of operation and starting of synchronous motor, their applications.

EXPERIMENTS

1. Verification of Kirchhoff's law
2. Verification of Norton's theorem
3. Verification of Thevenin's theorem
4. Verification of Series R-L-C circuit
5. Verification of Parallel R-L-C circuit
6. Measurement of Power and Power factor of three phase inductive load by two wattmeter methods
7. To draw the magnetization characteristics of separately excited dc motor.
8. To perform the external load characteristics of dc shunt motor.
9. To perform O.C. and S.C. test of a single-phase transformer

Books & References

1. "Principles of Electrical Engineering", V. Del Toro; Prentice Hall International
2. "Basic Electrical Engineering", D P Kothari, I.J. Nagarath; Tata McGraw Hill
3. "Basic Electrical Engineering", S N Singh; Prentice Hall International
4. "Fundamentals of Electrical Engineering" B Dwivedi, A Tripathi; Wiley India
5. "Electrical and Electronics Technology", Edward Hughes; Pearson

BMS-02/ BAS-07 ENGINEERING MATHEMATICS – II

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and One Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of various mathematical techniques such as differential operators, matrix algebra and vector differentiation and integration.
2. To identify, formulate and solve the real life problems.
3. To inculcate the habit of mathematical thinking and lifelong learning.

Topics Covered

UNIT-I 9

Differential Equations: Linear differential equations with constant coefficients ($n^{th} order$), complementary function and particular integral. Simultaneous linear differential equations, solution of second order differential equations by changing dependent and independent variables, Method of variation of parameters, Applications of differential equations to engineering problems

UNIT-II 9

Special functions: Series solution of second order differential equations with variable coefficient (Frobeneous method). Bessel and Legendre equations and their series solutions, Properties of Bessel function and Legendre polynomials

UNIT-III 9

Laplace Transform: Laplace Transform, Laplace transform of derivatives and integrals. Unit step function, Laplace transform of Periodic function. Inverse Laplace transform, Convolution theorem, Applications to solve simple linear and simultaneous differential equations.

UNIT-IV 9

Fourier Series and Partial Differential Equations: Periodic Functions, Fourier Series of period 2π, Change of interval, Even and Odd functions, Half range Sine and Cosine Series. Harmonic analysis, Partial Differential Equations with constant coefficients

Books & References

1. Higher Engineering Mathematics - B.S. Grewal, Khanna Publishers
2. Engineering Mathematics - H.K. Dass and Rama Verma, S. Chand Publications
3. Engineering Mathematics - N.P. Bali and Manish Goel, Laxmi Publications

4. Higher Engineering Mathematics - B.V. Ramana, Tata McGraw Hill Education Pvt. Ltd., New Delhi.

BPM-02/ BAS-08 ENGINEERING PHYSICS-II

Course category : Basic Sciences & Maths (BSM)
Pre-requisite Subject : NIL
Contact hours/week : Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits : 5
Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Basics of crystallography application in Engineering
2. Use of the principles of sound wave and acoustics in civil engineering with the consideration of NDT.
3. Basic principles of electricity and magnetism applied in Engineering.
4. Maxwell's equation of electromagnetic theory and its application in engineering.
5. Basic principles of semiconducting materials and its application.
6. Basic Principles of Superconductivity and its application in Engineering.

Topics Covered

UNIT-I **9**

Crystal Structures and X-ray Diffraction: Space lattice, basis, Unit cell, Lattice parameter, Seven crystal systems and Fourteen Bravais lattices, Crystal-System Structure, Packing factor (cubic, body and face), Crystal structure of NaCl and diamond, Lattice planes and Miller Indices, Diffraction of X-rays by crystal, Laue's experiment, Bragg's Law, Bragg's spectrometer.

UNIT-II **9**

Sound Waves and Acoustics: Sound waves, intensity, loudness, reflection of sound, echo; Reverberation, reverberation time, Sabine's formula, remedies over reverberation; Absorption of sound, absorbent materials; Conditions for good acoustics of a building; Noise, its effects and remedies; Ultrasonics –Production of ultrasonics by Piezo-electric and magnetostriction; Detection of ultrasonics; Engineering applications of Ultrasonics (Non-destructive testing).

UNIT-III **9**

Electrodynamics –I: Basic concepts of Gauss's law, Ampere's law and faradays law of electromagnetic induction. Correction of Ampere's law by Maxwell (concept of displacement current), Maxwell's equation, transformation from integral form to differential form, physical significance of each equation

Electrodynamics –II: Maxwell's equation in free space, velocity of electromagnetic wave, transverse character of the wave and orthogonality of E, H and k vectors, Maxwell's equations in dielectric medium and velocity of e. m. wave, comparison with free space, Maxwell's equations in conducting media, solution of differential equation in this case and derivation of penetration depth

UNIT-IV **9**

Physics of Advanced Materials

Semiconducting Materials: Concept of energy bands in solids, Carrier concentration and conductivity in intrinsic semiconductors and their temperature dependence, carrier concentration and conductivity in extrinsic semiconductors and their temperature dependence. Hall effect in semiconductors, Compound semiconductors, Optoelectronic Materials.

Superconducting Materials: Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Temperature dependence of critical field, Type- I and Type-II superconductors, Electrodynamics of superconductors, BCS theory (Qualitative), High temperature superconductors and Applications of Superconductors.

Nano-Materials: Basic principle of nanoscience and technology, structure, properties and uses of Fullerene and Carbon nanotubes, Applications of nanotechnology.

EXPERIMENTS

1. To determine the specific resistance of a given wire using Carrey Foster's Bridge.
2. To study the variation of magnetic field along the axis of current carrying circular coil.
3. To study the Hall's effect and to determine Hall coefficient in n type Germanium.
4. To study the energy band gap of n- type Germanium using four probe method
5. To determine e/m of electron using Magnetron valve
6. To draw hysteresis curve of a given sample of ferromagnetic material
7. To determine the velocity of Ultrasonic waves
8. To determine the Elastic constants (Y, η, σ) by Searl's method

Books & References

1. Introduction to Solid State Physics- Kittel , 7th edition, Wiley Eastern Ltd.
2. Solid State Physics - S. O. Pillai, 5th edition, New Age International.
3. Introduction to Electrodynamics- David J. Griffiths Pearson, New International Edition
4. Semiconductor Devices and Application - S.M. Sze, Wiley
5. Introduction to Nano Technology - Poole Owens, Wiley India
6. Master Hand book of Acoustics - F. Alton Everest and Ken Pohlmann, 5th edition, McGraw Hill

BMS-06/ BAS-24 APPLIED COMPUTATIONAL METHODS

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 2

Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and One Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To find the root of a curve using Bisection, Regula falsi Newton's Method.
2. Use of moments and kurtosis to find the type of curve.
3. To interpolate a curve using Gauss, Newton's interpolation formula.
4. To find the derivative of a curve.
5. To find the area of a curve.

Topics Covered

UNIT-I 9

Numerical Methods: Solution of algebraic and Transcendental equations, Bisection method, Method of False position (Regula-Falsi method) and Newton-Raphson method, Solution of linear simultaneous equations; Guass-Siedel method, Crout's method.

UNIT-II 9

Interpolation and Numerical Integration: Interpolation: Finite Differences, Difference operators, Newton's forward and backward interpolation formulae, Lagrange's formula for unequal intervals, Newton's divided difference formula for unequal intervals. Numerical Integration: Trapezoidal Rule, Simpson's one-third and three-eight rules.

UNIT-III 9

Numerical Solution of Ordinary Differential Equations and Difference Equations: Picard's method, Taylor's Series method, Euler's method, Modified Euler's method, Runge-Kutta method of order four. Difference equations and their solutions. Rules for finding the particular integral.

