LINGAYA'S VIDYAPEETH

Department of Computer Science & Engineering

Scheme & Syllabus

Of

B.Tech (AIML)

Batch: 2021-2025

VISION

To be a school, committed to education, research & innovation and develop globally competent professionals in the area of Computer Science, Information Technology and Computer Applications who are responsible citizens and have respect for life and sensitivity towards environment.

MISSION

1. To develop professionals and leaders in Computer Science, IT and allied areas who have right attitude and aptitude to serve the society.

2. To develop and maintain state-of-the-art infrastructure and research facilities to enable create, apply and disseminate knowledge.

3. To foster linkages with all stakeholders for continuous improvement in academics in Computer Science, IT and Computer Applications.

4. To develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders can emerge who have deep respect for human life and values.

5. To undertake disciplinary and inter-disciplinary collaborative research and innovation which offer opportunities for long term interaction with academia and industry and develop technologies relevant to the society.

PROGRAM OUTCOMES:

PO1- Engineering Knowledge: Apply the knowledge of mathematics, science, engineering and Application fundamentals, and an engineering and Application specialization to the solution of complex engineering problems.

PO2- Problem Analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3-Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with

appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4- Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5- Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6- The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7- Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8- Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9- Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10- Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11- Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12- Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES:

PSO1: To equip the students with theoretical and implementation knowledgebase in all the latest areas of Computer Science & Engineering for a successful career in software industries, pursuing higher studies, or entrepreneurial establishments.

PSO2: To nurture the students with the critical thinking abilities for better decision making by offering them a socially acceptable solutions to real life problems through computing paradigm.

PSO3: To nurture the students with the comprehensive analytical and design abilities by offering them techno-commercially feasible solutions of real business problems through computing.

LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2021-25

School: School of Computer Science & Information Technology	Batch:2021-2025
Department: Department of Computer Science & Engineering	Year:1st
Course: Bachelor of Technology (B.Tech(CSE))	Semester: I

SN	Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
								Theory			Practical		
				L	T	P		ABQ	MSE	ESE	IP	EXP	
1	BSC	BS-107	Mathematics-I	3	1	0	4	15	25	60	-	-	100
2	BSC	BS-109	Physics	3	1	0	4	15	25	60	-	-	100
3	ESC	EC-101	Basic Electrical and Electronics Engineering	3	0	0	3	15	25	60	-	-	100
4	PCC	CS-101	Programming for Problem-Solving using C	3	0	0	3	15	25	60	-	-	100
5	HSMC	HSS-101	Effective Technical Communication	3	0	0	3	15	25	60	-	-	100
6	ESC	ME-151	Workshop Practice	0	0	4	2	15	25	60	-	-	100
7	BSC	BS-159	Physics Lab	0	0	2	1				60	40	100
8	ESC	EC-151	Basic Electrical and Electronics Engineering Lab	0	0	2	1				60	40	100
9	HSMC	HSS-151	English Communication Lab	0	0	2	1						100
10	PCC	CS-151	Programming for Problem-Solving using C Lab	0	0	2	1				60	40	100
			Total---->	**15**	**2**	**12**	**23**						

Abbreviations:

PCC:	Programme Core Courses	ABQ:	Assignment Based Quiz	
ESC:	Engineering Science	MSE:	Mid Semester Examination	
HSMC:	Humanities, Social Science & Management course	ESE:	End Semester Examination	
BSC:	Basic Science	IP:	Internal Practical	
L:	Lecture	EXP:	External Practical	
T:	Tutorial			
P:	Practical			

LINGAYA'S VIDYAPEETH
SCHEME OF STUDIES
Session: 2021-22

School: School of Computer Science & Information Technology	**Batch:2021-2025**
Department: Department of Computer Science & Engineering	**Year:1st**
Course: Bachelor of Technology (B.Tech(CSE))	**Semester: II**

SN	Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
								Theory			Practical		
				L	T	P		ABQ	MSE	ESE	IP	EXP	
1	BSC	BS-108	Mathematics-II	3	1	0	4	15	25	60	-	-	100
2	BSC	BS-110	Environmental Science and Chemistry	2	0	0	2	15	25	60	-	-	100
3	HSMC	PEP-102	Universal Human Values	1	0	2	2				-	-	100
4	PCC	CS-102	Introduction to Biological Computing	3	0	0	3	15	25	60	-	-	100
5	PCC	CS-104	Object Oriented Programming	3	0	0	3	15	25	60	-	-	100
6	HSMC	MG-120	Engineering Economics & Industrial Management	3	0	0	3	15	25	60	-	-	100
7	ESC	ME-152	Engineering Graphics Lab	0	0	4	2				60	40	100
8	BSC	BS-160	Environmental Science and Chemistry Lab	0	0	2	1				60	40	100
9	PCC	CS-152	Introduction to Biological Computing Lab	0	0	2	1				60	40	100
10	PCC	CS-154	Object Oriented Programming Lab	0	0	2	1				60	40	100
			Total---->	**15**	**1**	**12**	**22**						

Abbreviations:

PCC:	Programme Core Courses	ABQ:	Assignment Based Quiz	
ESC:	Engineering Science	MSE:	Mid Semester Examination	
BSC:	Basic Science	ESE:	End Semester Examination	
L:	Lecture	IP:	Internal Practical	
T:	Tutorial	EXP:	External Practical	
P:	Practical			
HSMC:	Humanities, Social Science & Management course			

LINGAYA'S VIDYAPEETH
SCHEME OF STUDIES
SESSION: 2022-23

School: School of Computer Science & Information Technology	**Batch: 2021-25**
Department: Department of Computer Science & Engineering	**Year:2nd**
Course: Bachelor of Technology (B.Tech(CSE))	**Semester: III**

SN	Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
								Theory			Practical		
				L	T	P		ABQ	MSE	ESE	IP	EXP	
1	PCC	CS-201	Data Structures & Algorithms	3	1	0	4	15	25	60	-	-	100
2	PCC	CS-203	Discrete Mathematical Structures	3	0	0	3	15	25	60	-	-	100
3	PCC	CS-205	Python Programming	3	0	0	3	15	25	60	-	-	100
4	PCC	CS-207	Computer Architecture& Organization	3	0	0	3	15	25	60	-	-	100
5	BSC	BS-203	Numerical & Statistical Methods	3	1	0	4	15	25	60	-	-	100
6	ESC	EC-203C	Digital Electronics	3	0	0	3	15	25	60	-	-	100
7	PCC	CS-251	Data Structures & Algorithms Lab	0	0	2	1				60	40	100
8	PCC	CS-255	Python Programming Lab	0	0	2	1				60	40	100
9	ESC	EC-253C	Digital Electronics Lab	0	0	2	1				60	40	100
10	HSMC	PEP-201	Exploring self	1	0	2	2						100
			Total---->	**19**	**2**	**8**	**25**						

Abbreviations:

PCC:	Programme Core Courses
ESC:	Engineering Science
BSC:	Basic Science
L:	Lecture
T:	Tutorial
P:	Practical
ABQ:	Assignment Based Quiz
MSE:	Mid Semester Examination
ESE:	End Semester Examination
IP:	Internal Practical
EXP:	External Practical
HSMC:	Humanities, Social Science & Management course

LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2022-23

School: School of Computer Science & Information Technology	**Batch: 2021-2025**
Department: Department of Computer Science & Engineering	**Year:2nd**
Course Bachelor of Technology (B.Tech(CSE))	**Semester: IV**

SN	Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
								Theory			Practical		
				L	T	P		ABQ	MSE	ESE	IP	EXP	
1	PCC	CS-202	Operating Systems	3	0	0	3	15	25	60	-	-	100
2	PCC	CS-204	Introduction to Computer Science Specializations	2	0	0	2	15	25	60	-	-	100
3	PCC	CS-206	Data Base Management System	3	0	0	3	15	25	60	-	-	100
4	PCC	CS-208	Java Programming	3	0	0	3	15	25	60	-	-	100
5	PCC	CS-210	Web & Internet Technologies	3	0	0	3	15	25	60	-	-	100
6	PCC	CS-212	Design & Analysis of Algorithms	3	0	0	3	15	25	60	-	-	100
7	PCC	CS-214	Data Mining Techniques	3	0	0	3	15	25	60	-	-	100
8	PCC	CS-256	Data Base Management System Lab	0	0	2	1				60	40	100
9	PCC	CS-258	Java Programming Lab	0	0	2	1				60	40	100
10	PCC	CS-260	Web & Internet Technologies Lab	0	0	2	1				60	40	100
11	PROJ	CS-268	Minor Project-I/ Training	0	0	4	2					100	100
12	MC	MC-202	Indian Constitution	0	0	0	0						100
			Total---->	**20**	**0**	**10**	**25**						

Abbreviations:

PCC:	Programme Core Courses
MC:	Mandatory Course
PROJ:	Project
L:	Lecture
T:	Tutorial
P:	Practical
ABQ:	Assignment Based Quiz
MSE:	Mid Semester Examination
ESE:	End Semester Examination
IP:	Internal Practical
EXP:	External Practical

LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2023-24

School: School of Computer Science & Information Technology	Batch:2021-2025
Department: Department of Computer Science & Engineering	Year:3rd
Course: Bachelor of Technology (B.Tech(CSE-AIML))	Semester: V

SN	Category	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
								Theory			Practical		
				L	T	P		ABQ	MSE	ESE	IP	EXP	
1	ESC	EC-301	Microprocessors & Micro-controller	3	0	0	3	15	25	60	-	-	100
2	PCC	CS-301	Computer Network	3	0	0	3	15	25	60	-	-	100
3	PSC	CS-303	Formal Language & Automata Theory	3	1	0	4	15	25	60	-	-	100
4	PEC	CS-305	Artificial Intelligence	3	0	0	3	15	25	60	-	-	100
5	PEC	CS-307	Machine Learning	3	0	0	3	15	25	60	-	-	100
6	ESC	EC-351	Microprocessors & Micro-controller Lab	0	0	2	1				60	40	100
7	PEC	CS-355	Artificial Intelligence Lab	0	0	2	1				60	40	100
8	PEC	CS-357	Machine Learning Lab	0	0	2	1				60	40	100
9	PROJ	CS-381	Minor Project-II/ Training	0	0	4	2					100	100
10	HSMC	PEP-301	Leadership & Management Skills	1	0	2	2						100
			Total---->	**16**	**1**	**12**	**23**						

Abbreviations:

PCC:	Programme Core Courses	ABQ:	Assignment Based Quiz	
PEC:	Programme Elective Courses	MSE:	Mid Semester Examination	
PROJ:	Project	ESE:	End Semester Examination	
ESC:	Engineering Science	IP:	Internal Practical	
L:	Lecture	EXP:	External Practical	
T:	Tutorial	HSMC:	Humanities, Social Science & Management course	
P:	Practical			

LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2023-24

School: School of Computer Science & Information Technology	**Batch: 2021-2025**
Department: Department of Computer Science & Engineering	**Year:3rd**
Course: Bachelor of Technology (B.Tech(CSE-(AIML))	**Semester: VI**

SN	Cate-gory	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
								Theory			Practical		
				L	T	P		ABQ	MSE	ESE	IP	EXP	
1	PCC	CS-302	Statistical Learning Theory	3	0	0	3	15	25	60	-	-	100
2	PCC	CS-304	Software Engineering	3	0	0	3	15	25	60	-	-	100
3	PCC	CS-306	Cryptography & Network Security	3	0	0	3	15	25	60	-	-	100
4	PCC	CS-308	Compiler Design	3	0	0	3	15	25	60	-	-	100
5	PEC	CS-310	Artificial Neural Networks	3	0	0	3	15	25	60	-	-	100
6	PEC	CS-312	Computer Vision	3	0	0	3	15	25	60	-	-	100
7	PCC	CS-352	Statistical Learning Theory Lab	0	0	2	1				60	40	100
8	PCC	CS-356	Cryptography & Network Security Lab	0	0	2	1				60	40	100
9	PEC	CS-360	Artificial Neural Networks using Lab	0	0	2	1				60	40	100
10	PEC	CS-362	Computer Vision Lab	0	0	2	1				60	40	100
11	PROJ	CS-382	Minor Project-III	0	0	4	2					100	100
12	MC	MC-302	Essence of Indian Traditional Knowledge	0	0	0	0						100
			Total---->	**18**	**0**	**12**	**24**						

Abbreviations:

PCC:	Programme Core Courses
PEC:	Programme Elective Courses
PROJ:	Project
L:	Lecture
T:	Tutorial
P:	Practical
ABQ:	Assignment Based Quiz
MSE:	Mid Semester Examination
ESE:	End Semester Examination
IP:	Internal Practical
EXP:	External Practical

LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2024-25

School: School of Computer Science & Information Technology	**Batch: 2021-2025**
Department: Department of Computer Science & Engineering	**Year:4th**
Course: Bachelor of Technology (B.Tech(CSE- AIML))	**Semester:VII**

SN	Cate-gory	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
								Theory			Practical		
				L	T	P		ABQ	MSE	ESE	IP	EXP	
1	PEC	CS-401	R Programming	3	0	0	3	15	25	60	-	-	100
2	PEC	CS-403	Deep Learning	3	0	0	3	15	25	60	-	-	100
3	PEC	CS-405	Pattern Recognition	3	0	0	3	15	25	60	-	-	100
4	PEC	CS-407	Speech and Natural language Processing	3	0	0	3	15	25	60	-	-	100
5	OE		Open Elective-I (From the bucket floated at University Level)	3	0	0	3	15	25	60	-	-	100
6	PEC	CS-451	R Programming Lab	0	0	2	1				60	40	100
7	PEC	CS-453	Deep Learning Lab	0	0	2	1				60	40	100
8	PEC	CS-455	Pattern Recognition Lab	0	0	2	1				60	40	100
9	PROJ	CS-485	Major Project I	0	0	8	4					100	100
10	HSMC	PEP-401	Professional skills	1	0	2	2						100
			Total---->	**16**	**0**	**16**	**24**						

Abbreviations:

PEC:	Programme Elective Courses	ABQ:	Assignment Based Quiz	
PROJ:	Project	MSE:	Mid Semester Examination	
OE:	Open Elective	ESE:	End Semester Examination	
L:	Lecture	IP:	Internal Practical	
T:	Tutorial	EXP:	External Practical	
P:	Practical			

LINGAYA'S VIDYAPEETH

SCHEME OF STUDIES

SESSION: 2024-25

School: School of Computer Science & Information Technology	Batch: 2021-2025
Department: Department of Computer Science & Engineering	Year:4th
Course: Bachelor of Technology (B.Tech(CSE-AIML))	Semester: VIII

SN	Cate-gory	Course Code	Course Name	Periods			Credits	Evaluation Scheme					Subject Total Marks
								Theory			Practical		
				L	T	P		ABQ	MSE	ESE	IP	EXP	
1	PEC	CS-402	AIML Tools and Applications	3	0	0	3	15	25	60	-	-	100
2	PROJ	CS-490	Major Project-II/ Project Based on Internship	0	0	24	12	-	-	-	-	100	100
3	PROJ	CS-492	Seminar	0	0	2	1	-	-	-	-	100	100
			Total---->	**3**	**0**	**26**	16						

Open Elective-I

Course Code	Course Name
BA-271A	Human Resource Management
MEOE- 401C	Industrial Robotics

Syllabus

Of

B.Tech(CSE-AI/ML)

1st Year

1st Semester

BS-107	MATHEMATICS - I	L T P	Cr
		3 1 0	4

OBJECTIVES

The objective of this subject is to understand the major problems of differential and integral calculus and to appreciate how calculus allows us to solve important practical problems in an optimal way.

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Calculate limits, derivatives and indefinite integrals of various algebraic and trigonometric functions of a single variable.

CO2: Use the fact that the derivative is the slop of the tangent line to the curve at a given Point.

CO3: Use the properties of limits and the derivative to analyze graphs of various functions of a single variable

CO4: Apply derivative tests in optimization problems appearing in social sciences, physical sciences, life Sciences and a host of other disciplines.

UNIT I

MATRIX ALGEBRA: Elementary operations and their use in getting the Rank, Inverse of a matrix and solution of linear simultaneous equations. Orthogonal, Symmetric, Skew-symmetric, Hermitian, Skew-Hermitian, Normal & Unitary matrices and their elementary properties. Eigen-values and Eigenvectors of a matrix, Cayley-Hamilton theorem, Diagonalization of a matrix.

UNIT II

DIFFERENTIAL CALCULUS: Limit, Continuity and differentiability of functions of two variables, Euler's theorem for homogeneous equations, Tangent plane and normal. Change of variables, chain rule, Jacobians, Taylor's Theorem for two variables, Error approximations. Extrema of functions of two or more variables, Lagrange's method of undetermined multipliers.