UNIT-IV 9

Statistical Methods and Probability Distributions: Frequency Distributions, mean, mode, median, standard deviation, Moments, Skewness, Kurtosis, Types and measurement of Skewness and Kurtosis. Correlation; Regression and regression lines. Binomial Distribution, Poisson's Distribution, Normal Distribution.

EXPERIMENTS

1. To implement Regula-Falsi method to find root of algebraic equation.
2. To implement Newton-Raphson method to find root of algebraic equation.
3. To implement Newton's Divided Difference formula to find value of a function at a point.
4. To implement Numerical Integration by using Simpson's one-third rule.
5. To implement numerical solution by using Runge-Kutta method of order four to find solution of differential equation.
6. To implement numerical solution of differential equation by Picard's method.

7. To implement numerical solution of differential equation by using Euler's method.
8. To estimate regression equation from sampled data and evaluate values of standard deviation, regression coefficient.

Books & References

1. B.S. Grewal: Higher Engineering Mathematics; Khanna Publishers.
2. B.V. Ramana: Higher Engineering Mathematics, Tata Mc. Graw Hill Education Pvt. Ltd., New Delhi.
3. H.K. Dass and Rama Verma: Engineering Mathematics; S. Chand Publications.
4. N.P. Bali and Manish Goel: Engineering Mathematics; Laxmi Publications

BCE-10 ENGINEERING GRAPHICS

Course category	:	Engineering Fundamentals(EF)
Pre-requisite Subjects	:	NIL
Contact hours/week	:	Lecture : 0, Tutorial : 0 , Practical: 4
Number of Credits	:	2

Course Assessment methods: Continuous assessment through three Viva voce, Practical work/record, attendance and Major Practical

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. How Engineering Drawing helps to sketch the imagination?
2. Able to effectively practice the different scales for drawings.
3. Effectively analyze the geometrical shapes and to be able to draw.
4. Know about out solids and discuss about their classification.
5. How to implement the different views for a solid placed in 3dspace.
6. Construction of the object from different perspective.
7. Comparison and contrast between frustum and truncated solid.
8. Sketching of different sections for any 3D regular object.
9. Discussing the principles of Isometric Projection.
10. Sketching isometric projections for different geometrical shapes and solids.

Topics Covered

UNIT-I 6x4

Title: Conic Sections and Orthographic Projections Introduction

Introduction to Engineering Drawing covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales

Orthographic Projections

Orthographic Projections covering Principles of Orthographic Projections- Conventions Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Plane

UNIT-II 3x4

Title: Projection of Regular Solids

Projections of Regular Solids covering, those inclined to both the Planes- Auxiliary Views

UNIT-III 3x4

Title: Sections and Sectional Views of Right Angular Solids

Sections and Sectional Views of Right Angular Solids covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone

UNIT-IV 3x4

Isometric Projections

Isometric Projections covering, Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions.

Overview of computer graphics, demonstrating knowledge of the theory of CAD software.

Books & References

1. Engineering Drawing-Bhat, N.D.& M. Panchal, Charotar Publishing House, 2008
2. Engineering Drawing and Computer Graphics- Shah, M.B. & B.C. Rana, Pearson Education, 2008
3. A Text Book of Engineering Drawing-Dhawan, R.K., S. Chand Publications,2007
4. Text book on Engineering Drawing-Narayana, K.L. & P Kannaiah, Scitech Publishers, 2008

BMS- 05/ BAS-01 DISCRETE MATHEMATICS

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 0
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and One Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use logical notation to define different function such as set, function and relation.
2. Use of basic properties of group theory in computer science.
3. Use of graph theory models to solve problems of connectivity and constraint satisfaction, for example, scheduling.
4. Use of induction hypotheses to prove formulae.

Topics Covered

UNIT-I 9

Set Theory, Relation and Function: Definition of sets, Countable and uncountable sets, Venn Diagrams, Proofs of some general identities on sets. Definition and types of relation, composition of relation, equivalence relation, partial order relation. Function: Definition, types of function, one to one, into and onto function, inverse function, composition of functions.

UNIT-II 9

Algebraic Structures: Definition, properties and types of algebraic structures, Semi groups, Monoid, Groups, Abelian group, properties of groups, Subgroups, Cyclic groups, Cosets, Factor group, Permutations groups, Normal subgroups, examples and standard results. Rings and fields: Definition and Standard results.

UNIT-III 9

Graphs: Simple graph, multigraph, graph terminology, representation of graphs, Bipartite, regular, planar and connected graphs, connected components in a graph, Euler graphs, Hamiltonian path and circuits, graph colouring, chromatic number, chromatic polynomials. Tree: types and definition, rooted tree, properties of trees.

UNIT-IV 9

Combinatorics: Basic counting Technique, Pigeon-hole principle, Discrete Numeric function, Recurrence relations and their solution, Generating function, Solution of recurrence relations by method of generating function.

Books & References

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with applications to computer science, Tata McGraw-Hill.
2. D. Narsingh, Graph Theory with application to engineering and computer science - Prentice Hall

3. V. Krishnamurthy, Combinatorics: Theory and applications -, East East-West Press PVT. LTD, 1985

BMS-03/ BAS-14		**GRAPH THEORY**
Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 2
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and One Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Write precise and accurate mathematical definitions of objects in graph theory.
2. Use a combination of theoretical knowledge and independent mathematical thinking in creative investigation of questions in graph theory.
3. Use mathematical definitions to identify and construct examples.
4. Validate and critically assess a mathematical proof.

Topics Covered

UNIT-I 9

Preliminaries: Sets, relations, functions & multi-sets, Inductive definition and proof by induction, Cardinality of sets Basic concepts of Graph Theory: Digraphs, graphs and other similar objects, Representations of diagraphs and graphs, Operations on graphs, degree sequence and isomorphism Connectedness and distance: Walks, trails, circuits, cycles, and paths, Connected digraphs and graphs, Weighted graphs and digraphs and distance

UNIT-II 9

Trees and their applications: Basic properties of trees and forests, Minimum-weight spanning trees, Enumeration of labeled trees, Rooted trees and uniquely decipherable coding, Tree traversals and parentheses-free notations Networks and flows: Legal flows and capacities of cuts, The Ford-Fulkerson Algorithms and Maxflow-Mincut theorem

UNIT-III 9

Edge and Vertex traversal problems: Euler circuits and Euler trails, Fleury's algorithm and the Chinese Postman problem, Hamilton cycles and the Travelling Salesman problem Planar embeddings of graphs: Basic properties of planar graphs, Kuratowski's theorem and non-planar graphs, The DMP planarity algorithm, Polyhedral graphs and geometric dual

UNIT-IV 9

Colorings and Matchings in graphs: Legal colorings and k-colorable graphs, Chromatic Polynomial and Fourcolor theorem, Matchings in graphs and Stable marriage algorithm Directed graphs: Tournaments, directed paths and cycles, connectivity and strongly connected digraphs, branching, Infinite graphs and digraphs