UNIT III

INTEGRAL CALCULUS: Review of curve tracing and quadric surfaces, Double and Triple integrals, Change of order of integration. Change of variables. Gamma and Beta functions. Dirichlet's integral. Applications of Multiple integrals such as surface area, volumes, centre of gravity and moment of inertia.

UNIT IV

VECTOR CALCULUS: Differentiation of vectors, gradient, divergence, curl and their physical meaning. Identities involving gradient, divergence and curl. Line and surface integrals. Green's, Gauss and Stroke's theorem and their applications.

REFERENCES

1. Shanti Narayan (2005), Differential Calculus, S. Chand Limited, ISBN 978-8-121-90471-4
2. P. K. Mittal (2005), Integral Calculus, S. Chand Limited, ISBN-13**:** 978-8-121-90681-4
3. Thomas (1996), Calculus and Analytical Geometry, Pearson Education, ISBN: 978-8-817- 758325-0.
4. Erwin Kreyszig, Herbert Kreyszig, Edward J. Norminton (2011), Advanced Engineering Mathematics, Wiley. ISBN: 978-0-470-45836-5.
5. R. K. Jain, S. R. K. Iyengar (2004), Advanced Engineering Mathematics, Alpha Science

International. ISBN: 978-1-842-65185-8.

BS-109	PHYSICS	L T P	Cr
		3 1 0	4

OBJECTIVES

To familiar the students with the very basic knowledge of concepts and tools of applied physics and guide them to understand the various engineering subject.

COURSE OUTCOMES:

CO1: Examine the different phenomenon related with wave nature of light and significance in applications of engineering

CO2: Analyze the basics of laser and types of lasers & apply them to diverse engineering problems

CO3: Understand the concept of fundamental forces and apply the various laws in different engineering situations

CO4: Apply laws of the electrostatic and magnetostatic in different engineering situations

UNIT I

MECHANICS: Transformation of scalars and vectors under Rotation transformation; Forces in Nature; Newton's laws and its completeness in describing particle motion; Form invariance of Newton's Second Law; Solving Newton's equations of motion in polar coordinates; Problems including constraints and friction; Extension to cylindrical and spherical Coordinates.

UNIT II

WAVE OPTICS: Huygens' principle, superposition of waves and interference of light by wave front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer, Mach-Zehnder interferometer.

Fraunhauffer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

UNIT III

LASERS: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO2), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity, coherence, directionality and brightness, laser speckles, applications of lasers in science, engineering and medicine.

UNIT IV

ELECTROSTATICS: Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential, Boundary conditions of electric field and electrostatic potential; method of images; energy of a charge distribution and its expression in terms of electric field.

UNIT V

MAGNETOSTATICS: Principle of work and energy for a particle and a rigid body in plane motion – Conservation of energy - Principle of impulse and momentum for a particle and a rigid bodies in plane motion – Conservation of momentum – System of rigid bodies – Impact - direct and central impact – coefficient of restitution.

REFERENCES

1. David J. Griffiths Pati (2017), Introduction to Electrodynamics, Cambridge University Press. ISBN: 978-1-108-35714-2.
2. W H Hayt Jr, , J A Buck, M Jaleel Akhtar (2020), Engineering Electromagnetics, 9th Edition, McGraw-Hill International Edition. ISBN: 978-9-353-16973-2
3. Manoj K. Harbola (2009), Engineering Mechanics , 2nd Edition, Cengage Learning India Private Limited. ISBN: 978-8-131-50990-6
4. Mahendra K. Verma (2019), Introduction to Mechanics, Taylor & Francis Group. ISBN: 978-1-138-11677-1
5. Robert Eisberg, Robert Martin Eisberg, Robert Resnick, David O. Caldwell, Edward Derringh (1985), Quantum Physics of Atoms, Molecules, Solids, Nuclei, and Particles, Wiley Publishers. ISBN: 978-0-471-87373-0.

EC-101	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L T P	Cr
		3 0 0	3

OBJECTIVES

1. To understand and analyze basic electric and Electronics concepts.
2. To study the working principles of electrical machines and power converters.
3. To study the Network Theorems.

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Understand and analyze basic electric and magnetic circuits

CO2: Understand the working principles of electrical machines and power converters.

CO3: Understand the components of low voltage electrical installations and power converters.

UNIT I

HISTORICAL BACKGROUND: Vacuum tubes; working of vacuum tube and their characteristics; vacuum diode; triode; tetrode and pentode. PN JUNCTION: Depletion layer; Barrier potential; Forward and reverse bias; Breakdown voltage; PIV; switching characteristics of p-n junction diode; knee voltage; load line; and operating Point Ideal p-n junction diode; junction capacitance; Zener diode.

UNIT II

RECTIFIERS AND FILTERS: Half wave; centre tap full wave and bridge rectifier; percentage of regulation; PIV; ripple factor; C; RC; LC and PI filter; voltage doubler; clipping and clamping circuit; voltage regulation. Bipolar Junction Transistor: Introduction; basic theory of operation of PNP ad NPN transistor-l characteristics; CB; CE and CC configuration; different biasing techniques.

UNIT III

FET: Introduction; Theory of operation; JFET Parameters; and JFET Amplifiers. MOSFET: Introduction; theory of operation; MOSFET parameters; application; graphical analysis of BJT and FET circuits; linear models of BJT and FET; pulse and large signal models of BJT and FET.

UNIT IV

DC CIRCUITS: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real Power, reactive power, apparent power, power factor. Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin, Norton and maximum power transfer Theorems.

UNIT V

ELECTRICAL MACHINES: Three phase balanced circuits, voltage and current relations in star and delta connections. Generation of rotating magnetic fields, Construction and working of a three-phase induction Motor, Significance of torque-slip characteristic, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of dc motor. Construction and working of synchronous generators.

REFERENCES

1. Millman and Halkias (2000), Electronic Devices and Circuits, 2nd Edition, Tata McGraw Hill Publication, ISBN: 978-0-070-42380-0.

2. D P Kothari, I J Nagrath (2020), Basic Electrical and Electronics Engineering,Second Edition, McGraw-Hill Education, ISBN: 978-9-389-81125-4.
3. W.A.J.Chapman (2001), Workshop Technology, Vol 1, 5th Edition, CBS Publishers, ISBN: 978-8-123-90401-6.
4. Boylestad and Nashelsky (1999) , Electronic Devices and Circuit , 4th Edition, Pearson Education, ISBN: 978-9-332-54260-0.

CS-101	PROGRAMMING FOR PROBLEM-SOLVING USING C	L T P	Cr
		3 0 0	3

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Know the basic concepts of programming languages as well as operating system

CO2: Learn the basics of programming using C

CO3: undergo the functions and pointers

CO4: Learn about the structures, unions as well as functions using recursion

CO5: Know about the dynamic programming as well as file handling

UNIT I

INTRODUCTION TO COMPUTER SYSTEMS, PROGRAMMING LANGUAGES, OPERATING SYSTEM, NETWORKING, AND SECURITY: Overview of Computer Systems: Characteristics of Computer- speed, storage, Accuracy, Categories of computer- Micro Computers, Mini Computers, Main Frames, Super Computers, Computer Organization- Central processing unit, Arithmetic and Logic Unit, Control Unit, Memory System- Primary memory, secondary memory. Data Representation in a Computer System- Number system - decimal, Binary, Octal, Hexadecimal representation and conversion.

SOFTWARE BASICS: Application software, System Software, Programming languages: Low level languages, Machine language, Assembly language, High Level languages, Translator, Assembler, Interpreter, Compiler, Operating System: Need of Operating System, Function of Operating System, Types of Operating System, Introduction to Networking: Local and Wide Area Networks.

SECURITY THREATS: Intruders, Password Cracking, Types of malicious Software- Virus, Worms, Trojan Horse, Prevention from malicious Software- Antivirus

UNIT II

BASICS OF PROGRAMMING USING C: Problem definition, Representation of Algorithms: Flow charts/ Pseudocode with example, Types of programming languages, Translators, From algorithms to programs; source code, variables and memory location, Introduction to C: Structure of C program, C character set, Identifier and Keywords, Data types, constants, variables, Declaration, Arithmetic expressions & precedence , statements, Symbolic constants, type conversion, Types of operators, Input and output functions in C, header files, common programming errors, Control Statements, Sequencing, Selection, Condition and iteration, Arrays and Strings: Declaring, Referencing and initializing arrays, array subscript, using for loop for sequential access, multi-dimensional array, String basics string library functions, assignment and substring, concatenation, string comparison.

UNIT III

FUNCTIONS AND POINTERS: Definition of function, function prototype, Purpose of main function, passing parameters, Scope of function, recursion, Call by value and reference, Types of storage classes, Scope of variable: Global and local, static variables, Recursion. Pointer variables, initializing pointers, pointer operators, pointer expressions, pointers and arrays, pointer and functions.

UNIT IV

STRUCTURES, UNIONS & RECURSION: Defining a structure, Declaring structure variables, Structure initialization, Copying and Comparing Structure variables, Array of structures, Arrays within structure, nested structures, Unions. Recursion as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

UNIT V

DYNAMIC ALLOCATION, AND FILE HANDLING: C's dynamic allocation functions. Streams and file types, opening and closing a data file, input and output operations, text mode versus binary mode, formatted input output operations with files, random access to files.

REFERENCES

1. Pradeep K. Sinha, Priti Sinha (2004), Computer Fundamentals, BPB Publications, ISBN: 9788176567527.
2. Byron S. Gottfried(1996), Programming with C, McGraw-Hill Education, ISBN:9780070240353.
3. E. Balagurusamy (1990), Programming in C, Tata McGraw-Hill Publishing ISBN: 9780074600474

HSS-101	EFFECTIVE TECHNICAL COMMUNICATION	L T P	Cr
		3 0 0	3

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Comprehend and summarize characteristics & various structural principles prerequisite to Technical Communication

CO2: Classify and formulate the elementary intricacies of Scientific and Technical Writing using applicative grammar construct

CO3: Create cohesive technical paragraphs & text

CO4: Paraphrase text(s) and use appropriate referencing styles

CO5: Design and present/publish technical documents

UNIT I

INTRODUCTION TO TECHNICAL WRITING: An overview of Technical Writing, Nature of Scientific English & Technical writing, Taxonomy of Technical writing, Examples of Technical Writing

UNIT II

TECHNICAL WRITING DESIGN & DEVELOPMENT: Linguistic know-how in Technical Writing, Techniques of precision, Organization of Technical contents

UNIT III

SIGNPOSTING PARAGRAPH STRUCTURE & DEVELOPMENT: Signposting with strong Topic Sentence, Writing for Purpose: Explanation, Instruction, Description, Definition, Comparison & Contrast, Classification, Narration, Hypotheses

UNIT IV

FINDING DATA & INCORPORATING SOURCES: Finding data & incorporating sources, Paraphrasing, Avoiding Plagiarism, Referencing styles

UNIT V

CREATING TECHNICAL DOCUMENTS: Creating Technical Documents – Report, Manuals, Brochures etc. (Selected), Technical Presentation in Groups

REFERENCES

1. Technical Communication – Principles and Practices by Meenakshi Raman & Sangeeta
2. Modern Technical Writing by Sherman, Theodore A (et.al); Apprentice Hall; New Jersey; U.S.
3. A Text Book of Scientific and Technical Writing by S.D. Sharma; Vikas Publication, Delhi.
4. Rizvi, M.A. Academic Writing: A course in English for Science and Technology, Nabodaya
5. Price, Jonathan and Korman H., (1993) How to Communicate Technical Information: The Benjamin Cummings Publishing Company.
6. Muralikrishna and S. Mishra (2011) Communication Skills for Engineers, Pearson education. ISBN: 9788131733844.
7. Murphy, R. (2007) Essential English Grammar, CUP. ISBN: 8175960299.

8. Essential English Grammar by Raymond Murphy, CUP, 2011.
9. Intermediate English Grammar by Raymond Murphy, CUP, 2011.
10. Practical English Usage by Michael Swan, OUP, 2013.
11. Dignen, Bob. Presentation Skills in English. Orient Black Swan, 2007.

ME-151	WORKSHOP PRACTICE	L T P	Cr
		0-0-4	2

UNIT I: MACHINE SHOP

Step turning & Taper turning Operation

Exercise 1: To obtain required diameters (steps) on a cylindrical work piece with the given lengths.

Shoulder Turning

Exercise 2: To obtain required diameters on a cylindrical work piece with the given dimensions.

UNIT II: CARPENTARY SHOP

Dove Tail Lap Joint

Exercise 3: To make a dovetail lap joint Cross Half Lap Joint Exercise
4: To make a Cross Half Lap Joint

UNIT III: SHEET METAL SHOP

Exercise 5: To make a funnel using G.I Sheet as per dimensions provided. Exercise 6: To make a Square box using G.I Sheet as per the dimension.

UNIT IV: WELDING SHOP

Exercise 7: To make a single v -butt joint
Exercise 8: To make a T - joint using the given m

UNIT V: FOUNDARY SHOP

Mould For A Solid

Exercise 9 To prepare a sand mould, using the given Single piece pattern.
Exercise 10. To prepare a sand mould, using the given Split piece pattern.

BS-159	PHYSICS LAB	L T P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

1. To study response curve of a series LCR circuit.
2. To determine the Planck's constant using LEDs.
3. To determine the Rydberg's constant of Hydrogen atom.
4. To find the refractive index and Cauchy's constants of a prism.
5. To find the wavelength of light by Newton's rings experiment.
6. To determine the thickness of a thin wire by interference.
7. To determine the wavelength of LASER using diffraction grating.
8. To determine the resolving power of a telescope.
9. To find the numerical aperture of an optical fiber cable.
10. To find the wavelength of light using Michelson's interferometer.

EC-151	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB	L T P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi – meter, oscilloscope. Resistors, capacitors and inductors.
2. To study V-I characteristics of diode; and its use as a capacitance.
3. Study of the characteristics of transistor in Common Base configuration.
4. Study of the characteristics of transistor in Common Emitter configuration.
5. Study of characteristics of MOSFET/JFET is CS configuration.
6. To verify the Thevenin's & Norton's theorem.
7. To verify the Superposition theorem.
8. To study frequency response of series & parallel RLC Circuit.
9. Demonstration of cut – out sections of machines:
10. Load test on D.C. Shunt generator

HSS-151	ENGLISH COMMUNICATION LAB	L T P	Cr
		0-0-2	1

LIST OF TOPICS

1. Intro - Lab & Seating Plan/Ice-breaking
2. Basic Ear training & Listening Skills: Practice
3. Listening Skills Test: Graded Exercise
4. International Phonetic Alphabet & Mispronounced Words: Practice.
5. International Phonetic Alphabet-2: Practice
6. Group Discussion Techniques – Dos & Don'ts – Practice GD
7. Extempore based on Cue Cards
8. Individual Speaking Activity: Graded Exercise.
9. Reading Skills & Comprehension: Practice
10. Reading Skills & Comprehension - Graded Exercise
11. Creating Technical Posters
12. Technical Poster Presentation Graded Exercise

REFERENCES

1. Jones, D. (1909), "The Pronunciation of English", Cambridge: CUP; rpt in facsimile in Jones (2002).
2. Jones, D. (1918), "An Outline of English Phonetics", Leipzig: Teubner; rpt in Jones (2002).
3. Jones, D. (1909) "The Dictionary of English Phonetics" Cambridge: CUP (2002).
4. Bansal, R.K. The Intelligibility of Indian English, Monograph, 4 CIEFL, Hyderabad, Second abridged edition, 1976.
5. Jones, Daniel, English Pronouncing Dictionary, revised by A.C. Gimson, 14th Edition, The English Language Book Society and JM Dent Sons Ltd. London 1977.
6. Senthi. J and P.V. Dhamija, A Course in Phonetics and Spoken English Prentice Hall of India Private Ltd. New Delhi, 1989.
7. Taylor, Ken, Telephoning and Teleconferencing Skills. Orient Black Swan, 2008.
8. Dignen, Bob. Presentation Skills in English. Orient Black Swan, 2007.
9. Murphy, R. (2007) Essential English Grammar, CUP. ISBN: 8175960299.
10. C. Muralikrishna and S. Mishra (2011) Communication Skills for Engineers, Pearson education. ISBN: 9788131733844.
11. Essential English Grammar by Raymond Murphy, CUP, 2011
12. Intermediate English Grammar by Raymond Murphy, CUP, 2011
13. Practical English Usage by Michael Swan, OUP, 2013

CS-151	PROGRAMMING FOR PROBLEM-SOLVING USING C LAB	L T P	Cr
		0-0-2	1

List of Topics (Students have to do at 3-4 programs from each section)

SEQUENTIAL CONTROL STATEMENTS

1. Write a program to Print HELLO
2. Write a program to add two numbers
3. Write a program to calculate simple interest
4. Write a program to calculate average of three numbers
5. Write a program to swap two numbers
6. Write a program to illustrate mixed data types
7. Write a program to calculate area and circumference of circle
8. Write a program to evaluate a polynomial expression
9. Write a program to add digits of a four digit number
10. Write a program to check whether the person if eligible for voting or not

CONDITIONAL CONTROL STATEMENTS

11. Write a program to find greatest of two numbers
12. Write a program to find out which type of triangle it is
13. Write a program to find out greatest of three numbers
14. Write a program to evaluate performance of the student
15. Write a program to make a basic calculator

LOOP CONTROL STATEMENTS

16. Write a program to print Fibonacci up-to the given limit
17. Write a program to find the sum of digits of a number
18. Write a program to find factorial of a number
19. Write a program to print table of any number
20. Write program for printing different pyramid pattern

ARRAYS AND STRINGS

21. Write a program to enter the elements in a one dimensional array
22. Write a program to find the sum and average of five numbers
23. Write a program to sort the array elements
24. Write a program to enter the marks of 50 students an calculate the average
25. Write a program to add 2 matrix
26. Write a program to multiply 2 matrices
27. Write a program to calculate the length of string
28. Write a program to concatenate 2 strings
29. Write a program to reverse the string
30. Write a program to count the numbers of characters in a string

31. Write a program that converts lower case characters to upper case
32. Write a program without using predefined functions to check whether the string is palindrome or not

FUNCTIONS & POINTERS

33. Write a program using function to find the largest of three numbers
34. Write a program using function to sum the digits of a number
35. Write a program to calculate factorial of a number using recursive function
36. Write a program to print first n Fibonacci using recursive function
37. Write a program to illustrate the concept of chain of pointers
38. Write a program using function to swap two numbers using call by reference
39. Write a program to calculate the area and perimeter of circle using pointers
40. Write a program to copy the contents of one array into another in the reverse order using pointers

STRUCTURES

41. Write a program to read an employee record using structure and print it
42. Write a program to prepare salary chart of employee using array of structures
43. Write a program to print the name and percentage of 20 students (array of structures and arrays within structures).
44. Write a program to demonstrate structure within structure.