EXPERIMENTS

1. Write a recursive program that computes the value of ln(N!).
2. Write a C program to Implement Euler Circuit which starts and ends on the same vertex.
3. Write a C Program to Implement Hamiltonian Cycle Algorithm.
4. Write a C Program to assign a colour to each of the states so that no two adjacent states share the same colour. The program should output each state and its colour. Example: Alabama touches Florida, Mississippi, Tennessee, and Georgia. Arkansas touches Louisiana, Texas, etc.
5. Graph implementation of BFS and DFS using C.
6. Write a C Program to Implement Euler Circuit problem. In graph theory, this starts and ends on the same vertex.
7. Write a C Program for the 'marriage problem', for N boys and N girls and an NxN binary matrix telling us which pairings are suitable, and want to pair each girl to a boy. Implement perfect matching in a bipartite graph.
8. Write a C program to implement ford-fulkerson algorithm
9. Write A C program for the implementation of the Branch and Bound Algorithm: The Asymmetric Travelling Salesman Problem
10. Write a C program for Dijkstra's Algorithm for Finding Shortest Paths in Non-Negative Weight Graphs.
11. Write a C program to check whether the given graph is tree.
12. Write a C program to extract spanning tree (without using Kruskal and prim's Algorithm).
13. Write a C program to perform following operations on a given 2 connected graph i. Union ii. Intersection iii. deletion of a vertex iv. deletion of any edge v. fusion of 2 vertex
14. Write a C program to input an image (Graph) and find out its adjacency and incidence matrix.
15. Write a C program to extract walk, path from any vertex to any vertex in a given graph.
16. Write a C program for the i. test for emptyness ii. return the number of vertices iii. return the number of edges iv. test if a given vertex exists v. test if a given edge exists vi. add a vertex (this operation does not add any edge) vii. add an edge (this operation may result in adding new vertices) viii. delete a vertex (this operation may result in deleting edges) ix. delete an edge (this operation may result in deleting vertices)

Books & References

1. Graphs and Hypergraphs -Berge, C., New York: Elsevier, 1973.
2. Theory of Graphs and Its Applications - Berge, C., New York: Wiley, 1962.
3. Modern Graph Theory- Bollobás, B., New York: Springer-Verlag, 1998

BMS-09/ BAS-26 OPTIMIZATION TECHNIQUES

Course category	:	Basic Sciences & Maths (BSM)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture: 3, Tutorial: 1, Practical: 0
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and One Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To find the root of a curve using iterative methods.
2. To interpolate a curve using Gauss, Newton's interpolation formula.
3. Use the theory of optimization methods and algorithms developed for various types of optimization problems.
4. To apply the mathematical results and numerical techniques of optimization theory to Engineering problems.

Topics Covered

UNIT-I 9

Classical Optimization Techniques: Single variable optimization, Multi-variable with no constraints. Non-linear programming: One Dimensional Minimization methods. Elimination methods: Fibonacci method, Golden Section method.

UNIT-II 9

Linear Programming: Constrained Optimization Techniques: Simplex method, Solution of System of Linear Simultaneous equations, Revised Simplex method, Transportation problems, Karmarkar's method, Duality Theorems, Dual Simplex method, Decomposition principle.

UNIT-III 9

Non-Linear Programming: Unconstrained Optimization Techniques: Direct search methods: Random jumping method, Univariate method, Rosenbrock's method. Indirect search methods: Steepest Descent method, Cauchy-Newton Methods, Newton's method.

UNIT-IV 9

Geometric Programming: Polynomial, Unconstrained minimization problem, Degree of difficulty. Solution of an unconstrained **Geometric** Programming problem. Constrained minimization complementary Geometric Programming, Application of Geometric Programming.

Books & References

1. S.S. Rao; Engineering Optimization, New Age International
2. E.J. Haug and J.S. Arora; Applied Optimal Design, Wiley New York
3. Kalyanmoy Deb; Optimization for Engineering Design, Prentice Hall of India

MBA-113 MANAGEMENT INFORMATION SYSTEM

Course category : Departmental Core
Pre- requisites : NIL
Contact hours/week : Lecture: 2, Tutorial: 1, Practical:0
Number of Credits : 3
Course Assessment : Continuous assessment through tutorials, assignments, Methods Quizzes and Minor test and Major Theory Examination

Course Outcome: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Understands the concept, its development and management support for the Management Information System
2. Ability to define needs and dimensions of MIS, steps for short- and long-range plans

and budget for MIS.

3. Analyses the elements and data sources, constraints and develops formats and documents of MIS.
4. Develops methods, planning for implementation and process of evaluation of MIS

UNIT I **6**

Meaning and role of Management Information System, Development of Management Information system, Organisation for Management Information System, Systems and user training; Top Management Support for Management. Information System

UNIT II **6**

Meaning, needs and dimension of Management information system Plan, Strategic Planning for Management Information System, Step in Planning; Information System; Steps in Planning Information needs for short and long- range plans budgeting for management information system.

UNIT III **6**

Information elements and data sources; constraints in Management Information System design, Information flow charts; Documentation and Formats in Management Information System, Alternative Approaches to Design.

UNIT IV **6**

Methods and tasks in implementation, Planning for implementation, Behavioural implications in Management Information System, Approaches and process of evaluation of Management Information System. Case Study

Books & References:

1. Brein James, Computer in Business Management An Introduction
2. Murdick, Robert G,.Information System for Modern Management
3. Contar Jesome, Management Information System
4. Bentley Trevoi, Management Information System and Data Process
5. Davis Gozdam B. &Doson, Modern Information System
6. Jawedekar W.S., Management Information System
7. Schulthesis, Management Information System.

MBA-02 ENGINEERING AND MANAGERIAL ECONOMICS

Course category : Program Elective
Pre- requisites : General Management
Contact hours/week : Lecture: 2, Tutorial: 1, Practical:0
Number of Credits : 3
Course Assessment: Continuous assessment through tutorials, assignments, Methods Quizzes and Minor test and Major Theory Examination

Course Outcome : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Students will acquire basic knowledge in Engineering & managerial economics, which allows students to gain theoretical and empirical skill of economics.
2. To make Engineering students prepared for economic empowerment so that they could

manage their wealth, help them in starting their own business or during managerial period.

3. Students will develop Interdisciplinary skills which can help them to thrive in the lifelong changing environment in various fields of Industry of Economics.
4. Students will acquire practical knowledge of economics, the kind of markets, cost theory, various issues of demand and other major economic concepts.
5. Able to explain succinctly the meaning and definition of managerial economics; elucidate on the characteristics and scope of managerial economics.
6. Able to describe the techniques of managerial economics.
7. Able to explain the applications of managerial economics in various aspects.
8. To learn about the management and economics of the industrial environment

UNIT I **6**

Introduction: Meaning, Nature and Scope of Economics, Meaning of Science, Engineering and Technology. Managerial Economics and its scope in engineering perspective

Basic Concepts: Demand Analysis, Law of Demand, Determinates of Demand, Elasticity of Demand Price, Income and cross Elasticity. Uses of concept of elasticity of demand in managerial decision

UNIT II **6**

Demand Forecasting: Meaning, significance and methods of demand forecasting, production function, Laws of returns to scale & Law of Diminishing returns scale. An overview of Short and Long run cost curves – fixed cost, variable cost, average cost, marginal cost, Opportunity cost.

UNIT III **6**

Market Structure: Perfect Competition, Imperfect competition – Monopolistic, Oligopoly, duopoly sorbent features of price determination and various market conditions.

National Income, Inflation and Business Cycles: Concept of N.I. and Measurement. Meaning of Inflation, Type causes & prevention methods, Phases of business cycle

UNIT IV **6**

Concept of Goals, Resources, Efficiency & Effectiveness; Introduction to Management discipline and activity, Managerial Roles and Skills; Management Thought and Thinkers-Details: Scientific Management; Classical

Organization Theory; Neo-Classical Theory; Systems Approach; Contingency Approach. Managerial Functions and Decision Making

Books & References

1. Koutsoyiannis A : Modern Microeconomics, ELBS.
2. Managerial Economics for Engineering : Prof. D.N. Kakkar
3. Managerial Economics : D.N. Dwivedi
4. Managerial Economics : Maheshwari.
5. Principles & Practices of Management : L.M. Prasad
6. Industrial Economics and Principles of Management: T.N. Chabra

BCY-04/BAS-05	**ENVIRONMENT & ECOLOGY**
Course category	: Audit
Pre-requisite Subject	: NIL
Contact hours/week	: Lecture : 2, Tutorial : 1 , Practical: 0
Number of Credits	: 3
Course Assessment methods	: Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

Topics Covered

UNIT-I 6

The Multidisciplinary nature of environmental studies, Definition, scope and importance, Need for public awareness. Natural Resources, Renewable and non-renewable resources, Natural resources and associated problems

(a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining.
(b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems.
(c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources,
(d) Food resources: World food problem, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.
(e) Energy resources: Growing energy needs, renewable and non renewable energy

sources, use of alternate energy sources.

UNIT-II 6

Ecosystems

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem, Ecological succession, Food chains, food webs and ecological pyramids

Introduction, types, characteristic features, structure and function of the following ecosystem: (a) Forest ecosystem (b) Grassland Ecosystem (c) Aquatic ecosystems (ponds, rivers, oceans) **Biodiversity**

Introduction- Definition : genetic, species and ecosystem diversity, Biogeographically 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, Endangered and endemic species

of India, Conservation of biodiversity:

UNIT-III 6

Environmental Pollution Causes, effects and control measures of-

(a) Air Pollution. (b) Water Pollution. (c) Soli Pollution (d) Marine Pollution. (e) Noise Pollution.
(f) Thermal Pollution.
Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution
Global warming and green house effect, Acid Rain, Ozone Layer depletion

UNIT-IV 6

Environmental Protection- Role of Government, Legal aspects, Initiatives by Non-governmental Organizations (NGO), Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.
Human Population and the Environment
Population growth, Population explosion- Family Welfare Programme, Environment and human health, Environmental Education, Women Education., Women and Child Welfare

Books and references

1. Environmental Studies - J Krishnaswamy , R J Ranjit Daniels, Wiley India
2. Environmental Science - Bernard J. Nebel, Richard T. Right, 9780132854467, Prentice Hall
3. Environment and Ecology - R K Khandal, 978-81-265-4277-2, Wiley India
4. Environmental Science – 8th edition ISV, Botkin and Keller, 9788126534142, Wiley India
5. Environmental Studies - Soli. J Arceivala, Shyam, R Asolekar, McGrawHill India, 2012
6. Environmental Studies - D.L. Manjunath, 9788131709122 Pearson Education India, 2007

BEC-01 FUNDAMENTALS OF ELECTRONICS ENGINEERING

Course category	:	Engineering Fundamentals (EF)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and minor and major theory & practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Able to identify schematic symbols and understand the working principles of electronic devices, e.g., Diode, Zener Diode, LED, BJT, JFET and MOSFETetc.
2. Able to understand the working principles of electronic circuits e.g. Rectifiers, Clipper, Clamper, Filters, Amplifiers and Operational Amplifiers etc. also understand methods to analyse and characterize thesecircuits
3. Able to understand the functioning and purposes of Power Supplies, Test and Measuring equipments such as multimeters, CROs and function generatorsetc.
4. Able to rig up and test small electronicscircuits.

Topics Covered

UNIT-I

9

Semiconductor materials and properties: electron-hole concepts, Basic concepts of energy bands in materials, concept of forbidden gap, Intrinsic and extrinsic semiconductors, donors and acceptors impurities, Junction diode, p-n junction, depletion layer, v-i characteristics, diode resistance, capacitance, diode ratings (average current, repetitive peak current, non-repetitive current, peak inverse voltage). Diode Applications in rectifier, filters, voltage multipliers, load regulators, clipper and clamper circuits, Breakdown mechanism (Zener and avalanche), breakdown characteristics, Zener resistance, Zener diode ratings, Zener diode application as shunt regulator

UNIT-II

9

Bipolar Junction Transistor (BJT): Basic construction, transistor action, CB, CE and CC configurations, input/output characteristics, Biasing of transistors-fixed bias, emitter bias, potential divider bias, comparison of biasing circuits. Transistor Amplifier: Graphical analysis of CE amplifier, concept of voltage gain, current gain, h- parameter model (low frequency), computation
of Ai, Av, Ri, Ro of single transistor CE and CC amplifier configurations.

UNIT-III

9

FieldEffectTransistors(JFETandMOSFET):Basicconstruction,transistoraction,conceptof pinch off, maximum drain saturation current, input and transfer characteristics, characteristic

equation CG, CS and CD configurations, fixed & self-biasing. MOSFET: depletion and enhancement type MOSFET-construction, operation and characteristics. Computation of Av, Ri, Ro, of single FET amplifiers using all the three configurations.

Operational Amplifiers: Concept of ideal operational amplifiers, ideal op-amp parameters, inverting, non-inverting and unity gain amplifiers, adders, difference amplifiers, integrators

UNIT-IV

Switching theory and logic design: Number systems, conversion of bases, Boolean algebra, logic gates, concept of universal gate, canonical forms, Minimization using K-map Operational Amplifiers 9

Electronics Instruments: Working principle of digital voltmeter, digital multimeter (block diagram approach), CRO (its working with block diagram), measurement of voltage, current, phase and frequency using CRO

EXPERIMENTS

A. Compulsory Experiments

1. To identify the components which are used in electronic circuits.
2. To get familiarization and to study the operation of a function generator instrument and visualize the types of waveforms produced by a function generator.
3. To study the CRO and to find the Amplitude and Frequency of a sinusoidal wave form using CRO.
4. To plot and analyze the forward and Reverse Characteristics of Si based P-N junction diode.
5. To implement a circuit to study the various applications of Operational Amplifier.
6. Study of half wave rectifier.
7. Operation of diode based clipper and clamper circuits.

B. Optional Experiments

1. Implement a circuit to draw the characteristics of JFET in common source

configuration.

2. Implement a circuit of half wave and full wave rectifiers with filters.
3. Implement a circuit to draw the characteristics of common emitter BJT amplifier.

Books & References

1. Electronic Devices and Circuits-Boylestad and Nashelsky, 6e, PHI,2001.
2. Electronic Devices and Circuits, A Mottershead, PHI, 2000,6e.
3. Digital Computer Design, Morris Mano, PHI, 2003.
4. Electronic Instrumentation-H.S. Kalsi, 2e, TMH,2007.

BCS-13 INTERNET & JAVA PROGRAMMING

Course Category	:	Department Core (DC)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 2
Number of Credits	:	5
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and Three Minor tests and One Major Theory & Practical Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To identify different components of client server architecture on Internet computing.
2. Knowledge of how to develop and deploy applications and applets in JAVA.
3. Knowledge of how to develop and deploy GUI using JAVA Swing and AWT.
4. Design, develop and implement interactive web applications.
5. Be able to implement, compile, test and run JAVA programs comprising more than one class and to address a particular software problem.
6. To understand the basic concepts of Internet services and related technologies.
7. Develop programs using the JAVA Collection API as well as the JAVA standard class library.

Topics Covered

UNIT-I

Internet: Internet, Connecting to Internet: Telephone, Cable, Satellite Connection, Choosing an ISP, Introduction to Internet Services, E-Mail Concepts, Sending and Receiving Secure E-Mail, Voice and Video Conferencing.

UNIT-II

Core JAVA: Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread Programming, I/O, JAVA Applet, String Handling, Networking, Event Handling, Introduction to
AWT, AWT Controls, Layout Managers.

UNIT-III

JAVA Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text Fields, Buttons, Tabbed Panes.
JDBC: Connectivity Model, JDBC/ODBC Bridge, JAVA. SQL Package, Connectivity to
Remote Database.