FILE HANDLING

45. Write a program to create, open, and close files.
46. Write a program to demonstrate the purpose of different file opening modes.
47. Write a program to count the number of characters, spaces, tabs, new line characters in a file.
48. Write a program to receive strings from keyboard and write them to a file.
49. Write a program to copy a file to another.
50. Write a program to read strings from a file and display them on screen

Syllabus
Of
B.TECH(CSE-AI/ML)
1st Year
2nd Semester

BS-108	MATHEMATICS-II	L T P	Cr
		3-1-0	4

UNIT I

SEQUENCE, POWER SERIES AND FOURIER SERIES : Sequence, Convergentce of Sequence, Series, geometric series, Convergence of series, comparision test, p-test, Leibnits Test, Periodic Function, Fourier series, Dirichlet's condition for Fourier series, Determination of Fourier coefficients (Euler's formulae), Fourier series for discontinuous, even, and odd functions.

UNIT II

COMPLEX VARIABLE: Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm), Contour integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof) singularities, Laurent's series; Residues, Cauchy Residue theorem.

UNIT III

ORDINARY DIFFERENTIAL EQUATIONS (ODS): First order ordinary differential equations, Separation of varables, Exact, Linear and Bernoulli's equations, Second order differential equation with constant coefficients, Cauchy-Euler equation, Sturm-Liouville's problems.

UNIT IV

PARTIAL DIFFERENTIAL EQUATIONS (PDES): Formation and classification of first-order PDEs, Linear first-order PDEs, Lagrange's method, Nonlinear first-order PDEs, Charpit's method, Linear partial differential equations with constant coefficients, Method of separation of Variables, Heat Equation, Wave Equation.

UNIT V

INTEGRAL TRANSFORMS: Definition and properties of Laplace Transform, Transform of a periodic function, Dirac delta Function, Laplace Transform, Fourier Transforms, Properties of Fourier Transforms, Convolution Theorem for Fourier Transforms Application of Laplace and Fourier transform in finding the solution of differential equations.

TEXTS BOOKS

1. Advanced Engineering Mathematic By D. G. Zill and W. S. Wright.
2. Advanced Engineering mathematics by Erwin Kreyszig.

REFERENCE BOOKS

1. Higher Engineering mathematics By B.S. Grewal.
2. Mathematical Analysis. By S.C. Malik and Savita Arora.
3. Higher Engineering Mathematics By H.K. Dass and Er. Rajnish Verma

BS-110	ENVIRONMENTAL SCIENCE AND CHEMISTRY	L T P	Cr
		2-0-0	2

COURSE OBJECTIVES:

An important objective of environmental science and chemistry is to understand and characterize chemical and physical measurements of complex environmental systems. Creating the awareness about environmental problems among students, imparting basic knowledge about the environment and its allied problems and developing an attitude of concern for the environment.

COURSE OUTCOMES:

CO1. To understand the composition of water along with the hardness and their determination for treatments.
CO2. To aware the students about the principles of green chemistry.
CO3. To learn about the structure and function of ecosystems.
CO4. To know about the environmental issues and their act for prevention.

UNIT I

WATER AND ITS TREATMENT: Introduction, Composition of water, Structure, Bonding and shape of water, Hardness of water: Type of hardness, EDTA titration Method, Degree of hardness, Alkalinity and its determination, scale and sludge formation, Demineralization or Ion Exchange process, Aerobic and Anaerabic Oxidation, Dissolved Oxygen, Bio-Chemical Oxygen demand (BOD), Method for determination of BOD and Chemical Oxygen demand (COD) and Method for determination of COD.

UNIT II

INTRODUCTION TO GREEN CHEMISTRY: Introduction to green chemistry need for green chemistry. Principles of Green Chemistry with their explanations and examples (Prevention of Waste/ byproducts/ toxic products; maximum incorporation of the materials used in the process into the final products).

UNIT III

ECOSYSTEMS: Concept of an ecosystem, structure and function of an ecosystem, producers, consumers and decomposers, energy flow in the ecosystem, ecological succession, food chains, food webs and ecological pyramids; characteristic features, structure and function of the following ecosystem -forest ecosystem, grassland ecosystem desert ecosystem and aquatic ecosystems.

UNIT IV

ENVIRONMENTAL POLLUTION: Causes, effects and control measures of air pollution, water pollution, soil pollution, marine pollution, noise pollution, thermal pollution; solid waste management.

UNIT V

ENVIRONMENT ISSUES And ENVIRONMENTAL ACT: Global warming, acid rain, ozone layer depletion; Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Forest Conservation Act.

TEXT BOOKS/REFERENCE BOOKS:

1. M.A. Ryan & M. Tinnesand, Introduction to Green Chemistry, American Chemical Society, Washington (2002).
2. Green Chemistry Theory and Practice. P.T.Anatas and J.C. Warner
3. Real world cases in Green Chemistry M.C. Cann and M.E. Connelly
4. Green Chemistry: Introductory Text M.Lancaster: Royal Society of Chemistry (London)
5. University chemistry, by B. H. Mahan Agarwal, K.C., “Environmental Biology”, 2nd Edition, Nidhi Publ. Ltd., Bikaner, 2001.
6. BharuchaErach, “The Biodiversity of India”, 2nd Edition, Mapin Publishing Pvt. Ltd., 2006.
7. Brunner R. C., “Hazardous Waste Incineration”, 1st Edition McGraw Hill Inc., 1989.
8. Clark R.S., “Marine Pollution”, 1st Edition Clanderson Press Oxford,1989
9. Cunningham, W.P., Cooper, T.H. Gorhani, E. & Hepworth, M.T., Environmental
10. Encyclopedia”, 2nd Edition, Jaico Publ. House, 2001.
11. De, A. K., “Environmental Chemistry”, 2nd Edition, Wiley Eastern, 1989

PEP-102	UNIVERSAL HUMAN VALUES	L T P	Cr
		1-0-2	2

OBJECTIVE

The present course deals with meaning, purpose, and relevance of universal human values and how to inculcate and practice them consciously to be a good human being and realise one's potentials.

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Know about universal human values and understand the importance of values in individual, social circles, career path, and national life.

CO2: Learn from case studies of lives of great and successful people who followed and practised human values and achieved self-actualisation.

CO3: Become conscious practitioners of human values.

CO4: Realise their potential as human beings and conduct themselves properly in the ways of the world.

Module 1: Love & Compassion - 4 Hours

- Introduction: What is love? Forms of love—for self, parents, family, friend, spouse, community, nation, humanity and other beings, both for living and non-living
- Love and compassion and inter-relatedness - Love, compassion, empathy, sympathy and non-violence
- Individuals who are remembered in history for practicing compassion and love.: Narratives and anecdotes from history, literature including local folklore
- Practicing love and compassion: What will learners learn/gain if they practice love and compassion? What will learners lose if they don't practice love and compassion?
- Sharing learner's individual and/or group experience(s)

Module 2: Truth - 4 Hours

- Introduction: What is truth? Universal truth, truth as value, truth as fact (veracity, sincerity, honesty among others)
- Individuals who are remembered in history for practicing this value: Narratives and anecdotes from history, literature including local folklore
- Practicing Truth: What will learners learn/gain if they practice truth? What will learners lose if they don't practice it?
- Learners' individual and/or group experience(s)

Module 3: Non-Violence - 4 Hours

- Introduction: What is non-violence? Its need. Love, compassion, empathy sympathy for others as pre-requisites for non-violence
- Ahimsa as non-violence and non-killing

- Individuals and organisations that are known for their commitment to nonviolence: Narratives and anecdotes about non-violence from history, and literature including local folklore
- Practicing non-violence: What will learners learn/gain if they practice nonviolence?
- What will learners lose if they don't practice it?
- Sharing learner's individual and/or group experience(s) about non-violence

Module 4: Righteousness - 2 Hours

- Introduction: What is righteousness?
- Righteousness and *dharma*, Righteousness and Propriety
- Individuals who are remembered in history for practicing righteousness: Narratives and anecdotes from history, literature including local folklore
- Practicing righteousness: What will learners learn/gain if they practice righteousness?
- What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s)

Module 5: Peace - 2 hours

- Introduction: What is peace? Its need, relation with harmony and balance.
- Individuals and organisations that are known for their commitment to peace: Narratives and Anecdotes about peace from history, and literature including local folklore
- Practicing peace: What will learners learn/gain if they practice peace? What will learners lose if they don't practice it?
- Sharing learner's individual and/or group experience(s) about peace

Module 5: Service - 4 Hours

- Introduction: What is service? Forms of service, for self, parents, family, friend, spouse, community, nation, humanity and other beings—living and non-living, persons in distress or disaster.
- Individuals who are remembered in history for practicing this value: Narratives and anecdotes dealing with instances of service from history, literature including local folklore
- Practicing service: What will learners learn/gain if they practice service? What will learners lose if they don't practice it?
- Sharing learners' individual and/or group experience(s) regarding service

Module 6: Renunciation (Sacrifice) - 4 Hours

- Introduction: What is renunciation? Renunciation and sacrifice.
- Self-restrain and Ways of overcoming greed.
- Renunciation with action as true renunciation
- Individuals who are remembered in history for practicing this value: Narratives and anecdotes from history and literature, including local folklore about individuals who are remembered for their sacrifice and renunciation.
- Practicing renunciation and sacrifice: What will learners learn/gain if they practice
- Renunciation and sacrifice? What will learners lose if they don't practice it?

- Sharing learners' individual and/or group experience(s)

ADDITIONAL PRACTICAL MODULES or OPERATIVE ELECTIVES:

NOTE: The faculty/institution may choose any/some of the following modules keeping in mind the level and specific needs of learners.

MODULE A - Integral Human Well-Being

Importance of well-being, inter-relatedness of different kinds of well-being and definition of well-being (state of being comfortable, healthy, happy and equanimity)

Well-being and its Kinds

(i) Physical (physical strength and endurance)
(ii) Emotional (ability to respond to emotions and control them)
(iii) Aesthetic (faculty to see and appreciate beauty in all beings)
(iv) Intellectual (rational, logical well-being)
(v) Relational well-being (obligation to self, parents, family society, nation humanity and other beings in the universe; living with others with their acceptance)
(vi) Moral (difference between good and evil and practicing goodness; righteousness)
(vii) Spiritual (thinking beyond self and journey from senses to spiritual level)

- Establish and recognise various states of well-being, embedded in different creatures, but consciously understood by humans.
- Identify the most pronounced emotions in the individual through given activities- Anecdotes/video/activity to help identify different well-beings
- Discussion of related values to well-beings: Aesthetics, ethics, gratitude, forgiveness, and spiritual health i.e., thinking beyond senses and self and for the welfare of others
- Importance and practice of well-being through case study/ activity Ways to attain different kinds of well-being
- Activities

MODULE B - Yoga & Pranayama 5 Hours

Importance of Yoga and Pranayama

- Yoga and pranayama for integral well-being and balance in life
- Yoga & Pranayama: Introduction
- Mind - Body – Intellect
- Difference between Yoga and Pranayama and their inter-relatedness.
- Basic Yogasans and pranayamas for students:
  a) Every morning
  b) Before bedtime
  c) Before a presentation
  d) Before examination
  e) To fight stomach cramps
  f) To fight stress
- Healthy diet
- Healthy mind
- Recommended routine for yoga and pranayama

MODULE C - Gratitude

Outlines:

- Gratitude, a great embellishment to a person’s mental quality
- Duty versus Rights
    - What is duty?
    - What is right?
- Wonderment and simplicity
- Gratitude to one's family
- Gratitude to one's teachers
- Gratitude to one's society
- Gratitude to one's nation
- Gratitude to the universe
- Count your blessings (activity)
- Live in an attitude of gratitude

SUGGESTED READINGS

1. Mookerji Radha Kumud, *Ancient Indian Education*, Motilal Banarasidass
2. Saraswati Swami Satyananda, *Asana Pranayama Mudra Bandha*, Bihar School of yoga
3. Joshi Kireet, *Education for Character Development*, Dharma Hinduja Center of Indic Studies Joshi Rokeach (1973). The Nature of Human Values. New York: The Free Press
4. Ghosh, Sri Aurobindo. 1998. *The Foundations of Indian Culture*. Pondicherry: Sri Aurobindo Ashram
5. Basham A.L., *The Wonder That was India*, London: Picador Press
6. Patra, Avinash (2012), *The Sprirtual Life and Culture of India*, Oxford University Press Shantikumar Ghosh, *UniversalValues.* The Ramakrishna Mission, Kolkata, 2004.

CS-102	INTRODUCTION TO BIOLOGICAL COMPUTING	L T P	Cr
		3 0 0	3

OBJECTIVES

To introduce the nature and scope of life sciences to give an overview about basic molecular Biology concept to understand the basic Bioinformatics and algorithms used in Computational Biology.

COURSE OUTCOMES

CO1: To get introduced to the basic concepts of Bioinformatics and its significance in biological data analysis

CO2: Classify different types of Biological Databases.

CO3: Introduction to the basics of sequence alignment and analysis.

CO4: Explain about the methods to characterise and manage the different types of biological data.

CO5: Overview about biological macromolecular structures and structure prediction methods.

UNIT I

INTRODUCTORY CONCEPTS: Bioinformatics as an Emerging Discipline, Applications of Bioinformatics in Various Areas, Overview of Available Bioinformatics Resources on the Web, Protein and Genome; Information Resources and Analysis Tools; Established Techniques and Methods; Sequence File Formats FASTA, GenBank, FASTQ and Structured File Formats.

UNIT II

BIOLOGICAL DATABASES: Protein Sequence and Structural Databases, Nucleotide Sequence Databases; NCBI, PubMed, Protein Data Bank (PDB), PIR, UniProt, EMBL, GenBank, DDBJ, SRA, UniGene; Specialized Databases: Pfam, SCOP, GO, Metabolic Pathways.

UNIT III

METHODS OF SEQUENCE ANALYSIS: Pairwise sequence alignment methods; Heuristic Methods; BLAST and its variants, Statistics of Sequence Alignment Score; E-Value, P-Value, scoring matrix, PAM, BLOSUM and Gap Penalty; Multiple Sequence Alignments; ClustalW, Hidden Markov Models, HMM Based Multiple-Sequence Alignment

UNIT IV

PHYLOGENETIC ANALYSIS: Distance and Character Based Methods and Software, Computing Tools for Phylogenetic Analysis, Distances, GROWTREE, PAUP, PHYLIP and MEGA; Construction and Visualization Phylogenetic Tree; and Application of Phylogenetic Analysis.

UNIT V

SECONDARY STRUCTURE ANALYSIS TOOLS: Sequence Motif Databases, Pfam, PROSITE, Protein Structure Classification; SCOP, CATH, Other Relevant Databases, KEGG, Protein Structure Alignments; Structure Superposition, RMSD, Different Structure Alignment Algorithms, DALI, and TMalign.

REFERENCES

1. Jin Xiong: Essential Bioinformatics, Cambridge University Press

2. Tramontano: Introduction to Bioinformatics, Chapman and Hall Series.

CS-104	OBJECT ORIENTED PROGRAMMING	L T P	Cr
		3 0 0	3

OBJECTIVE

Providing a sound conceptual understanding of the fundamental concepts of computing hardware, software, networking and services; build programming logic and thereby developing skills in problem solving using C++ programming language; Introduce the concept of object orientation and on how to handle data in different forms; Emphasize the concepts and constructs rather than on language features.

PRE-REQUISITE

Knowledge of C programming language.

COURSE OUTCOMES:

The students undergoing this course will be able to:

CO1: Specify simple abstract data types

CO2: Design implementations, using abstraction functions to document them. Recognize features of object-oriented design such as encapsulation, polymorphism, inheritance, and composition of systems based on object identity.

CO3: Learn about the overloading of operators and their usage

CO4: Know about inheritance and polymorphism

CO5: Manage the data via files

UNIT I

OBJECT ORIENTED CONCEPTS& INTRODUCTION TO C++: Introduction to objects and object oriented programming, difference between procedure oriented & Object oriented programming; main feature of Object oriented programming: Class, Object, encapsulation (information hiding); Polymorphism: overloading, inheritance, overriding methods, abstract classes, access modifiers: controlling access to a class; method, or variable (public, protected, private, package); other modifiers; Basics of C++,Simple C++ Programs, preprocessors directives, Namespace, Memory management operators in C++, Inline function, default arguments, & reference types.

UNIT II

CLASSES AND DATA ABSTRACTION: Introduction; structure definitions; accessing members of structures; class scope and accessing class members; separating interface from implementation; controlling access function and utility functions, initializing class objects: constructors, using default arguments with constructors; using destructors; classes: const(constant) object and const member functions, object as member of classes, friend function and friend classes; using this pointer, dynamic memory allocation with new and delete; static class members& function; container classes and integrators;.

UNIT III

OPERATOR OVERLOADING, TEMPLATE & EXCETION HANDLING: Introduction; fundamentals of operator overloading; restrictions on operators overloading; operator functions as class members vs. as friend functions; overloading, <<; >> overloading unary operators; overloading binary operators. Function templates; overloading template functions; class template; class templates and non-type parameters; basics of C++ exception handling: try, throw, catch, throwing an exception, catching an exception, re-throwing an exception.

UNIT IV

INHERITANCE, VIRTUAL FUNCTIONS AND POLYMORPHISM: Introduction, inheritance: base classes and derived classes, protected members; casting base-class pointers to derived-class pointers; using member functions; overriding base–class members in a derived class; public, protected and private inheritance;using constructors and destructors in derived classes; implicit derived–class object to base-class object conversion; composition vs. inheritance; virtual functions; abstract base classes and concrete classes; polymorphism; new classes and dynamic binding; virtual destructors; polymorphism; dynamic binding.

UNIT V

FILES AND I/O STREAMS: Files and streams; creating a sequential access file; reading data from a sequential access file; updating sequential access files, random access files; creating a random access file; writing data randomly to a random access file; reading data sequentially from a random access file; stream input/output classes and objects; stream output; stream input; unformatted I/O (with read and write); stream manipulators; stream format states; stream error states.

TEXT BOOKS

1. Balagurusam y , E., ―Object Oriented Programming with C++‖, Prentice Hall of India, 2008
2. Scheldt, Herbert ―C++: The Complete Reference‖, Tata McGraw Hill, 3rd Ed, 2008

REFERENCE BOOKS

1. Kamthane, ―Object Oriented Programming with ANSI and Turbo C++, Pearson Education
2. Lafore, Robert, ―Object Oriented Programming in Turbo C++‖, The WAITE Group Press, 1994
3. Balagurusam y , E., ―Object Oriented Programming with C++‖, Prentice Hall of India, 2008
4. Bhave, ―Object Oriented Programming with C++‖, Pearson Education.

MG-120	ENGINEERING ECONOMICS & INDUSTRIAL MANAGEMENT	L T P	Cr
		3 0 0	3

COURSE OUTCOMES

CO1: Analyze, understand and manage critical financial situations
CO2: Evaluate the economic potential of investment.
CO3: Understand the various parameters like resource availability, depreciation, cost accounting etc and analyze project economic feasibility
CO4: Comprehend procurement process and analyze the proper utilization of human resources.
CO5: Examine the importance of job satisfaction as well as integration and maintenance function.

UNIT I

INTRODUCTION TO ECONOMICS: Definitions, Nature, Scope, Difference Between Microeconomics & Macroeconomics Theory Of Demand & Supply; Meaning, Determinants, Law Of Demand, Law Of Supply, Equilibrium Between Demand & Supply Elasticity; Elasticity Of Demand, Price Elasticity, Income Elasticity, Cross Elasticity.

UNIT II

THEORY OF PRODUCTION: Production Function, Meaning, Factors Of Production (Meaning & Characteristics Of Land, Labour, Capital & Entrepreneur), Law Of Variable Proportions & Law Of Returns To Scale Cost; Meaning, Short Run & Long Run Cost, Fixed Cost, Variable Cost, Total Cost, Average Cost, Marginal Cost, Opportunity Cost. Break Even Analysis; Meaning, Explanation, Numerical.

UNIT III

MACRO-ECONOMIC INDICATORS: Macro-Economic Indicators, Changes In The Gross Domestic Product (Gdp), Gross National Product (Gnp), Inflation, Employment & Unemployment Indicators, Currency Strength, Interest Rates, Corporate Profits, Balance Of Trade, Agricultural Production, Current Account Balance, Foreign Exchange, Foreign Trade, Industrial Production Index, Wholesale Price Index (Wpi), Retail Price Index (Rpi), Consumer Price Index (Cpi)

UNIT IV

INTRODUCTION TO MANAGEMENT: Definitions, Nature, Scope Management & Administration, Skill, Types And Roles Of Managers Management Principles; Scientific Principles, Administrative Principles, Maslow's Hierarchy Of Needs Theory.

UNIT V

FUNCTIONS TO MANAGEMENT: Planning, Organizing, Staffing, Directing, Controlling (Meaning, Nature And Importance) Organizational Structures; Meaning, Principles Of Organization, Types-Formal And Informal, Line, Line & Staff, Matrix, Hybrid (Explanation With Merits And Demerits), Span Of Control, Departmentalization.

UNIT VI

INTRODUCTION TO MARKETING & PRODUCTION MANAGEMENT: Marketing Mix, Concepts Of Marketing, Demand Forecasting And Methods, Market Segmentation Introduction To Finance Management; Meaning, Scope, Sources, Functions.

UNIT VII

PRODUCTION MANAGEMENT: Definitions, Objectives, Functions, Plant Layout-Types & Factors Affecting It, Plant Location- Factors Affecting It. Introduction To Human Resource Management; Definitions, Objectives Of Manpower Planning, Process, Sources Of Recruitment, Process Of Selection.

REFERENCE BOOKS

1. Engineering Economics, R.Paneerselvam, Phi Publication
2. Fundamentals Of Management: Essential Concepts And Applications, Pearson Education, Robbins S.P. And Decenzo David A.
3. Economics: Principles Of Economics, N Gregory Mankiw, Cengage Learning
4. Principles And Practices Of Management By L.M.Prasad
5. Principles Of Management By Tripathy And Reddy
6. Modern Economic Theory, By Dr. K. K. Dewett & M. H. Navalur, S. Chand Publications
7. Samuelson, Nordhaus: Economics (2009)
8. N. Gregory Mankiew (2007): Macroeconomics, Sixth Edition
9. Bock Gyula (2001): Makroökonómia Feladatok, Tri-Mester
10. Actual Economic Articles from The Printed Media Or From The Internet.

ME-152	ENGINEERING GRAPHICS LAB	L T P	Cr
		0-0-4	2

OBJECTIVE

Engineering drawing is an effective language of engineers. It is the foundation block which strengthens the engineering and technological structure. Moreover, it's the transmitting link between ideas and realization. After learning the course the students should be able to understand conventions and the methods of engineering drawing and interpret engineering drawings, using fundamental technical mathematics, construct basic and intermediate geometric improve their visualization skills so that they can apply these skills in developing new projects improve their technical communication skill in the form of communicative drawings, comprehend the theory of projections and acquire basic knowledge of computer aided drafting**.**

All phases of manufacturing or construction require the conversion of new ideas and design concepts into the basic line language of graphics. Therefore, there are many areas (civil, mechanical, electrical, architectural and industrial) in which the skills of the CAD technicians play major roles in the design and development of new products or construction. Students prepare for actual work situations through practical training in a new state-of-the-art computer designed CAD laboratory using engineering software. This course is designed to address:

- To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- to prepare you to communicate effectively
- to prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice

COURSE OUTCOMES

The students undergoing this course will be able to:
CO1: Introduction to engineering design and its place in society
CO2: Exposure to the visual aspects of engineering design
CO3: Exposure to engineering graphics standards
CO4: Exposure to solid modelling

UNIT I

INTRODUCTION TO ENGINEERING DRAWING: 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 Dimensioning

UNIT II

ORTHOGRAPHIC PROJECTIONS: Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes;

UNIT III

PROJECTIONS OF SOLIDS: Projections of planes inclined Planes - Auxiliary Planes; Projection of Regular Solids covering those inclined to both the planes, Auxiliary Views; Section of such solids and the true shape of the section.

UNIT IV

SECTIONS AND SECTIONAL VIEWS OF RIGHT ANGULAR SOLIDS: Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; objects from industry and dwellings (foundation to slab only) 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

UNIT V

OVERVIEW OF COMPUTER GRAPHICS: Introduction to Computer Aided Drafting and CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];

REFERENCE BOOKS:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech
5. Publishers (Corresponding set of) CAD Software Theory and User Manuals

BS-160	ENVIRONMENTAL SCIENCE AND CHEMISTRY LAB	L T P	Cr
		0-0-2	1

COURSE OBJECTIVES:

An important objective of environmental science and chemistry Lab is to understand the experimental techniques for the students to determine amount of hardness as well as understanding the complexometric titration method

COURSE OUTCOMES:

CO1. Analyze & generate experimental skills.

CO2. To understand the composition of water along with the hardness and their determination for treatments.

CO3. To learn about the complexometric titration.

CO4. To determine the total dissolved Oxygen and solid in water sample.

Experiment

1. Determination of Ca^{2+} & Mg^{2+} Hardness of water sample by EDTA Method.
2. Determination of Alkalinity in given water sample by volumetric method.
3. To determine the CO_3^{2-} & HCO_3^- in a given water sample.
4. Estimation of Calcium in limestone or dolomite ore.
5. To estimate the amount of Dissloved Oxygen (DO) in given water sample.
6. To estimate the amount of Chloride ion present in water sample by Argentomentric Method (Mohr's Method)
7. Water sampling, total dissolved solids and total suspended solids.
8. To estimate the amount of Chemical Oxygen Demand (COD) in given water sample

TEXT BOOKS/REFERENCE BOOKS:

1) Vogel's Textbook of Quantitative chemical analysis, J. Mendham et.al. (Pearson Education).
2) Concise Inorganic Chemistry, J. D. Lee (Blackwell Science).

CS-152	INTRODUCTION TO BIOLOGICAL COMPUTING LAB	L T P	Cr
		0-0-2	1

AIM: To give a bird's eye view of life sciences and to introduce basics of Bioinformatics.

COURSE OBJECTIVES

To introduce the nature and scope of life sciences to give an overview about basic molecular Biology concept to understand the basic Bioinformatics and algorithms used in Computational Biology.

COURSE OUTCOMES

CO1: To get introduced to the basic concepts of Bioinformatics and its significance in biological data analysis
CO2: Classify different types of Biological Databases.
CO3: Introduction to the basics of sequence alignment and analysis.
CO4: Explain about the methods to characterise and manage the different types of biological data.
CO5: Overview about biological macromolecular structures and structure prediction methods.

UNIT-I

INTRODUCTORY CONCEPTS: Bioinformatics as an Emerging Discipline, Applications of Bioinformatics in Various Areas, Overview of Available Bioinformatics Resources on the Web, Protein and Genome; Information Resources and Analysis Tools; Established Techniques and Methods; Sequence File Formats FASTA, GenBank, FASTQ and Structured File Formats.

UNIT-II

BIOLOGICAL DATABASES: Protein Sequence and Structural Databases, Nucleotide Sequence Databases; NCBI, PubMed, Protein Data Bank (PDB), PIR, UniProt, EMBL, GenBank, DDBJ, SRA, UniGene; Specialized Databases: Pfam, SCOP, GO, Metabolic Pathways.

UNIT-III

METHODS OF SEQUENCE ANALYSIS: Pairwise sequence alignment methods; Heuristic Methods; BLAST and its variants, Statistics of Sequence Alignment Score; E-Value, P-Value, scoring matrix, PAM, BLOSUM and Gap Penalty; Multiple Sequence Alignments; ClustalW, Hidden Markov Models, HMM Based Multiple-Sequence Alignment

UNIT-IV

PHYLOGENETIC ANALYSIS: Distance and Character Based Methods and Software, Computing Tools for Phylogenetic Analysis, Distances, GROWTREE, PAUP, PHYLIP and MEGA; Construction and Visualization Phylogenetic Tree; and Application of Phylogenetic Analysis.

UNIT-V

SECONDARY STRUCTURE ANALYSIS TOOLS: Sequence Motif Databases, Pfam, PROSITE, Protein Structure Classification; SCOP, CATH, Other Relevant Databases, KEGG, Protein Structure Alignments; Structure Superposition, RMSD, Different Structure Alignment Algorithms, DALI, and TMalign.

List of Experiments:

1) Exp1: Biological Databases with Reference to Expasy and NCBI
2) Queries based on Biological databases.

Exp2: Retrieve the gene sequence in FASTA format corresponding to P00519.
Exp3: Write about PTM involved in P53355 and comment on the residues involved in it.
Exp4: Retrieve any one FASTA sequence of GABA transaminase in Human, mouse, pig and chick.
Exp5: Find the number of proteins which are having isoelectric point value between 5 and 5.5. Comment on the result.

3) Sequence similarity searching using BLAST

Exp6: To determine the conserved domain present in Q8NFM4
Exp7: Find the gene sequences of Mouse origin similar to U80226.1.
Exp8: Write the function of C7AE31. Find its orthologous proteins.
Exp9: Find whether the given pattern is present in the following protein. Also find its homologous proteins present in SWISPROT database possessing the similar pattern.

4) Pairwise sequence alignment

Exp10: Perform the local alignment between following sequences using any two variants of BLOSUM. Comment on the result.
Exp11: Obtain the global alignment between the following sequences. Comment on the result.
QLNIIQNAEAVHFFCNYEESRGNYLVDVDGNRMLDLYSQISSVPIGYSHPALLKLIQQPQ
NASMFVNRPALGILPPENFVEKLRQSLLSVAPKGMSQLITMACGSCSNENALKTIFMWYR
Exp12: Perform the alignment using Needleman Wunsch algorithm between P80404 and P80147.

REFERENCES

1. Jin Xiong: Essential Bioinformatics, Cambridge University Press
2. Tramontano: Introduction to Bioinformatics, Chapman and Hall Series.

CS-154	OBJECT ORIENTED PROGREAMMING LAB	L T P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

BASIC CONCEPT OF C++

1. Write a program to show the concept reference type, call by reference & return by reference in C++
2. Write a program to show the concept of default arguments in C++
3. Write a program to show the concept of inline function
4. Write a program to show the concept of dynamic memory management in C++
5. Write a program to show the concept of function overloading

CLASS & OBJECTS

6. Write a C++ program to show the concept of class & object
7. Write A C++ program showing function taking objects as a arguments and function returning objects
8. Write C++ programs to show the concept of static data member & static member function
9. Write C++ program to show the concept of friend function
10. Write C++ program to show the concept of different type of constructor
11. Write C++ program to show the concept of destructor

OPERATOR OVERLOADING

12. Write a C++ program showing overloading of unary operator using member function & friend function
13. Write a C++ program showing overloading of binary operator using member function & friend function
14. Write a C++ program showing overloading of << and >> operators

INHERITANCE

15. Write a C++ program to show the concept of multilevel inheritance
16. Write a program to show the concept of multiple inheritance
17. Write a C++ program to show the concept of hybrid inheritance
18. Write a program to show the concept of virtual base class

DYNAMIC BINDING & VIRTUAL FUNCTION

19. Write a C++ to show the concept of virtual function to implement dynamic binding
20. Write a C++ program to show the concept of pure virtual function & abstract class

FILES HANDLING

21. Write C++ programs for creating, reading& writing sequential access file
22. Write C++ programs for creating, reading & writing random access file

TEMPLATES

23. Write a C++ program to show the concept of class template
24. Write a C++ program to show the concept of function template

TEXT BOOKS

1. Balagurusam y , E., ―Object Oriented Programming with C++‖, Prentice Hall of India, 2008
2. Schildt, Herbert ―C++: The Complete Reference‖, Tata McGraw Hill, 3rd Ed, 2008

REFERENCE BOOKS

1. Kamthane, ―Object Oriented Programming with ANSI and Turbo C++‖, Pearson Education
2. Lafore, Robert, ―Object Oriented Programming in Turbo C++‖, The WAITE Group Press, 1994
3. Balagurusam y , E., ―Object Oriented Programming with C++‖, Prentice Hall of India, 2008
4. Bhave, ―Object Oriented Programming with C++‖, Pearson Education.