UNIT-IV

JAVA Beans: Application Builder Tools, The Bean Developer Kit(BDK), JAR files, Introspection, Developing a Simple Bean, using Bound Properties, The JAVA Beans API, Session Beans, Entity Beans, Introduction to JAVA Servlet: Servlet Basics, Servlet API Basic, Life Cycle of a Servlet, Running Servlet.

EXPERIMENTS

1. Basic programs of simple statements, conditional statements, iterative statements and arrays
2. Programs having object oriented concepts like Inheritance and Interface
3. Programs for Exception Handling and Event Handling
4. Programs of Threads and Multithreading
5. Programs related to Applets and Swings
6. Programs including JAVA Beans and Servlets

Textbooks

1. Naughton, Schildt, The Complete Reference JAVA2, TMH.
2. Balaguruswamy E, Programming in JAVA, TMH

Reference books

1. Margaret Levine Young, The Complete Reference Internet, TMH.
2. Dustin R. Callway, Inside Servlets, Addison Wesley.
3. Mark Wutica, JAVA Enterprise Edition, QUE.
4. Steven Holzner, JAVA2 Black book, Dreamtech.

BCS-53 LAMP TECHNOLOGY

Course Category	:	Program Elective (PE1&PE2)
Pre-requisite Subject	:	NIL
Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination

Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Use Open Source Operating system and its distributions like Fedora, Google chrome OS, Ubuntu.
2. To comprehend framework of BSD (Berkley System Distribution) and its installation
3. Study of Web technologies based on open Software‟s LAMP (Linux Apache MySql and PHP/Python)
4. To Learn HTML, XHTML, PHP and JAVA Script

Topics Covered

UNIT-I
Introduction to LAMP Terminologies, Two Tier and Three Tier Web based Application Architecture; Advantages of using LAMP based Technologies, Linux: Distributions – Fedora and Ubuntu; Installation – Disk Partitioning, Boot Loader, Etc; Using Linux – Shell, File System Familiarity; Linux Administration – Managing Users, Services and Software; Network Connectivity and Configurations; Security.

UNIT-II
Apache: Web Server Conceptual Working, Web Browser, HTTP, Installation and Configuration; *Httpd. Conf* File; Logging; Security; Running Website

UNIT-III
Mysql: Database Management System, ER Diagram, Relational Database, Installation, Configuration, Administration, Common SQL Queries – Create, Describe, Select, Insert, Delete, Update, Etc.

UNIT-IV
PHP: Dynamic Content, Server Side Scripting, Installation, Configuration, Administration, Language Syntax, Built-in Functions, PHP and Mysql Connectivity, Installation, Configuration and Administration of All Four LAMP Components Namely Linux, Apache Web Server, Mysql and PHP, Testing with Any Project Example.

Textbooks

1. Eric Rosebrock, Setting Up LAMP, Sybex Publishers.
2. James Lee, Brent Ware, Open Source Development with LAMP, Addison-Wesley Professional.
3. Jason Gerner, Elizabeth Naramore, Professional LAMP, John Wiley & Sons.

Reference books

1. Ben Laurie, Peter Laurie, Apache – Definitive Guide, O‟Reilly Publications.
2. Paul DuBois, MySQL, Addison-Wesley.
3. Rasmus L Erdorf, Kevin Tatroe, Programming PHP, O‟Reilly Publications.

BCS-73 NEURAL NETWORK & FUZZY SYSTEM

Course Category : Program Elective (PE3 & PE4)
Pre-requisite Subject : NIL

Contact Hours/Week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment Methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

1. Basics of ANN and its learning algorithms.
2. Fuzzy principles and relations.
3. Genetic algorithms and its applications.
4. Hybrid systems and usage of MATLAB toolbox

Topics Covered

UNIT-I

Neural Networks-1(Introduction &Architecture) Neuron, Nerve Structure and Synapse, Artificial Neuron and its Model, Activation Functions, Neural Network Architecture: Single Layer and Multilayer Feed Forward Networks, Recurrent Networks, Various Learning Techniques; 9

Perception and Convergence Rule, Auto-Associative and Hetro-Associative Memory

UNIT-II

Neural Networks-II (Back Propagation Networks) Architecture: Perceptron Model, Solution, Single Layer Artificial Neural Network, Multilayer Perception Model; Back Propagation Learning Methods, Effect of Learning Rule Co-Efficient ;Back Propagation Algorithm, Factors 9

Affecting Back-propagation Training, Applications.

UNIT-III

Fuzzy Logic-I (Introduction) Basic Concepts of Fuzzy Logic, Fuzzy Sets and Crisp Sets, Fuzzy Set Theory and Operations, Properties of Fuzzy Sets, Fuzzy and Crisp Relations, Fuzzy to Crisp Conversion, Membership Functions, Interference in Fuzzy Logic, Fuzzy If-Then Rules, Fuzzy Implications and Fuzzy Algorithms, Fuzzyfications & Defuzzificataions, Fuzzy Controller, Industrial Applications. 9

UNIT-IV

Genetic Algorithm(GA) Basic Concepts, Working Principle, Procedures of GA, Flow Chart of GA, Genetic Representations, (Encoding) Initialization and Selection, Genetic Operators, Mutation, Generational Cycle, Applications 9

Textbooks

1. S. Rajsekaran& G.A. Vijayalakshmi Pai, Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications, Prentice Hall of India.
2. N. P. Padhy, Artificial Intelligence and Intelligent Systems, Oxford University Press.
3. Siman Haykin, Neural Netw0rks, Prentice Hall of India
4. Timothy J. Ross, Fuzzy Logic with Engineering Applications, Wiley India.
5. S.N. Sivanandam & S.N. Deepa, Principles of Soft Computing, John Wiley & Sons, 01-Jun-2007

Reference books

1. Hertz J. Krogh, R.G. Palmer, Introduction to the Theory of Neural Computation, Addison-Wesley, California, 1991
2. Freeman J.A. & D.M. Skapura, Neural Networks: Algorithms, Applications and Programming Techniques, Addison Wesley, Reading, Mass, (1992).

MHM-104/ MAS-109 FOREIGN LANGUAGE-FRENCH

Course category : Audit Course
Pre-requisite Subject : NIL
Contact hours/week : Lecture : 2, Tutorial : 1 , Practical: 0
Number of Credits : 3
Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of various facets of French language, it problems and understanding.
2. To identify, formulate and solve the real life problems with positive attitude.
3. To inculcate the habit of learning and developing the French knowledge

Topics Covered

UNIT-I 6

Alphabets and numbers
Simple Grammar: Basics of French conversation (To greet a person, Introducing oneself, Asking basic information)

UNIT-II 6

Simple Grammar: Name and locate objects, colours and simple description of people.
Simple Grammar: Asking for directions, Giving suggestions.

UNIT-III 6

Simple Grammar: Indicate date and time. Asking and giving information on one's profession and activities.

UNIT-IV 6

Simple Grammar: Use of past tense. Narrating past events. Giving one's opinion.

Books & References

1. –Taxi‖ – Guy Cappelle and Robert Menand.
2. NSF I (Nouveau sans frontières) - Philippe Dominique & Jacky Girardet.
3. Nouvel Espace I - Guy Cappelle
4. Cadences I – D. Berger & L. Mérieux

MHM-105/ MAS-110 FOREIGN LANGUAGE-GERMAN

Course category : Audit Course
Pre-requisite Subject : NIL
Contact hours/week : Lecture : 2, Tutorial : 1 , Practical: 0
Number of Credits : 3

Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of various facets of German Language, it problems and understanding
2. to identify, formulate and solve the real life problems with positive attitude
3. to inculcate the habit of learning and developing the German knowledge

Topics Covered

UNIT-I **6**

- Alphabets and numbers (1 - 20)
- Simple Grammar: Articles (Definite, Indefinite, Negative), Nouns, Gender; Singular and plural. Conjugation of the auxiliary verb ―To be‖ ―Sein‖
- Contextual Vocabulary and Dialogue: Greeting, Self Introduction, Simple questions.
- Hard Facts of Germany: (i) Fall of Berlin Wall (ii) Unification of Germany

UNIT-II **6**

•Numbers (20 – 100)

•Simple Grammar: Conjugation of verbs, pronouns (personal and interrogative), Present tense, Imperative tense, auxiliary verb ―To have‖, ―Haben‖, Nominative and accusative cases.

•Contextual Vocabulary and Dialogue: At the Railway Station, Airport.

•Hard Facts of Germany: Education System.

UNIT-III **6**

•Simple Grammar: Modal verbs, Past and perfect tenses, Dative case.

•Contextual Vocabulary and Dialogue: Idiomatic expressions, One's family and background, Reading the time, days, months and year

•Hard Facts of Germany: Germany and the European Union.

UNIT-IV **6**

•Simple Grammar: Irregular verbs, Separable and inseparable verbs, Reflexive pronouns, Possessive pronouns Revision of Grammar learn so far

•Contextual Vocabulary and Dialogue: Daily life, Meals, How to place an order in a restaurant.

•Hard Facts of Germany: Presentation of topics on German Civilization discussed earlier.

Books & References

1. ―Komm Mit‖ – Level I – Holt, Rinehart & Winston
2. ―Moment Mal!‖ - Level I
3. ―Themen‖ - Level I
4. ―Facts about Germany‖
5. ―Deutsch FÜr Ausländer‖ – Schulz-Griesbach

MHM-106/ MAS-111 FOREIGN LANGUAGE-SPANISH

Course category	:	Audit Course
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 2, Tutorial : 1 , Practical: 0
Number of Credits	:	3
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of various facets of Spanish Language, it problems and understanding.
2. to identify, formulate and solve the real life problems with positive attitude
3. to inculcate the habit of learning and developing the Spanish knowledge

Topics Covered

UNIT-I

6

- Alphabet
- Introducing oneself
- Pronunciation
- Nouns, gender of the nouns
- Singular and plural of the nouns Articles: definite and indefinite
- Subject pronouns
- Number (1~100)

- Name of months and days

UNIT-II 6

- Present indicative of the two auxiliaries: Ser/Estar – Tener
- Hay / Están / Dónde está /están
- Adjectives
- The interrogative adjectives and pronouns (cuanto? cual?)
- Nationalities
- Idiomatic expressions with ―Tener‖ (Tener hambre/ sed/...)
- Culture and civilization

UNIT-III 6

- Present indicative of the three conjugations (AR-ER-IR)
- Negation
- Interrogative sentences
- Present indicative of a few common irregular verbs
- Present indicative of ―ir‖ and ―venir‖
- Possession (de/ de quién)
- Culture and civilization

UNIT-IV 6

- Prepositions and their combination with the articles
- Possessive adjectives and pronouns
- Use of prepositions with ―ir‖ and ―venir‖
- Present indicative of the verbs. Querer- Poder- Deber/Tener que
- Asking and expressing time
- Family vocabulary (family relations)
- Culture and Civilization

Books & References

1. Virgilio Borobio, Nuevo ELE 1, Curso de Español para extranjeros,2002, SM, Madrid.
2. Luis Aragonés y Ramón Palencia: Gramática de uso del Español, teoría y práctica, Ed. SM,Madrid.
3. Lisa Prange y Francisca Pichardo Castro**:** Por Turnos, Actividades para aprender españoljugando, Ed. Difusión, Madrid.
4. Chamorro, M. D.: Abanico, libro del alumno, Ed. Difusión, Madrid.
5. Deutsch FÜr Ausländer – Schulz-Griesbach

BHM-01/ BAS-03 PROFESSIONAL COMMUNICATION

Course category	:	Humanities & Social Science Core (HSSC)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 3, Tutorial : 1 , Practical: 0
Number of Credits	:	4
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of various facets of communication skills, such as, Reading, Writing, Listening andspeaking skills.
2. To identify, formulate and solve the real life problems with positive attitude.
3. To inculcate the habit of learning and developing the communication and soft skills bypractice.

Topics Covered

UNIT-I 9

Communication

Principles of Communication – Communication as coding and decoding – signs and symbols – verbal and non –verbal symbols – Language AND communication; language VS communication, language as a tool of communication – media/channels for communication **:** Types of Communication- functional, situational, verbal and non-verbal, interpersonal, group, interactive, public, mass line, dyadic – with illustrations LSRW in Communication – Listening – active vs passive (Talk less, listen more); Speaking - Speech vs. enunciation (mind your tone); Reading – Focus on the structure not on the theme alone, Technical Communication, General Communication,
Barriers of Communication, Levels of Communication

UNIT-II 9

Language Acquisition through Grammar, Usage and Mechanics of Writing

Vocabulary, Phrase, Clause, Parts of Speech: Types ,Examples with Use Gender, Singular, Plural, Article, Sequence of Tenses, Use of Modifiers, Sentence-Loose Sentence, Periodical Sentence, Topic Sentence, Paragraph-Different Orders and Methods of Paragraph Writing, Inductive Method, Deductive Method, Spatial Method, Question and Answer Method, Chronological Method, Expository Method, Common Errors, Antonyms, Synonyms, One- word Substitutes, Homophone, Homonym, Comprehension and Précis, Words Frequently Misspelt, Punctuation and Capitalization,
Abbreviations and Numerals ,Proofreading, Using the Library

UNIT-III 9

Technical Writing

Report Writing: Meaning, Types, Structure, Methods and Models of Report Writing, Technical Proposal; Concept, Kinds, Layout, and Examples of Technical Proposal, Definitions, Characteristics, Structure, Letter Writing: Importance, Types, Layout, and examples of letters, Scientific and Technical Writing: Features, Methods, Examples, Project, Thesis and Dissertation
Writing

UNIT-IV 9

Spoken and Presentation Skills

Impromptu speech – tackling hesitation, shyness and nervousness in speaking – Public speaking, academic and professional presentations – Group discussions – facilitators and impediments Planning, preparing and delivering a presentation, essentials of presentation - etiquette; clarity; lively delivery – Speech generation; speech rhythm; speech initiators body language – voice, posture and gesture; eye contact; dress codes; verbal crutches; stresses, pronunciation – contextualization – creating and understanding contexts, Speech Drill.

Books & References

1. Complete Course in English - Dixon Robert J., Prentice Hall of India, New Delhi
2. A Practical English Grammar - Thomson and Martinet, ELBS
3. English Pronouncing Dictionary - Jones Daniel, Paperback
4. Spoken English - Bansal ,R.K. &Harrison J.B., Orient Longman, India
5. Handbook of Pronunciation of English Words - Sethi J. & Jindal D.V.A, Prentice Hall of India,New Delhi
6. Word Power Made Easy - Lewis, Norman, Pocket Books
7. Business Correspondence and Report Writing - Sharma R.C. & Mohan Krishna, Tata McGrawHill
8. Business Communication - Chhabra T.N., Sun India Publication, New Delhi

BEE-15A MICROPROCESSOR: ARCHITECTURE, PROGRAMMING, AND INTERFACING

Course category : Department Core (DC)
Pre-requisite Subject : NIL
Contact hours/week : Lecture: 3 Tutorial: 1 Practical: 2
Number of Credits : 5
Course Assessment methods : Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and One Minor test, One Major Theory & Practical Examination.
Course Outcomes : The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course

Course Learning objective	Course outcome
This subject helps student to learn the • Microcomputer systems and its associated hardware • Detailed architecture of the Intel 8085microprocessor. • Operation and control, instruction set and interrupts of the microprocessor • Assembly language programming with the 8085 microprocessors • Intel 8255 and 8254 peripheral interfaces • Architecture and operation of the intel 8086 microprocessor.	The students should be able to use and apply • The hardware knowledge of 8085 microprocessor • The programming skill on 8085 microprocessor-based applications along with peripheral interfaces • The knowledge on intel 8086 microprocessor architecture and operation.