Syllabus

Of

B.Tech (CSE-AI/ML)

2nd Year

3rd Semester

CS-201	DATA STRUCTURES AND ALGORITHMS	L T P	Cr
		3 1 0	4

OBJECTIVE
To relay the theoretical and practical fundamental knowledge of most commonly used algorithms.

PRE-REQUISITES
Knowledge of basic computer programming

COURSE OUTCOMES
CO1: Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
CO2: Understand basic data structures such as arrays, linked lists, stacks and queues.
CO3: Describe the hash function and concepts of collision and its resolution methods
CO4: Solve problem involving graphs, trees and heaps
CO5: Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data

UNIT I
INTRODUCTION TO DATA STRUCTURES AND RUNNING TIME: Definition of data structures and abstract data types; linear vs. non-linear data structure; primitive vs. non-primitive data structure; static and dynamic implementations; arrays, 1,2-dimensional arrays, insertion & deletion in 1-D array; examples and real life applications. Time complexity; Big Oh notation; running times; best case, worst case, average case; factors depends on running time; introduction to recursion.

UNIT II
STACKS AND QUEUES: Stacks: definition, array based implementation of stacks, examples: infix, postfix, prefix representation; conversions, applications; definition of queues, circular queue; array based implementation of queues.

UNIT III
LINKED LISTS: Lists; different type of linked Lists; implementation of singly linked list, linked list implementation of stacks and queues; implementation of circular linked list; implementation of doubly linked list, applications.

UNIT IV
TREES AND GRAPHS: Definition of trees and binary trees; properties of binary trees and implementation; binary traversal pre-order, post-order, in-order traversal; binary search trees: searching, insertion & deletion. Definition of undirected and directed graphs; array based implementation of graphs; adjacency matrix; path matrix implementation; linked list representation of graphs; graph traversal: breadth first traversal, depth first traversal; implementations and applications.

UNIT V
SORTING AND SEARCHING ALGORITHMS: Introduction, selection, insertions, bubble sort, efficiency of above algorithms; merge sort, merging of sorted arrays and algorithms; quick sort algorithm analysis, heap sort, searching algorithms: straight sequential search, binary search (recursive & non–recursive algorithms)

TEXT BOOK
1. Langsam, Augentem M.J. and Tenenbaum A. M., Data Structures using C & C++‖, Prentice Hall of India, 2009.

2. R. S.Salariya, Data Structure and Algorithm, Khanna Publications.

REFERENCE BOOKS

1. Aho A. V., Hopcroft J. E. and Ullman T. D., ―Data Structures and Algorithms‖, Original Edition, Addison-Wesley, Low Priced Edition, 1983.
2. Horowitz Ellis and S ahni S artaj, ―Fundamentals of Data Structures‖, Addison-Wesley Pub, 1984.
3. Horowitz, S ahni and Rajasekaran, ―Fundamentals of Computer Algorithms‖ 2007.
4. Kruse Robert, ―Data Structures and Program Design in C‖, Prentice Hall of India, 1994
5. Lipschetz Jr. Seymour, ―Theory & Problems of Data Structures‖, S chaum ‘s Outline, Tata McGraw Hill
6. Weiss Mark Allen, ―Data Structures and Algorithms Analysis in C‖, Pearson Education, 2000
7. Corm en T . H . et al., ―Introduction to Algorithms‖, 2nd Edition, Prentice Hall of India, 2001.
8. Dasgupta Sanjay, Christos P. and Vazirani Umesh, ―Algorithms‖, Tata McGraw Hill, 2008

CS-203	DISCRETE MATHEMATICAL STRUCTURES	L T P	Cr
		3 0 0	3

OBJECTIVES

To lay mathematical foundation for the fundamentals of various computational structures such as Boolean algebra, propositional logic, graph and trees.

PRE-REQUISITES: Knowledge of Data Structure

COURSE OUTCOMES

CO1: Perform operations on various discrete structures such as sets, functions, relations, and sequences.
CO2: Ability to solve problems using Counting techniques, Permutation and Combination, Recursion and generating functions
CO3: Apply algorithms and use of graphs and trees as tools to visualize and simplify Problems.
CO4: Apply algorithms and use of graphs and trees as tools to visualize and simplify Problems.
CO5: Understand the various properties of algebraic systems like Rings, Monoids and Groups

UNIT I

SET THEORY: Introduction to set theory; set operations; algebra of sets: duality, finite and infinite sets, classes of sets, power sets, multi sets, Cartesian product, representation of relations, types of relation, equivalence relations and partitions, partial ordering relations and lattices; function and its types, composition of function and relations; cardinality and inverse relations.

UNIT II

PROPOSITIONAL CALCULUS AND TECHNIQUES OF COUNTING: Basic operations: AND (Λ), OR (V), NOT (~), truth value of a compound statement, propositions, tautologies, contradictions, Permutations with and without repetition, combination.

UNIT III

RECURSION AND RECURRENCE RELATION: Polynomials and their evaluation; sequences, introduction to AP, GP and AG series, partial fractions; linear recurrence relation with constant coefficients; homogeneous solutions, particular solutions, total solution of a recurrence relation using generating functions.

UNIT IV

ALGEBRIC STRUCTURES: Definition and examples of a monoid, semigroup, groups and rings; homomorphism, isomorphism and auto morphism; subgroups and normal subgroups; cyclic groups, integral domain and fields; co-sets; Lag range‘s theorem

UNIT V

GRAPHS: Introduction to graphs, directed and undirected graphs; homomorphic and isomorphic graphs; subgraphs; cut points and bridges; multigraph and weighted graph; paths and circuits, shortest path in weighted graphs; Eulerian path and circuits, Hamilton paths and circuits; planar graphs; Euler‘s formula.

TEXT BOOK

Liu C. L., Elements of Discrete Mathem atics‖, McGraw Hill, 1989

REFERENCE BOOKS

1. Johnson Bough R., ―Discrete Mathematics‖, 5th Edition, Pearson Education, 2001
2. Graham Ronald, Knuth Donald E. and Patashik Oren, ―Concrete Mathematics: A Foundation for Computer Science‖ , Addison-Wesley, 1989
3. Gersting Judith L., ―Mathematical Structures for Computer Science‖, Computer Science Press, 1993
4. Chtewynd A. and Diggle P.. , Discrete Mathem atics‖ , Modular Mathematics Series, Edward Arnold, London, 1995
5. Lipshutz S ., ―S chaums Outline series: Theory and problems of Probability‖, McGraw Hill Singapore, 1982
6. Kolm an B. and Busby R. C., ―Discrete Mathematical Structures‖, Prentice Hall of India,
7. 1996
8. Trembley and Manohar, ―Discrete Mathematical Structures with Applications to Com puters‖, McGraw Hill, 1995

CS-205	PYTHON PROGRAMMING	L T P	Cr
		3 0 0	3

OBJECTIVES

To build programming logic and thereby developing skills in problem solving using Python programming language; To be able to do testing and debugging of code written in Python Emphasize the concepts and constructs rather than on language features.

PREREQUISITE COURSE:

Students should have basic knowledge of programming language like what is a loop, what if and else does, how operators are used, etc. They should also need knowledge of Object Oriented Programming Language, Database Management Systems.

COURSE OUTCOMES

The students undergoing this course will be able to:
CO1: Define and demonstrate the use of built-in data structures “lists” and “dictionary”.
CO2: Design and implement a program to solve a real world problem.
CO3: Solve exception handling problem and files.
CO4: Make database connectivity in python programming language

UNIT I

INTRODUCTION TO PYTHON: History, Features & Benefits of Python, Structure of a Python Program, Identifiers and Keywords, Concept of Variable, Memory Allocation for Variable, Data Types in Python, Conversion Functions, Operators (Arithmetic Operator, Relational, Logical or Boolean Operator, Assignment, Bitwise Operator, Membership Operator).Input and Output Function, Control Statements (Looping- while Loop, for Loop, Loop Control, Conditional Statement-if...else), Difference between break, continue and pass.

UNIT II

DATA STRUCTURES & FUNCTION: String, Lists, Tuples, Sets, Dictionary Data Structure, Built-in Library Function, Method and Operation on these Data Structure. Defining Function, Type of Function Arguments (Required Arguments, Keyword Arguments, Default Arguments, Variable-Length Arguments), Pass by Reference Vs Pass by Value, Concept of Recursion, Lambda Functions, Scope of a Variable, Global Vs Local Variable, Python Modules & Packages, Import Statement, dir(), globals(), locals() and reload() Functions.

UNIT III

PYTHON OBJECT ORIENTED PROGRAMMING: Introduction to Object Oriented Programming, Concept of Abstraction, Encapsulation, Class, Object and Instances. Creating Classes, _init_() Method, Creating Instance Object, Class Attributes, Access Specifiers in Python, Instance Method Vs Class Method. Inheritance & Polymorphism, Overriding and Overloading Methods, Overloading Operators, Programming Using OOP Support.

UNIT IV

PYTHON FILE HANDLING, EXCEPTION HANDLING & CONCURRENCY: Opening & Closing Files, File Access Modes, File Object Attributes, Reading and Writing Files, Manipulating File Pointer using seek and tell. Programming using File Operations. Exception Handling in Python.

UNIT V

PYTHON MYSQL: Mysql/Oracle Database Connection using Python. Creating Database Tables, SELECT, INSERT, UPDATE, And DELETE Operation, Performing Commit, Rollback Operation.

TEXT BOOKS

John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India

REFERENCE BOOKS

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Python Tutorial/Documentation www.python.or 2010
3. Allen Downey, Jeffrey Elkner, Chris Meyers ,How to think like a computer scientist :Learning with Python,Freelyavailableonline.2012
4. http://docs.python.org/3/tutorial/index.html
5. http://interactivepython.org/courselib/static/pythonds
6. http://www.ibiblio.org/g2swap/byteofpython/read/

CS-207	COMPUTER ARCHITECTURE & ORGANIZATION	L T P	Cr
		3 0 0	3

OBJECTIVE

To provide basic knowledge of internals of computer, its architecture, components, terminologies, etc. at minute level and ultimately about the working of a digital computer hardware as a whole.

PRE-REQUISITES

Knowledge of data structures, microprocessors and interfacing.

COURSE OUTCOMES

CO1: Understand the theory and architecture of central processing unit. Analyze some of the design issues in terms of speed, technology, cost, performance.

CO2: Design a simple CPU with applying the theory concepts. Use appropriate tools to design verify and test the CPU architecture.

CO3: Learn the concepts of parallel processing, pipelining and inter-processor communication.

CO4: Exemplify in a better way the I/O and memory organization.

CO5: Define different number systems, binary addition and subtraction, 2's complement representation and operations with this representation.

UNIT I

GENERAL SYSTEM ARCHITECTURE & DIGITAL LOGIC: Functions and block diagram of computer, store program control concept, Flynn's classification of computers (SISD, MISD, MIMD); CPU, caches, main memory, secondary memory units & I/O; Computer registers; combinational logic blocks (adders, multiplexers, encoders, de-coder), sequential logic blocks (latches, flip-flops, registers, counters). Designing of counters.

UNIT II

INSTRUCTION SET ARCHITECTURE: Instruction codes, instruction set formats(fixed, variable, hybrid), types of instructions, memory reference, register reference, I/O reference; addressing modes: register, immediate, direct, indirect, indexed; operations in the instruction set; arithmetic and logical, data transfer, control flow; types of interrupts; timing and control; instruction set based classification of processors (RISC, CISC, and their comparison).

UNIT III

BASIC NON PIPELINED CPU ARCHITECTURE: CPU Architecture types (accumulator, register, stack, memory/ register) detailed data path of a typical register based CPU, fetch-decode-execute cycle (typically 3 to 5 stage); micro-instruction formats, implementation of control unit: hardwired and micro-programmed, control memory, microinstruction sequencing.

UNIT IV

MEMORY HIERARCHY & I/O TECHNIQUES: Need for a memory hierarchy (Locality of Reference Principle, memory hierarchy in practice: cache, main memory and secondary memory,

memory parameters: access cycle time, cost per bit); main memory (semiconductor RAM & ROM organization, memory expansion, static & dynamic memory types); cache memory: associative & direct mapped cache organizations.

UNIT V

INTRODUCTION TO PARALLELISM: Goals of parallelism (exploitation of concurrency, throughput enhancement); Amdahl's law; instruction level parallelism (pipelining, super scaling-basic features); processor level parallelism (multiprocessor systems overview).

TEXT BOOK

1. John P.Hayes, 'Computer architecture and Organisation', Tata McGraw-Hill, Third
2. edition, 1998.
3. 2. V.Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organisation", V edition, McGraw-Hill Inc, 1996.
4. Carpinelli, ―Computer Organization & Architecture‖ Tata McGraw Hill, 2001

REFERENCE BOOKS

1. Stallings. W, ―Computer Organization & Architecture: Designing For Performance‖, 6th Edition, Prentice Hall of India, 2002/ Pearson Education Asia, 2003

2. Mano M Morris, ―Computer System Architecture‖, 3rd Edition, Prentice Hall of India Publication, 2001 / Pearson Education Asia, 2003

3. Jotwani, ―Computer System Org anisation‖, T ata McGraw Hill, 2000.

4. Rajaraman V. and Radhakrishnan T, ―Introduction to Digital Computer Design‖, 4th Edition, Prentice Hall of India 2004.

5. Stalling William, ―Computer Organization and Architecture‖, 7th Edition, Prentice Hall of India, 2005.

6. Brey Barry, ―Intel Micro Processors‖, Pearson US Imports & PHIPEs,1998

7. Paraami, "Computer Architecture", BEH R002, Oxford Press.

BS-203	NUMERICAL & STATISTICAL METHODS	L T P	Cr
		3 1 0	4

OBJECTIVES:

1. Derive appropriate numerical methods to solve algebraic and transcendental equations
2. Develop appropriate numerical methods to approximate a function

COURSE OUTCOMES:

CO1: Solve an algebraic or transcendental equation using an appropriate numerical method
CO2: Approximate a function using an appropriate numerical method

UNIT I

ERRORS AND APPROXIMATIONS, SOLUTION OF NONLINEAR EQUATIONS: Introduction to numbers and their accuracy; absolute, relative and percentage errors. Bisection method; Regular falsi method; secant method; fixed point iteration method; Newton- Raphson method; convergence criteria of methods.

UNIT II

SOLUTION OF SIMULTANEOUS LINEAR EQUATIONS: Gauss elimination method; Gauss-Jordan method; UV factorization method; Jacobi's iteration method; Gauss-Seidal iteration method.

UNIT III

INTERPOLATION AND CURVE FITTING: Introduction to interpolation ; Newton's forward and backward interpolation formulae; Gauss's forward and backward interpolation formulae; Stirling formula; Lagrange interpolation; Newton's divided difference formula; Principle of least squares; curve fitting.

UNIT IV

NUMERICAL DIFFERENTIATION AND INTEGRATION: Numerical differentiation formulae: differentiation by using forward interpolation formula; backward interpolation formula; Stirling formula; Newton-Cotes formula for numerical integration: Trapezoidal rule; Simpson's rules; Boole's rule and Weddle's rule; Romberg' method.

UNIT V

SIMPLE CORRELATION AND REGRESSION ANALYSIS: Correlation Analysis: Meaning and types of Correlation; Pearson's coefficient of correlation: computation and properties (proofs not required). Probable and standard errors; Rank correlation. Regression Analysis: Principle of least squares and regression lines; Regression equations and estimation; Properties of regression coefficients; Relationships between Correlation and Regression coefficients; Standard Error of Estimate.

TEXTBOOKS/REFERENCE BOOKS:

1. Grewal, B. S., "Numerical methods in Engineering and Science".
2. M.K. Jain, S.R.K. Iyengar and R.K. Jain, Numerical Methods for Scientific and Engineering Computation, 6th Ed., New age International Publisher, India, 2007
3. Sastry, S.S., "Introductory Methods of Numerical Analysis".
4. Vohra, N. D. (2017). Business Statistics, New Delhi: McGraw-Hill Education India.