Topic Covered

UNIT I

Introduction to Microcomputer Systems and Hardware: History of computers computer Language, Large computers to single chip Microcomputers. Evolution of **9**

Microprocessors Microprocessor Architecture and its operations, memory, Input/output. Interfacing Devices 8085 Microprocessor: pin configuration. Internal architecture, control and status signals interrupts, bus timings.de-multiplexing of address bus generating control signals, ALU, Flag, register.

UNIT II **9**

Operation and control of Microprocessor: Decoding and executing an instruction. Op-code fetch machine cycle memory read/write machine cycles. I/O read/write machine cycles interrupt acknowledge machine cycle, state-transition diagram.

Instruction Set: Addressing modes: Data transfer, arithmetic, logical, branch, stack and machine control groups of instruction set, macro RTI and micro-RTL flow chart of few typical instructions unspecified flags and instructions unspecified flags and instructions.

Interrupts: Interrupt structure of 8085 microprocessor processing of vectored and nin-vectored interrupts. Latency time and response time handling multiple interrupts.

UNIT III **9**

Assembly Language Programming for 8085 microprocessor Assembler examples: Subroutines. Parameter passing to subroutines. Programming techniques with looping counting and indexing counter and timing delays.

Serial and Parallel Input and output: memory mapped I/O I/O mapped I/O, programmed I/O interrupt Driven I/O DMA I/O.

Programmable Peripheral Interface: Intel 8285 pin configuration, internal structure of a port bit. Modes of operation. Bit SET/RESET feature.

Programmable Interval Timer: Intel 8253 pin configuration, internal block diagram of counter and modes of operation, counter read methods.

UNIT IV **9**

Electrical Machines:

Concept of electromechanical energy conversion DC machines: Types, EMF equation of generators and torque equation of motor, Characteristics, and applications of DC Generators & motors.

Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications.

Three Phase Induction Motor: Types, Principle of operation, Torque-slip characteristics, Applications

EXPERIMENTS

Course Learning Objective

This subject helps student to learn the

- To become familiar with 8085 microprocessor training kit.
- To be able to write Intel 8085 microprocessor-based assembly language program.

Course outcomes

The students should be able to use and apply

- The Intel 8085 based microcomputer training kits/software simulator.
- The knowledge of the 8085 microprocessors to write typical assembly language programs

- To become familiar with 8085 microprocessor software simulators
- The programming to the peripheral devices interfaced with the Intel 8085 based microcomputer.

1. To become familiar with 8085 microprocessor training kit/software simulator and execute following programs.
   - Add two 8-bit numbers stored in register B&C store result in register D.
   - Subtract 8-bit data stored at memory location 402th ROM data stored at memory location 4020h. store result at memory location 4022h.
   - To perform OR operation between accumulator and register B store result in register C.
2. To become familiar with 8085 microprocessor simulator and simulate following programs using simulator
   - Write a program to interchange content of register B and C
   - Subtract content of register E from register B.
   - Complement content of accumulator and display result on output port PORT2
   - Perform logical OR operation between register B and C logical AND operation between

3. Write a program to transfer set of data from memory location 2050 Fh to 2060-206Fh.
4. Write a program to find smallest numbers from given set of data stored at location 2040h to 2051h.
5 write a program to find negative number in given set of data stored at the location 2050h to 2051h.
6 write a program to arrange an array of data in ascending order.
7 write a program to multiply two 8-bit numbers stored at the location 2100 and 2101. store result at memory location 2102h.
8 write a program to divide 16-bit number stored at memory location 2100h a 2101h and 2111h. Remainder at memory location 2112h.
9 write a program to convert hexadecimal number into equivalent BCD number.
10 write a program to check parity of data stored at memory location 2100. Move content EEh to register B. if parity is even and 00h if parity is odd.
11 To interface Programmable peripheral interface (PPI) IC- Microprocessor in Mode 0.
12 To generate square wave on port pin PC7 of 8255 in BSR mode.

Text Books:

1. Gaonkar, Ramesh S, "Microprocessor Architecture, programming and applications with the 8085" Pen ram International Publishing 5th Ed.
2. Uffenbeck, John, "Microcomputers and Microprocessors" PHI/ 3rd Edition.
3. Ray, A.K. &Burchandi, K.M., "Advanced Microprocessors and Peripherals: Architecture, Programaming and Interfacing" Tata Mc. Graw Hill.
4. Krishna Kant, "Microprocessors and Microcontrollers" PHI Learning.
5. Brey, Barry B. "INTEL Microprocessors" Prentice Hall (India)

6. Aditya P. Mathur, "Introduction to Microprocessor" Tata McGraw Hill
7. M. Rafiquzzaman, "Microprocessors- Theory and applications" PHI
8. B. Ram, "Advanced Microprocessor & Interfacing" Tata McGraw Hill
9. Renu Singh &B.P.Singh, "Microprocessor and Interfacing and applications" New Age International
10. Hall D.V., "Microprocessors Interfacing" Tata McGraw Hill
11. Liu and Gibson G.A., "Microcomputer Systems: The 8086/8088 Family" Prentice Hall (India)

BHM-02/ BAS-10 TECHNICAL WRITING

Course category	:	Humanities & Social Science Electives (HSSE)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 2, Tutorial : 1 , Practical: 0
Number of Credits	:	3
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Overcome the problems he/she faces in oral and written communication.
2. Acquire knowledge of and methods for using technical communication, such as, reports, proposals and business letters etc.
3. Use and practice compositions correctly.
4. Give Presentations in different sessions and make self appraisal.

Topics Covered

UNIT-I 6

The Sentence, The paragraph: Structure, types and Linking, Technical Vocabulary, Impersonal Style, Scientific Attitude Plain Statement, Interesting Composition, Miscellaneous Exercises, Definition, Description, Description of a process, Diagrams, Explanations, Technical Communication-Simplicity, Clarity and Conciseness of a Presentation, Blending of Artistic and Technical Writing, Usages in Grammar, Comprehension—Reading Listening, Précis Writing

UNIT-II 6

Thesis Elements-Front Matter of a Thesis, Main Text of a Thesis, End Matter of a Thesis, Paper Elements-Front Matter of a Paper, Main Text of a Paper, End Matter of a Paper, Order of a thesis and Paper Elements, Concluding Remarks ,Identification of Author and His Writing-Author's name and Affiliation, Joint Authorship of a Paper, Identification of Writing-Title, Keywords, Synopsis, Preface and abstract, Specimen—Thesis and Research Paper, Chapters and Sections-Introductory Chapters and Sections, Statement of the Problems, Plan and Scope, Core Chapters and Sections-Theoretical Analysis and Synthesis, Basic Assumption and Hypothesis

UNIT-III 6

Letter Writing_ Formal and Informal Letters, Parts of a Letter, Types of Letters, Business Letters, Examples of Letter-Writing, Job Applications, C.V and Resume Writing, Stylistic Faults in Letter Writing, Report Writing, Kinds of Reports, Length of Report, Parts of a Report, Terms of Reference, Collection of Facts, Outlines of Report, Examples of Report, Technical Proposal,
Elements of Proposal, Examples of Proposal, drafting of proposal

UNIT-IV 6

Technical seminar-purpose, modes and methods, Interviewing skills-body language, gesture, posture, tips and tactics of interview, resume making.
Case study- objectives, methods, examples of various case studies
Audience Analysis: Industrial vs. non-industrial users; Exploring primary, secondary, tertiary users in contexts of production and use; Creating personas; Multicultural issues; Analyzing real-world examples
Estimating, tracking, and managing tech writing projects. Determine the project scope, Estimates and schedules, Assemble the team, Provide resources and leadership, Evaluate the project, Appendixes and Annexure, References, Peripherals—Official Formalities, Rights and Permission, Certificate and Copyright, Dedication, Acknowledgement, Correspondences.
Project making: Making a final Project on topics, given by the instructor.