EC-203C	DIGITAL ELECTRONICS	L T P	Cr
		3 0 0	3

OBJECTIVE

Modern world deals with digital conditioning of various signals. Digitally manipulating signals or using digital circuits have a lot of advantages in terms of accuracy etc. This subject introduces concept of basic digital electronics: gates; combinational and sequential circuits and their designing.

COURSE OUTCOMES

CO1: Convert different type of codes and number systems which are used in digital communication and computer systems.

CO2: Employ the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.

CO3: Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.

CO4: Design different types of with and without memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints.

CO5: Apply the fundamental knowledge of analog and digital electronics to get different types analog to digitalized signal and vice-versa converters in real world with different changing circumstances.

UNIT I

INTRODUCTION OF GATES, COMBINATIONAL DESIGN BY USING GATES AND SIMPLIFICATION : Digital signal; logic gates: AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR; Boolean algebra. Review of Number systems. Binary codes: BCD; Excess- 3; Gray; EBCDIC; ASCII; Error detection and correction codes; Design using gates; Karnaugh map and Quine Mcluskey methods of simplification.

UNIT II

COMBINATIONAL DESIGN USING MSI DEVICES: Multiplexers and Demultiplexers and their use as logic elements; Decoders; Adders/Subtractors; BCD arithmetic circuits; Encoders; Decoders/Drivers fordisplay devices.

UNIT III

SEQUENTIAL CIRCUITS: Flip Flops : S-R; J-K; T; D; master-slave; edge triggered; shift registers; sequence generators; Counters; Asynchronous and Synchronous Ring counters and Johnson Counter; Design of Synchronous and Asynchronous sequential circuits.

UNIT IV

DIGITAL LOGIC FAMILIES: Bipolar logic families:RTL; DTL; DCTL; HTL; TTL; ECL; MOS; and CMOS logic families. Tristate logic; Interfacing of CMOS and TTL families.

UNIT V

A/D AND D/A CONVERTERS & PLD: Sample and hold circuit; weighted resistor and R -2 R ladder D/A Converters; specifications for D/A converters. A/D converters : successive approximation; counting type; ROM; PLA; PAL; FPGA and CPLDs.

TEXT BOOK

Jain, R.P., “Modern Digital Electronics”, 4th Ed.; Tata McGraw Hill, 2003.

REFERENCE BOOKS

1. Taub and Schilling, ”Digital Integrated Electronics” Tata McGraw Hill,1997
2. Malvino and Leach; ”Digital Principles and Applications”, 6th Edition, Tata McGraw Hill, 2006
3. Mano, Morris, “Digital Design”, 3rd Edition, Prentice Hall of India,1994
4. Gupta and Singhal, “Digital Electronics”, 2nd Edition, Dhanpat Rai and Sons, 2000.
5. Wakerly, John F, ”Digital Design Principles and Practices”, 4th Edition, Prentice Hall of India,2005.

CS-251	DATA STRUCTURES AND ALGORITHMS LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

ARRAY OPERATIONS

1. Write a program to insert an element at given position in linear array
2. Write a program to insert an element in sorted array.
3. Write a program to delete an element from given position in linear array
4. Perform following operations on matrices using functions only
   a) Addition b) Subtraction c) Multiplication d) Transpose

SEARCHING

5. Search an element in a linear array using linear search.
6. Using iteration and recursion concepts write programs for finding the element in the array using Binary Search Method

RECURSION

7. Write a program to compute factorial of given number using recursion
8. Write as program to solve Tower of Hanoi problem using recursion
9. Write a program to find power of given number using recursion

STACK & QUEUE

10. Write a program for static implementation of stack
11. Write a program for dynamic implementation of queue
12. Write a program for static implementation of circular queue
13. Write a program for dynamic implementation of queue
14. Write a program to evaluate a postfix operation

LINKED LIST

15. Create a linear linked list & perform operations such as insert, delete at end , at beg & reverse the link list
16. Create a circular linked list & perform search, insertion & delete operation
17. Create a doubly linked list & perform search, insertion & delete operation

TREE & GRAPH

18. Write program to implement binary search tree. (Insertion and Deletion in Binary Search Tree)
19. Write program to simulates the various tree traversal algorithms
20. Write program to simulate various graph traversing algorithms.

SORTING ALGORITHMS

21. Write program to implement Bubble, Insertion & selection sort.
22. Write program to implement quick sort
23. Write program to implement merge sort
24. Write a program to implement heap sort

TEXT BOOKS

1. A.K. Sharma – Data structure Using C, 2nd edition pearson 2013
2. Langsam, Augentem M.J. and Tenenbaum A. M., ―Data Structures using C & C++‖, Prentice Hall of India, 2009.

REFERENCE BOOKS

1. R. S. Salaria -Data Structure Using C
2. Kruse Robert, ―Data Structures and Program Design in C‖, Prentice Hall of India, 1994
3. Lipschitz Jr. Seymour, ―Theory & Problems of Data Structures‖, Schaum‘s Outline, 2nd Edition, Tata McGraw Hill

CS-255	PYTHON PROGRAMMING LAB	L T P	Cr
		0-0-2	1

Program 1: Programs using if else structure

a) Find the Largest Among Three Numbers
b) Python Program to Check Leap Year
c) Python Program to Take in the Marks of 5 Subjects and Display the Grade
d) Python Program to Check if a Date is Valid and Print next date

Program 2: programs using for and while loop

a) Python Program to check whether given number is Prime Number or not
b) Python Program to Find LCM of two numbers
c) Write a Python program to compute the GCD of two numbers
d) Python Program to Find the Sum of Digits in a Number
e) Python Program to convert binary number to decimal number
f) Python Program to Display Fibonacci sequence Using Recursion

Program 3: Program using List and String data structure

a) Write Python Program to input a list of integers, (1) display the no of elements in the list (2) display minimum and maximum element in the list (3) display sum of square of all the element in the list (4) (5) add a new element at end and display the list (6) add a new element at given index and display list (7) display the occurrence of given element in the list (8) remove the given element in the list (9) add element from a new list from given list (10) sort the given list & reverse the given list (11) also perform slicing, concatenation and multiplication operation
b) A fruit seller sells different type of fruits. Type of fruits and corresponding rates are stored in two different lists. Customer can order any type of fruit (one or more type) in any quantity. If total bill of customer is greater than 500, customer is given 10% discount. If any of the fruits required by the customer is not available in the store, then consider the bill amount to be -1. Write a Python program to calculate and display the bill amount
c) Write a Python program to display all the permutations of given string (don't use python permutation function)
d) Accept two strings 'string1' and 'string2' as input from the user. Generate a resultant string-1, such that it is a concatenated string of all upper case alphabets from both the strings in the order they appear. Generate a resultant string-2 that contain character which are in both string1 and 2 Print the actual resultant string-1 and resultant string-2

Program 4: Programs using concept of sets, tuple & dictionary

a) Write a Python program that take a string as input and store the character and occurrence of each character in a dictionary. Create two lists from dictionary first having each character in sorted order of their frequency and second having corresponding frequency.
b) A furniture seller sells different type of furniture, Type of Furniture and rates are stored in a dictionary. Customer can order any type of furniture (one or more type) in any quantity. If total bill of customer is greater than 10,000, customer is given 5% discount. 8% GST is charged on total bill.

If any of the furniture required by the customer is not available in the store, then consider the bill amount to be -1. Write a Python program to calculate and display the bill amount

c) Consider a scenario from Lingayas Vidyapeeth. Given below are two Sets representing the names of students enrolled for a particular course: java_course = {"Anmol", "Rahul", "Priyanka", "Pratik"} python_course = {"Rahul", "Ram", "Nazim", "Vishal"}Write a Python program to list the number of students enrolled for:1)Python course2)Java course only3)Python course only4)Both Java and Python courses5)Either Java or Python courses but not both6)Either Java or Python

d) Students name and their corresponding marks are stored in a dictionary. Write a Python program to perform following (1) Display name and marks of each student (2) Display the names of top two scorer (3) display the class average for this course (4) check if the marks for given student is stored in dictionary or not, if not add the name and marks in the dictionary else display his/her marks (5) delete the name and marks of a given student in the dictionary (6) add name and marks from another dictionary and display combined dictionary

Program 5: Using Function in Python:

a) Write Python functions using the concept of Keyword & default arguments and write a program to use them
b) Write python functions to use the concept of variable length argument & global variable. Write a program to use these functions
c) Write a recursive function to solve the Tower of Hanoi Problem

Program 6: Program using concept of Class, object, class variable, class method, static method

a) Create a class Account with name, account no and balance as attribute and no_of_accounts as class variable. Account no should be generated automatically (starting from 1) using the class variable no_of_account. Add the methods for displaying the account information, depositing given amount, withdrawing given amount and initializer method to initialize the object. Create objects of Account class and call different method to test the class
b) Create a class Employee with name , empid ,salary as attribute and no_of_ employee and annual_incr (% annual increment) as class variable. empid should be generated automatically (starting from 1) using the class variable, no_of_employee. Add the instance methods for displaying the employee information, annually increasing the salary with help of class variable annual_incr , class method to change the value of annual_incr and initializer method to initialize the object. Create objects of employee class and call different method to test the class (program using class method)
c) Write a Program to showing the use of built in class attributes (__doc__, __dict__, __name__, __module__,__bases__) and special methods(__del__( ), __str__( )) and built in function isinstance()

Program 7: Program using the concept of Inheritance

a) Create a class Polygon to represent a polygon having no of sides and a list having magnitude of each side as attribute. Add the inputSides() to input sides and displaySides() to display sides as methods. Derive a class Triangle from Polygon and add an additional method displayArea() to display area. Create object of Triangle and call different methods to test the class

b) Create a class Person having name, age, as attributes, __init__() method to initialize the object and display() to display person information. Derive a class Student from Person having roll no, University name, branch as additional attributes and __init__(), display() to display student information and change_Branch() method. Create object of Student type and call different methods to test the class.

c) Write a program to show the concept of multiple inheritance in python

Program 8: Program using the concept of Polymorphism, operator overloading

a) In a retail outlet there are two modes of bill Payment (1) Cash : Calculation includes VAT(10%) Total Amount = Purchase amount + VAT (2) Credit card: Calculation includes processing charge and VAT Total Amount = Purchase amount + VAT (10%) + Processing charge (2%) The act of bill payment is same but the formula used for calculation of total amount di ffer
Payment maker simply call a method and that method dynamically selects the formula for the total amount? Demonstrate this Polymorphic behaviour with code.

b) Write a program to create a class to represent length in feet and inch. Overload the "+" operator to add the two object of length type.

c) Write a program to overload comparison operator in python

Program 9: Program on file handling in Python

a) Write a python program to write few lines on a file, read it back and create a dictionary having each word in file as keys in dictionary and occurrence of these word as values and print the dictionary.

b) A file student.txt store student information. Information about each student is written on separate line in the form: roll-no student-name (student-name may consist of any number of words).Write a Python program that takes student roll no as input and print the student name. If roll no is not present in the file it display : "roll no not present in the file"

c) Write a python program to read a file that contains email ids on the separate lines in the form: "personname@companyname.com. Create a new file that contain only company names, read the new file to print the company name

Program 10: Program on Exception handling

d) Write a function divide (arg1, arg2) to divide arg1 by arg2. Use the exception handling mechanism to handle all type of possible exceptions that may occur. Take the value of arg1 and arg2(of any type) from user as input and call the function divide to print the result of division or suitable message if any type of exception occurs(use also else and finally block)

e) Write a program to open a file in read only mode read data from file and then try to write data on file. Use the exception handling mechanism to handle all type of possible exception

f) Write a Python program that takes email id, mobile number and age as inputs from user. Validate each and raise user defined exceptions accordingly

Note:-

Email id: there must be only one @ and At least one "."

Mobile number must be 10 digits

Age must be a positive number less than 101

Program 11: Program on Multithreading

a) Write two functions : print_even(n) and print_odd(n) to print even numbers and print odd numbers respectively up to integer n. Create two thread objects by passing these function in thread class constructor to execute these functions in two different thread. Use sleep() method to see how these

functions are executed concurrently(* use start() method to start and join() method to wait for thread to terminate)

b) Write a python program to use the concept of multithreading by Overriding run() method in a subclass of threading.Thread.

c) Write a python program using the concept of thread synchronization.

REFERENCE BOOKS

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011
2. Allen Downey, Jeffrey Elkner, Chris Meyers ,How to think like a computer scientist :Learning with Python,Freelyavailableonline.2012
3. John V Guttag. “Introduction to Computation and Programming Using Python”, Prentice Hall of India

EC-253C	DIGITAL ELECTRONICS LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1. Study of TTL gates – AND; OR; NOT; NAND; NOR; EX-OR; EX-NOR.
2. Design and realize a given function using k-maps and verify its performance.
3. To verify the operation of multiplexer and demultiplexer.
4. To verify the operation of comparator.
5. To verify the truth tables of S-R; J-K; T and D type flip flops.
6. To verify the operation of bi-directional shift register.
7. To design and verify the operation of 3-bit synchronous counter.
8. To design and verify the operation of synchronous up/down decade counter using JK flip-flops and drive a seven-segment display using the same.
9. To design and verify the operation of asynchronous up/down decade counter using JK flip-flops and drive a seven-segment display using the same.
10. To design and realize a sequence generator for a given sequence using J-K flip-flops.
11. Study of CMOS NAND and NOR gates and interfacing between TTL and CMOS gates.
12. Design a 4-bit shift-register and verify its operation. Verify the operation of a ring counter and a johnson counter.

PEP-201	EXPLORING SELF	L T P	Cr
		1 0 2	2

Course Outcome

On completion of this course, the students will be able to:

- CO1. Introspect & develop a planned approach towards profession and life in general.
- CO2. Effectively set goals/target, self-motivate and practice creative thinking
- CO3. Apply professional skills in order to function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.
- CO4. Demonstrate right attitudinal and behavioral aspects for overall success in personal and professional life.

Assessment

Mode of Evaluation: ***Continuous Evaluation***

It can be combination of written evaluation and presentations, including simulations, case studies, projects, dossier-making activities, Assignments and business plan.

Module 1: Meaning of Personality – 02 hours

- Definition & Determinants
- Personality Traits
- Theories of Personality & Importance of Personality Development.
- Perception – Definition, Perceptual Process

Module 2: Self-Awareness & Self-Esteem – 06 hours

- Meaning, Benefits of Self- Awareness, Developing Self- Awareness.
- Self-Assessment, Self-Appraisal & Self-Development, Identifying Strength & Limitations; Habits, Will-Power and Drives
- Developing Self-Esteem and Building Self Confidence, Significance of Self-

Discipline

Module3: Self-Assessment & Monitoring – 10 hours

- Meaning, High self- monitor versus low self- monitor
- Advantages and Disadvantages of self-monitor
- Self–monitoring and job performance.

- **SWOT Analysis**:
  - Meaning, Importance, Application, Components.
- **Transactional Analysis**
  - Meaning – EGO States
  - Types of Transactions
  - Johari Window- Life Positions.
- **Emotional Intelligence**
  - Meaning – Components of Emotional Intelligence
  - Significance of managing Emotional intelligence
  - How to develop Emotional Quotient.

Module 5: Attitude – 06 hours

- Meaning & Formation of attitude
- Types of attitudes
- Measurement of Attitudes
- Barriers to attitude change – Methods to attitude change
- Carl Jung's contribution to personality development theory

- **Assertiveness**:
  - Meaning – Assertiveness in Communication
  - Assertiveness Techniques
  - Benefits of being Assertive
  - Improving Assertiveness

Syllabus

Of

BTECH (CSE-AI/ML)

2nd YEAR

4th Semester

CS-202	OPERATING SYSTEMS	L T P	Cr
		3 0 0	3

COURSE OBJECTIVE

To provide the knowledge of internals, different types and purpose of operating systems

PRE-REQUISITES

Knowledge of computer organization and architecture programming skills

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Understand the basics of operating systems like kernel, shell, types and views of operating systems
CO2: Describe the various CPU scheduling algorithms and remove deadlocks.
CO3: Explain various memory management techniques and concept of thrashing
CO4: Use disk management and disk scheduling algorithms for better utilization of external memory.
CO5: Recognize file system interface, protection and security mechanisms. Explain the various features of distributed OS like Unix, Linux, windows etc

UNIT I

INTRODUCTION: Introduction to operating system concepts (including multitasking, multiprogramming, multi user, multithreading, etc)., types of operating systems: batch operating system, time-sharing systems, distributed OS, network OS, real time OS, embedded and smart card OS, various operating system services, architecture, system programs and calls.

UNIT II

PROCESS MANAGEMENT: Process concept, Life cycle and implementation of process, Thread usage and implementation in user space and in kernel, process scheduling, operation on processes, CPU scheduling, scheduling criteria, scheduling algorithms -First Come First Serve (FCFS), Shortest-Job-First (SJF), priority scheduling, Round Robin (RR), multilevel feedback queue scheduling. Deadlocks, Deadlock characteristics, prevention, avoidance using banker's algorithm, detection and recovery; Critical section problems, mutual exclusion with busy waiting, Process synchronization, semaphores: binary and counting semaphores, Classical IPC problems: dining philosophers' problem, readers-writers problem.

UNIT III

MEMORY MANAGEMENT: Logical & physical address space, swapping, contiguous memory allocation, non-contiguous memory allocation paging and segmentation techniques, segmentation with paging, virtual memory management - demand paging & page-replacement algorithms, demand segmentation.

UNIT IV

I/O AND FILE YSTEMS: I/O hardware, device controllers, interrupt handlers, device drivers, application I/O interface, kernel, transforming I/O requests, performance issues, Different types of files and their access methods, directory structures, various allocation methods, disk scheduling and management and its associated algorithms, introduction to distributed file system.

UNIT V

LINUX/UNIX SYSTEM: LINUX/UNIX architecture, UNIX system calls for processes and file system management, basic commands of LINUX/UNIX, shell interpreter, shell scripts.

TEXT BOOK

1. William Stallings, Operating System: Internals and Design Principles, Prentice Hall, 8th Edition, 2014, ISBN10: 0133805913 • ISBN13: 9780133805918
2. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Operating System Concepts, John Wiley & Sons ,Inc., 9th Edition,2012, ISBN 9781118063330
3. Maurice J. Bach, "Design of UNIX Operating System", PHI
4. T1: Silberchatz et al, "Operating System Concepts", 5th edition, Addison-Wesley, 1998

REFERENCE BOOKS

1. Tom Adelstein and Bill Lubanovic, Linux System Administration, O'Reilly Media, Inc., 1st Edition, 2007.ISBN10: 0596009526 | ISBN13: 9780596009526
2. Harvey M. Deitel, Operating Systems, Prentice Hall, 3rd Edition,2003, ISBN10: 0131828274 | ISBN13: 9780131828278
3. Andrew S. Tanenbaum, Modern Operating System, Prentice Hall, 3rd Edition, 2007,ISBN10: 0136006639 | ISBN13: 9780136006633
4. Operating System in depth by Thomson
5. Tanenbaum A., "Modern Operating Systems", Prentice-Hall, 1992
6. Stallings William, "Operating Systems Internals and Design Principles", 4th edition, Prentice-Hall, 2001
7. Dhamdhere D. M., "Operating System", 2nd Edition, Tata McGraw Hill, 1999
8. Kernighan Brian and Pike Rob, "The Unix Programming Environment", Prentice Hall of India, 1984
9. Bach Maurich, "Design of the Unix Operating System", Prentice Hall of India, 1986
10. Muster John, "Introduction to UNIX and LINUX", Tata McGraw Hill, 2003
11. Ritchie Colin, "Operating System Incorporating Unix & Windows", Tata McGraw Hill, 1974
12. Madnick Stuart and Donovan John, "Operating Systems", Tata McGraw Hill, 2001
13. Deitel, "Operating Systems", Addison-Wesley, 1990
14. SinghalMukesh and Shivaratri N.G., "Operating Systems", Tata McGraw Hill, 2003

CS-204	INTRODUCTION TO COMPUTER SCIENCE SPECIALIZATIONS	L-T-P	Cr
		2-0-0	2

OBJECTIVE

To introduce about Artificial Intelligence & Machine Learning, Data Science, Cyber Security and Cloud Computing.

PREREQUISITE COURSE:

Students should have basic knowledge of Data Structures, Database, Privacy & security, Neural Network, Computer Networks.

CO1: To understand the need for machine learning for various problem solving
CO2: To understand the basic concept of Cyber Security.
CO3: To understand the basic concept of Cloud Computing.
CO4: To understand the concept of block chain and its need.

UNIT I

INTRODUCTION TO AI & ML: Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Intelligent System, AI Application to Robotics, Current Trends in Intelligent System. Introduction to Machine Learning, Features and History of Machine Learning, Machine Learning Life Cycle, Classification of Machine Learning, Machine Learning Applications. AI vs. Machine Learning.

UNIT II

INTRODUCTION TO DATA SCIENCE: Introduction to Data Science, Need of Data Science, Data Preprocessing, Data Science Components, Tools for Data Science, Data Science Life Cycle, Difference between Machine Learning and Data Science, Problem Solving using Machine Learning, Applications of Data Science.

UNIT III

INTRODUCTION TO CYBER SECURITY: Cyber Security Objectives, Cyber Security Roles, Differences between Information Security and Cyber Security, Classification of Cyber Attacks and Cyber Attackers,

CYBER SECURITY PRINCIPLES: Confidentiality, integrity, &availability Authentication & non-repudiation,

INCIDENT RESPONSE: Incident categories, Incident response

INCIDENT RECOVERY AND OPERATIONAL SECURITY PROTECTION: Digital and data assets, ports and protocols, Protection technologies, Identity and access Management, configuration management.

UNIT IV

INTRODUCTION TO CLOUD COMPUTING: Cloud Computing, Characteristics of Cloud Computing, Cloud Computing Architecture, Cloud Computing Technologies-Virtualization, SOA, Grid Computing, Utility Computing, How Cloud Computing Works, Types of Cloud-Public, Private, Hybrid, Community, Virtualization in Cloud Computing and Types of Virtualization, Cloud Computing Benefits and Limitations, Cloud Computing Applications.

UNIT V

INTRODUCTION TO BLOCKCHAIN: Overview of BlockChain Technology; Advantage over Conventional Distributed Database; History of Blockchain: How and When Blockchain/Bitcoin Started, Milestones on the Development of Bitcoin, Criticism, Ridicule and Promise of Bitcoin, Sharing Economy, Internet of Value; How Economics Benefits from Blockchain. BlockChain Hash Function, How Block Hashes work in BlockChain, Basic Components of Bitcoin, Key Concepts in Bitcoin, BlockChain Key Areas, BlockChain CryptoCurrency, BlockChain Limitations.

TEXT BOOKS:

1. Andreas Mulller. “Introduction to Machine Learning with Python”, O’REILLY
2. Davy Cielen, Arno D.B. Meysman, Mohamed Ali (Author). “Introducing Data Science”
3. Nina Godbole, Sunit Belapure. “Cyber Security”, WILEY
4. Erl (Author). “Cloud Computing: Concepts, Technology & Architecture”, PEARSON

		3 0 0	**3**

COURSE OBJECTIVE

To provide knowledge about various organizations and management information systems, keeping in view the aspects of share ability, availability, evolvability and integrity

PRE-REQUISITES

Knowledge of data structures, discrete mathematical structures

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Define the basic concepts of DBMS and Demonstrate the basic elements of a relational database management system

CO2: Identify the data models for relevant problems and Design entity relationship models.

CO3: Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data.

CO4: Demonstrate their understanding of key notions of query evaluation and optimization techniques and Extend normalization for the development of application software‘s.

CO5: Synthesize the concepts of transaction management, concurrency control and recovery.

UNIT I

INTRODUCTION: What is database, Purpose of database system; advantages of using DBMS; database concept and architecture; data abstraction; data models; instances and schema; data independence; schema architecture; database languages; database administrator; database users

UNIT II

DATA MODELING: Entity sets attributes and keys, relationships (ER); database modeling using entity; type role and structural constraints, weak and strong entity types; enhanced entity-relationship (EER), ER diagram design of an E-R database schema; specialization and generalization

UNIT III

RELATIONAL MODEL: Relational model: relational model -basic concepts, enforcing data integrity constraints, Relational algebra: introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators; extended relational algebra operations, Calculus: Tuple relational calculus, Domain relational Calculus; Codd's rules.

UNIT IV

DATABASE DESIGN AND SQL: Database design process; relational database design, anomalies in a database; functional dependencies membership and minimal covers normal forms, multi-valued dependencies, join dependencies, inclusion dependencies; reduction of an E-R schema to tables; effect of de-normalization on database performance, Query-by-example (QBE), Introduction to SQL, basic

queries in SQL, advanced queries in SQL, functions in SQL; basic data retrieval, aggregation, categorization, updates in SQLs; views in SQL.

UNIT V

TRANSACTION PROCESSING: Desirable properties of transactions, implementation of atomicity and durability; reconsistent model, read only and write only model; concurrent executions, schedules and recoverability; serializability of schedules concurrency control; serializability algorithms; testing for serializability; precedence graph; concurrency control, deadlock handling - detection and resolution.

TEXT BOOK

1. Silberschatz A., Korth H. F. and Sudarshan S., "Database System Concepts",6th edition, McGraw-Hill, International Edition,2010
2. Steven Feuerstein, Bill Pribyl , "Oracle PL/SQL", O'Reilly Media , 4th Edition, 2005

REFERENCE BOOKS

1. Desai Bipin, "Introduction to Database Management System", Galgotia Publications, 1991
2. Elmasri R. and Navathe S. B., "Fundamentals of Database Systems", 6th edition, Addison-Wesley, Low Priced Edition, 2010
3. Date C. J., "An Introduction to Database Systems", 8th edition, Addison-Wesley, Low Priced Edition, 2003
4. Date C. J. and Darwen H., "A Guide to the SQL Standard", 4th edition, Addison-Wesley, 2003
5. Hansen G. W. and Hansen J. V., "Database Management and Design", 2nd edition, Prentice- Hall of India, Eastern Economy Edition, 1999
6. Majumdar A. K. and Bhattacharyya P., "Database Management Systems", 5th edition, Tata McGraw-Hill Publishing, 1999
7. Looms, "Data Management & File Structure", Prentice Hall of India, 1989.

CS-208	JAVA PROGRAMMING	L T P	Cr
		3-0-0	3

OBJECTIVE

To relay the theoretical and practical knowledge of Core Java programming language

PRE-REQUISITES

Basic Knowledge of programming language and object oriented programming

COURSE OUTCOMES

The students undergoing this course will be able:

CO1: To understand the various features of object-oriented programming and features of OOP specific to Java programming.

CO2: To understand the components involved in designing web pages through Java programming.

CO3: To understand the various components of event mechanism.

CO4: To understand the major components of network programming through java swings.

CO5: To understand the major key contributing components to enable web-based applications through Java programming.

UNIT I

INTRODUCTION TO JAVA, DATA TYPE, VARIABLES, ARRAY : Basic Concepts of OOP and its Benefits; Application of OOP; Features of Java; Different types of data types, Literals, Variables, Type conversion and casting :Java's automatic type conversion, Casting incompatible types; Automatic type promotion in expression; Arrays: One-Dimensional Arrays, Multidimensional Arrays, Alternative Array Declaration Syntax

UNIT II

STRINGS, OPERATORS, EXPRESSION, CONTROL STATEMENTS: String handling: String class, Different string operations, String comparison ,Searching and modifying a string, Using string buffer class, Vector & Wrapper classes Different types of operators: arithmetic, bitwise, logical, relational, Boolean, assignment, conditional, special; Operator precedence and associatively; Using parentheses; Expression; Solving an expression; Control statements: if-else, nested if-else switch; Iteration statements: while, do-while, for, nested loops Jump Statements: using break, using continue, return

UNIT III

INHERITANCE, INTERFACES, PACKAGE : Inheritance: Different types of Inheritance, super keyword, Method overriding, Different types of access specifiers Defining Interface, Extending & Implementing interfaces, implementing multiple inheritance, Package: Java API Packages, Using System Package, Naming Conventions, Creating package, Accessing a package, using your own package

UNIT IV

MULTITHREADING, EXCEPTION HANDLING & APPLET PROGRAMMING: Multithreading: The Java Thread Model, Creating a Thread: extending Thread class and implementing Runnable interface, life cycle of a thread, using Thread methods, Thread exception Thread priority, Synchronization Exception: Exception Handling mechanism , Multiple catch statements , Using finally statements ,

throwing our own exception; Applet: Local & Remote Applets ,Steps to write & running Applets, Applet life cycle, Passing parameters, Displaying numerical values, getting input from the user

UNIT V

GRAPHICS PROGRAMMING & FILE HANDLING: Graphics class: Lines & Rectangle, Circles & Ellipses, Arcs, Polygons, Line Graphs, Bar Charts; File Handling: Stream Classes: Character & Byte Stream Class, I/O Exceptions, Reading /Writing character, Reading /Writing bytes, Concatenating & buffering files, Random Access Files

TEXT BOOK

Herbert Schildt , "The Complete Reference Java 2 fifth edition, McGraw Hill.

REFERENCE BOOKS

1. Balaguruswamy , E., ""Programming with Java", Tata Mcgraw Hill.
2. Horetmann Cay and Cornell Gary, "Core Java Volume – I", Pearson Education.
3. Horetmann Cay and Cornell Gary, "Core JavaTM 2, Volume II – Advanced Features", 7th Edition, Pearson Publisher.
4. Kathy Sierra and Bert Bates, "Head First Java" by O'REILLY publications.

CS-210	WEB & INTERNET TECHNOLOGIES	L T P	Cr
		3 0 0	3

OBJECTIVE

- To understand the concepts and architecture of the World Wide Web.
- To understand and practice Markup Language.
- To understand and practice Embedded Dynamic Scripting on Client-side Internet Programming.
- To understand and practice Web Development Techniques on client-side.

PRE-REQUISITES

Basics of programming, Structure and HTML Tags, Images, List, Tables, Anchors and Form Elements

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Explain the history of the internet and related internet concepts that are vital in understanding web development.

CO2: Discuss the insights of internet programming and implement complete application over the web.

CO3: Demonstrate the important HTML tags for designing static pages and separate design from content using Cascading Style sheet.

CO4: Utilize the concepts of JavaScript and Java

CO5: Use web application development software tools i.e. Ajax, PHP and XML etc. and identify the environments currently available on the market to design web sites.

UNIT I

INTRODUCTION TO WWW: Introduction to Computer networks - Internet Standards – Introduction to WWW – WWW Architecture – SMTP – POP3 – File Transfer Protocol - Overview of HTTP, HTTP request – response — Generation of dynamic web pages.

UNIT II

UI DESIGN: HTML5: What is HTML5 - Features of HTML5 – Semantic Tags – New Input Elements and tags - Media tags (audio and video tags) – Designing Graphics using Canvas API - Drag and Drop features – Geolocation API - Web storage (Session and local storage).

CSS3: What is CSS3 – Features of CSS3 – Implementation of border radius, box shadow, image border, custom web font, backgrounds - Advanced text effects(shadow) - 2D and 3D Transformations - Transitions to elements - Animations to text and elements

UNIT III

RESPONSIVE WEB DESIGN (RWD): Responsive Design: What is RWD – Introduction to RWD Techniques – Fluid Layout, Fluid Images and Media queries - Introduction to RWD Framework .

TWITTER BOOTSTRAP – Bootstrap Background and Features - Getting Started with Bootstrap - Demystifying Grids – Off Canvas - Bootstrap Components - JS Plugins - Customization

UNIT IV

INTRODUCTION TO JAVASCRIPT: Introduction - Core features - Data types and Variables - Operators, Expressions and Statements - Functions & Scope - Objects - Array, Date and Math related Objects - Document Object Model - Event Handling – Browser Object Model - Windows and Documents - Form handling and validations.

OBJECT-ORIENTED TECHNIQUES IN JAVASCRIPT - Classes – Constructors and Prototyping (Sub classes and Super classes) – JSON – Introduction to AJAX.

UNIT V

INTRODUCTION TO JQUERY: Introduction – jQuery Selectors – jQuery HTML - Animations – Effects – Event Handling – DOM – jQuery DOM Traversing, DOM Manipulation – jQuery AJAX

TEXT BOOKS

1. Harvey & Paul Deitel & Associates, Harvey Deitel and Abbey Deitel, “Internet and World Wide Web - How To Program”, Fifth Edition, Pearson Education, 2011.
2. Achyut S Godbole and Atul Kahate, “Web Technologies”, Second Edition, Tata McGraw Hill, 2012.

REFERENCE BOOK

1. Thomas A Powell, Fritz Schneider, “JavaScript: The Complete Reference”, Third Edition, Tata McGraw Hill, 2013.
2. David Flanagan, “JavaScript: The Definitive Guide, Sixth Edition”, O'Reilly Media, 2011
3. Bear Bibeault and Yehuda Katz, “jQuery in Action”, January 2008
4. Web link for Responsive Web Design - https://bradfrost.github.io/this-is-responsive/
5. Ebook link for JavaScript - https://github.com/jasonzhuang/tech_books/tree/master/js

CS-212	DESIGN & ANALYSIS OF ALGORITHMS	L T P	Cr
		3-0-0	3

OBJECTIVE

To relay the theoretical and practical aspects of design of algorithms

PRE-REQUISITES

Knowledge of fundamentals of basic computer programming for implementing algorithms

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Define the basic concepts of algorithms and analyze the performance of algorithms.

CO2: Discuss various algorithm design techniques for developing algorithms.