Books & References

1. Technical Writing – O.P. Pandey, SK Kataria & sons
2. Interview Skills : Tips & Techniques – Anita Acharya, Yking Books
3. Managing Writers - Richard Hamilton, Penguin
4. Technical Writing Management: A Practical Guide - Steven A. Schwarzman
5. Technical Writing - R.S. Sharma, Radha Publications, New Delhi
6. Technical Writing - B.N. Basu, PHI Learning Pvt. Ltd.., New Delhi
7. Lesikar and petit, Report writing for Business

BHM-04/ BAS-11 HUMAN VALUES & PROFESSIONAL ETHICS

Course category	:	Humanities & Social Science Electives (HSSE)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 2, Tutorial : 1 , Practical: 0
Number of Credits	:	3
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. To create conducive environment for professionals to grow as good and responsible human beings imbibing values and ethics.
2. Understanding the significance of environment.
3. Developing humanitarian outlook.

Topics Covered

UNIT-I 6

Origin, Meaning, and Definition of Value, Types of Values, Individual Value, Family Value, Societal Value, Human Value, Value in Education System, Understanding Happiness and Prosperity, Self Exploration and Natural Acceptance.

UNIT-II 6

Harmony in family, Harmony in Society, Values Leading to Harmony, Creating a world family, Harmony in Nature, Environment and Sustainable Developmental, Legal aspects of Environment, Holistic Perspectives of Values, Existence and Co-existence.

UNIT-III 6

Origin, Meaning and Definition of Ethics, Ethics: The science of the Morality of The Art of Correct Living ,Ethics in Human Acts, Ethics and Religion, Ethical Norms and Laws ,Ethics in Literature, Ethics in Science and Technology.

UNIT-IV 6

Ethical Approaches:- Theistic Approach, Atheistic Approach, General and Special Ethics, Professional Ethics: Ethics at work place, Ethics as Skill, Values and Ethics, Ethics with Value Education, Managerial and Business & Corporate Ethics, Corporate Social Responsibilities.

Books & References

1. Bangaria ,G.P et.al A foundation course in Human Values and Professional Ethics**,** Excel books.
2. Govindrajan, M Professional Ethics and Human Values, Eastern Economy Edition
3. Naagrazan, R.S. Textbook on Professional Ethics and Human Values**,** New age International.
4. Misra, Anuranjan and Shukla**,** Dr. R.K. Human values and Professional Ethics, Amazon(Paper Back).
5. Fernando, A.C Business Ethics**:** An Indian Perspective, Pearson,India.

BHM-05/ BAS-12 INDUSTRIAL PSYCHOLOGY

Course category	:	Humanities & Social Science Electives (HSSE)
Pre-requisite Subject	:	NIL
Contact hours/week	:	Lecture : 2, Tutorial : 1 , Practical: 0
Number of Credits	:	3
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of various facets of psychology, it problems and understanding.

2. To identify, formulate and solve the real life problems with positive attitude.
3. To inculcate the habit of learning and developing the industrial problems from psychological eyes.

Topics Covered

UNIT-I 6

Introduction to Industrial Psychology and its basic concepts

Nature, Importance and scope of Industrial Psychology, Scientific management, Time and motion study and human relations school

UNIT-II 6

Individual in workplace

Motivation and job satisfaction, Stress management, Organisational culture, Leadership and group-dynamic.

UNIT-III 6

Work environment, Recruitment and selection

Engineering Psychology, Fatigue and boredom, Work environment, Accident and safety, Job-analysis, Recruitment and selection, Psychological tests.

UNIT-IV 6

Performance management and training

Performance appraisal, Importance and Methods of Performance appraisal, Training and development- Concepts and Benefits to the organization.

Books & References

1. Miner, J. B. (1992). Industrial/Organizational Psychology. N Y: McGraw Hill
2. Blum & Naylor (1962). Industrial Psychology. Its Theoretical & Social Foundations CBS Publication
3. Aamodt, M. G. (2007). Industrial/Organization Psychology: A Applied Approach (5e) Wadsworth /Thompson: Belmont, C. A.
4. Aswathappa K. (2008). Human Resource Management (Fifth edition) New Delhi: Tata McGraw Hill
5. Archana Despandey (2010). Industrial Psychology, Sun India Publications, New Delhi.

BHM-06/ BAS-13 INDUSTRIAL SOCIOLOGY

Course category	:	Humanities & Social Science Electives (HSSE)
Pre-requisite Subject	:	-
Contact hours/week	:	Lecture : 2, Tutorial : 1 , Practical: 0
Number of Credits	:	3
Course Assessment methods	:	Continuous assessment through tutorials, attendance, home assignments, quizzes and Three Minor tests and One Major Theory Examination
Course Outcomes	:	The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Use of various facets of sociology, it problems and understanding.
2. To identify, formulate and solve the real life problems with positive attitude.
3. To inculcate the habit of learning and developing the industrial problems from sociological perspectives.

Topics Covered

UNIT-I 6

Introduction to Industrial Sociology

Nature, Scope and importance of Industrial Sociology, Development of Industrial Sociology and other social sciences. Understanding social structure and social processes: Perspectives of Marx, Weber & Durkheim

UNIT-II 6

Rise and development of industry

Early industrialisation- Types of productive systems- Evolution of Productive system and Development of Industry, Primitive Stage, Agrarian economy Stage, Handicrafts Stage, Guild System, Feudal or Manorial System, Putting out System, Industrial Revolution, Industrialisation- Causes and Consequences.

UNIT-III 6

Contemporary issues in Industrial Sociology Industrial Policy Resolutions

Social change in contemporary India: Modernization and globalization, Secularism and communalism, Nature of development, Processes of social exclusion and inclusion, Changing nature of work and organization **,**Industrial Grievances, Industrial conflicts, Industrial disputes in India, Strike and Lock-out, Promote industrial Peace. Industrial Policy Resolutions.

UNIT-IV 6

Industrial relations machinery in India

Tripartite and Bipartite Machinery, Code of discipline and standing orders and Trade unionism, The National Commission on Labour, Industrial Relations and Technology, Sociological Approach to Industrial relations

Books & References

1. Durae, Pravin. (2013). Dorling. Kindersley (India) P. Ltd. Pearson education in South Asia.
2. Archana Despandey (2010). Industrial Sociology., Sun India Publications, New Delhi.
3. Ramaswamy, E.A. and Ramaswamy, U. (1981), Industry and Labour, OU Press
4. Dhanagare, D.N. , Themes and Perspectives in Indian Sociology, Rawat
5. Chandoke, Neera & Praveen Priyadarshi (2009), Contemporary India: Economy, Society and Politics, Pearson