CO3: Discuss various searching, sorting and graph traversal algorithms.

CO4: Understand NP completeness and identify different NP complete problems.

CO5: Discuss various advanced topics on algorithms.

UNIT I

BRIEF REVIEW: Growth of functions, Asymptotic Notations, Representation of Graphs, Breadth First Search, Depth First Search and Data Structures for Disjoint Sets.

UNIT II

DIVIDE AND CONQUER: General method; binary search; merge sort; quick sort; selection sort; Strassen‘s matrix multiplication algorithms and analysis of algorithms for these problems.

UNIT III

GREEDY METHOD: General method; knapsack problem, job sequencing with deadlines; minimum spanning trees Algorithm of Kruskal’s and Prim’s; single source paths and analysis of these problems.

UNIT IV

DYNAMIC PROGRAMMING AND BACK TRACKING: General method; optimal binary search trees; O/I knapsack; the traveling salesperson problem, 8 queens ‘problem; graph coloring; Hamiltonian cycles

UNIT V

NP HARD AND NP COMPLETE PROBLEMS: Basic concepts; Cook‘s theorem; NP hard graph and NP scheduling problems; some simplified NP hard problems.

TEXT BOOK

Horowitz Ellis and Sahni Sartaj, ―Fundamental of Computer Algorithms‖, Galgotia Publications, 1978

REFERENCE BOOKS

1. Cormen Thomas H., Leiserson Charles E. and Rivest Ronald L., ―Introduction to Algorithms‖, Tata McGraw Hill, 1990

2. Aho A. V. and Hopcroft J. E., ―The Design and Analysis of Computer Algorithm‖, Addison Wesley, 1974
3. Berlion P., and Bizard P., Algorithms – The Construction, Proof and Analysis of Programs, John Wiley & Sons, 1986.
4. Bentley J. L., ―Writing Efficient Programs‖, Prentice Hall of India, June 1982.
5. Goodman S. E. and Hedetnieni, ―Introduction to Design and Analysis of Algorithm‖, McGraw Hill, 1997
6. Trembley Jean Paul and Bunt Richard B., ―Introduction to Computers Science - An Algorithms Approach‖, Tata McGraw Hill, 2002
7. Knuth Donald E., ―Fundamentals of Algorithms: The Art of Computer Programming‖, Vol. l, Naresh Publications, 1985
8. Goodrich Michael T. and Roberto Tamassia, ―Algorithm Design: Foundations, Analysis & Internet Examples‖, Wiley Student Ed., 2002

CS-256	DATA BASE MANAGEMENT SYSTEM LAB	L T P	Cr
		0-0-2	1

LIST OF EXPRIMENTS

1. Introduction to PL/SQL
2. Write a program to carry out
    a. Creation of table
    b. Insertion of data into table
    c. Viewing of data into table: All rows and all columns, Selected columns and all rows, Selected rows and all columns, Selected rows and selected columns, Elimination of duplicates from selected statements, Sorting of data into a table.
    d. Deletion of data from given table: Removal of all rows, Removal of selected rows
    e. Updating of table contents: Updating all rows, Updating of record conditionally
    f. Modifying the structure of table: Adding new column, Modifying existing column
    g. Renaming tables
    h. Destroying tables
    i. Examining objects created by user: Finding tables created by user, Finding column details of table created
    j. Computation on table data: Arithmetic operators, Logical operators (AND, OR, NOT), Range searching (BETWEEN, NOT BETWEEN), Pattern matching (LIKE, IN, NOT IN)
3. Oracle set functions (Scalar, Group & Pattern Matching Operator): AVG, SUM, MIN, MAX, COUNT, COUNT(*), ABS, ROUND, LENGTH, SUBSTR, POWER, SQRT, LOWER, UPPER, LPAD, RPAD, LTRIM, RTRIM
4. Data constraints at column level and at table level: NULL value concept, UNIQUE constraints, Primary key constraint, Foreign key constraint, Check constraint.
5. VIEWS: Creation of views, Renaming of columns in view, Selection, Updation, Destroy
6. Grouping Data from tables in SQL
7. INDEXES
8. SEQUENCES
9. Granting and Revoking Permissions in SQL
10. CURSORS & its Applications
11. Create Function and use Cursor in Function
12. TRIGGERS
13. Hands on Exercises

REFERENCE BOOKS

1. SQL, PL/SQL the Programming Language of Oracle, Ivan Bayross
2. Date C. J. and Darwen H., “A Guide to the SQL Standard”, 4th edition, Addison-Wesley, 2003
3. Desai Bipin, “Introduction to Database Management System”, Galgotia Publications, 1991
4. Date C. J., “An Introduction to Database Systems”, 8th edition, Addison-Wesley, Low Priced Edition

TEXT BOOK

Herbert Schildt , “The Complete Reference Java 2 fifth edition, McGraw Hill.

REFERENCE BOOKS

1. Balaguruswamy , E., ““Programming with Java”, Tata Mcgraw Hill.
2. Horetmann Cay and Cornell Gary, “Core Java Volume – I”, Pearson Education.

CS-258	JAVA PROGRAMMING LAB	L T P	Cr
		0 0 2	1

LABORATORY OVERVIEW:

A Java Programming lab manual is intended to provide a basic knowledge of java programming for students. To develop software development skills in java programming and Students will have the proficiency to develop projects in java programming. The course helps the students to solve the inter disciplinary applications through java programming.

OBJECTIVES:

1. To teach fundamentals of object oriented programming in Java. Understand various concepts of JAVA.
2. To familiarize Java environment to create, debug and run simple Java programs.
3. To demonstrate java compiler and eclipse platform and learn how to use Net Beans IDE to create Java Application.

COURSE OUTCOMES:

The students undergoing this course will be able to:
CO1: Implement Object oriented features using Java
CO2: Apply the concept of polymorphism and inheritance.

CO3: Implement exception handling

CO4: Develop network and window application using awt and swings.

LIST OF EXPERIMENTS

1. Write a Java program that prints all real solutions to the quadratic equation $ax^2 + bx + c = 0$. Read in a, b, c and use the quadratic formula. If the discriminate b^2-4ac is negative, display a message stating that there are no real solutions.
2. The Fibonacci sequence is defined by the following rule: The first two values in the sequence are 1 and 1. Every subsequent value is the sum of the two values preceding it. Write a Java program that uses both recursive and non recursive functions to print the nth value in the Fibonacci sequence.
3. Write a Java program that prompts the user for an integer and then prints out all prime numbers up to that integer. (use Scanner class to read input)
4. Write a Java program to multiply two given matrices.
5. Write a Java Program that reads a line of integers, and then displays each integer, and the sum of all the integers (Use String Tokenizer class of java.util)
6. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
7. Write a Java program for sorting list of names. Read input from command line.
8. Write a Java program to make frequency count of words in a given text.
9. Write a Java program to create a Student class with following fields
    i. Hall ticket number

ii. Student Name
iii. Department

Create ‘n’ number of Student objects where ‘n’ value is passed as input to constructor.

10. Write a Java program to demonstrate String comparison using == and equals method.
11. Write a java program to create an abstract class named Shape that contains an empty method named number Of Sides ( ).Provide three classes named Trapezoid, Triangle and Hexagon such that each one of the classes extends the class Shape. Each one of the classes contains only the method number Of Sides ( ) that shows the number of sides in the given geometrical figures.
12. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using JTable component.
13. Write a Java program to read copy content of one file to other by handling all file related exceptions.
14. Write a Java program that reads a file name from the user, and then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
15. Write a Java program that reads a file and displays the file on the screen, with a line number before each line.
16. Write a Java program that displays the number of characters, lines and words in a text file.
17. Write a Java program that creates three threads. First thread displays “Good Morning” everyone second, the second thread displays “Hello” every two seconds and the third thread displays “Welcome” every three seconds.
18. Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication.
19. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result.
20. Write a Java program for handling mouse events.
21. Write a Java program for handling key events using Adapter classes
22. Write a java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No light is on when the program starts.
23. Write a Java program that allows the user to draw lines, rectangles and ovals.
24. Develop simple calculator using Swings.
25. Develop an applet that displays a simple message in center of the screen

CS-260	WEB & INTERNET TECHNOLOGIES LAB	L T P	Cr
		0 0 2	1

LIST OF EXPERIMENTS

1 Design a web page using Physical and Logical tags of HTML.
2 Design a web page using
2.1 Ordered List
2.2 Unordered List
2.3 Nested Lists

3 Design a web page to show the use of image as a hyperlink
4 Design a web-page using frames and linking
5 Design a class Time Table using tables in HTML.
6 Code to create a bookmark.
7 Design a web-page showing the use of forms using HTML 4.01 and HTML 5 Tags.
8 Design a page using basic tags of HTML 5.0.
9 Design a web-page using style sheets (External, Internal and Inline)
10 Write a Program to print if the no is even or odd using JavaScript
11 Input a number and find the difference of the sum of factors and non-factors.
12 WAP in JavaScript to print the pattern

12345

1234

123

12

1

13 WAP to Accept an Array of 10 numbers and display the sum of elements.
14 WAP to find greatest of all elements of an array
15 Design a web-page to show different validation checking using Java Script
16 WAP in PHP code for calculating S.I
17 WAP to Calculate factorial of a number
18 WAP to print the table of 10.
19 WAP to print the sum of diagonal elements
20 WAP to enter 5 elements each from Array1 and Array2 and print these elements using third array.
21 WAP to show database connectivity using PHP and Mysql.

CS-268	MINOR PROJECT-I/TRAINING	L T P	Cr
		0-0-4	2

OBJECTIVE

The student shall be capable of identifying a problem related to the program of study and carry out wholesome research on it leading to findings which will facilitate development of a new/improved product, process for the benefit of the society.

B.Tech projects should be socially relevant and research oriented ones. Student is expected to do an individual project or in group of 3 members. The minor project work is carried out in three phases – Minor Project in IV, V & VI semesters. Major project proposed in VII & VIII semesters and the project work shall be in continuation of Minor Project only. At the completion of a project the student will submit a project report, which will be evaluated (end semester assessment) by duly appointed examiner(s). This evaluation will be based on the project report and a viva voce examination on the project. Student will be allowed to appear in the final viva voce examination only if he / she has submitted his / her project work in the form of paper for presentation / publication in a conference / journal and produced the proof of acknowledgement of receipt of paper from the organizers / publishers.

Syllabus
Of
B.Tech (CSE-AIML)
3rd Year
5th Semester

EC-301	MICROPROCESSORS & MICROCONTROLLER	L T P	Cr
		3 0 0	3

OBJECTIVES

This subject introduces the concept of Microprocessors to the students. It covers 8 bit (8085) and 16-bit (8086) Microprocessors: their architecture, assembly language programming and interfacing with peripheral devices

PRE-REQUISITES

Knowledge of Boolean algebra, number systems and basic digital circuitry.

COURSE OUTCOMES

CO1: Understand the taxonomy of microprocessors and knowledge of contemporary microprocessors.
CO2: Describe the architecture, bus structure and memory organization of 8085 as well as higher order microprocessors.
CO3: Explore techniques for interfacing I/O devices to the microprocessor 8085 including several specific standard I/O devices such as 8251 and 8255.
CO4: Demonstrate programming using the various addressing modes and instruction set of 8085 microprocessor
CO5: Design structured, well commented , understandable assembly language programs to provide solutions to real world control problems

UNIT I

THE 8085 PROCESSOR: Introduction to microprocessor; 8085 microprocessor: Architecture; Pin Diagram; instruction set; interrupt structure; Addressing modes and assembly language programming.

UNIT II

THE 8086 MICROPROCESSOR ARCHITECTURE: Architecture; block diagram of 8086 with details of sub-blocks; memory segmentation and physical address computations; program relocation; addressing modes; pin diagram and description of various signals; Interrupt Structure.

INSTRUCTION SET OF 8086: Data transfer instructions; arithmetic instructions; branch instructions; looping instructions; NOP and HLT instructions; flag manipulation instructions; logical instructions; shift and rotate instructions; directives; programming examples.

UNIT III

INTERFACING DEVICE: The 8255 PPI chip: Architecture; control words and modes; interfacing and programming with 8085.
DMA: Introduction to DMA process; 8257 pin diagram; architecture; operation; command words; interfacing and programming with 8085.

UNIT IV

PROGRAMMABLE INTERRUPT CONTROLLER: 8259 diagram; architecture; initialization command words; operational command wards.

UNIT V

PROGRAMMABLE INTERVAL TIMER: 8253 pin diagram; architecture; modes.

TEXT BOOK

Gaonkar, Ramesh S., ―Microprocessor Architecture: Programming and Applications with 8085‖, 5th Edition, Prentice Hall of India, 1995

REFERENCE BOOKS

1. Brey,‖The Intel Microprocessors 8086- Pentium Processor‖, 4th Edition, 2005
2. Hall, ―Microprocessors and interfacing‖, Tata McGraw Hill, 3nd Edition, 2003
3. Liu Yu-Chang and Gibson Glenn A., ―Microcomputer Systems: The 8086/8088 Family: Architecture, Programming and Design‖, Prentice Hall of India, 2003
4. Ray A. K. and Burchandi, ―Advanced Microprocessors and Peripherals Architectures, Programming and Interfacing‖, Tata McGraw Hill, 2002
5. Rafiquzzman, ―Microprocessor based System Design UBS‖ Wiley-Interscience, 5th Edition, 2005

CS-301	COMPUTER NETWORK	L T P	Cr
		3 0 0	3

OBJECTIVES

To have a fundamental understanding of the design, performance and state of the art of wireless communication systems, Topics covered include state of the art wireless standards and research and thus changes substantially form one offering of this course to the next

PRE-REQUISITES

Knowledge of computers hardware and software

COURSE OUTCOMES

CO1: Understand computer network basics, network architecture, TCP/IP and OSI reference models.

CO2: Identify and understand various techniques and modes of transmission

CO3: Describe data link protocols, multi-channel access protocols and IEEE 802 standards for LAN

CO4: Describe routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme

CO5: Discuss the elements and protocols of transport layer. Understand network security and define various protocols such as FTP, HTTP, Telnet, DNS

UNIT I

OVERVIEW OF DATA COMMUNICATION AND NETWORKING: Introduction; Data communications: components, data, direction of data flow, Protocols, Networks: type of connection, topology: Star, Bus, Ring, Mesh, Tree, categories of network: LAN, MAN, WAN: Internet: brief history, Layered architecture of networks, OSI reference model, Functions of each layer, services and protocols of each layer, TCP / IP reference model.

UNIT II

PHYSICAL AND DATA LINK LAYER: Transmission media: Guided media, Unguided media Switching: Circuit switching, packet switching, datagram switching. Error Detection and Correction: Types of errors, detection vs correction, cyclic codes, checksum. Framing: Flow and Error Control, Protocols: Stop &wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ.

UNIT III

MEDIUM ACCESS SUBLAYER RANDOM ACCESS: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, Controlled Access: Reservation, Polling, Channelization: FDMA, TDMA, CDMA, IEEE Standards, Standard Ethernet, Changes in the standard, Fast Ethernet, Gigabit Ethernet

UNIT IV

NETWORK LAYER: Network Devices**:** Active and Passive Hubs, Repeaters, Bridges, Two and Three layer switch, Gateway. Internet Protocol, Transmission Control Protocol, User Datagram Protocol; IP Addressing, IP address classes, subnet addressing, DNS, Internet control protocols: ARP, RARP, ICMP.

UNIT V

TRANSPORT LAYER: Process to process delivery, user datagram protocol, TCP services, features, TCP Connection, flow control, error control and congestion control; Congestion control, Quality of

Service, WAN Technologies: Synchronous Digital Hierarchy (SDH) / Synchronous Optical Network (SONET); Asynchronous Transfer Mode (ATM) Frame Relay.

TEXT BOOK

Tanenbaum Andrew S, ―Computer Networks‖, 4th Edition, Pearson Education/Prentice Hall of India, 2003.

REFERENCE BOOKS

1. Forouzan Behrouz A., ―Data Communications and Networking‖, Tata McGraw Hill 2006.
2. Stallings William, ―Data and Computer Com munication‖ , 5th Edition, Prentice Hall of India, 1997.
3. Fred H alsall, ―Data Communications, Computer Networks and Open Systems‖, 4th edition, Addison Wesley, Low Price Edition, 2000
4. Fitzgerald Jerry, ―Business Data Communications‖, Wiley, 2009.
5. Peterson Larry L. and Davie Bruce S., ―Computer Networks – A System Approach‖, 3rd Edition, Morgan Kaufmann, 2003.
6. Tittel E. D., ―Computer Networking‖, Tata McGraw Hill, 2002
7. Kurose James F. and Ross Keith W., ―Computer Networking: A Top-Down Approach Featuring the Internet‖, 2nd Edition, Pearson Education, 2003.
8. Keshav S., ―An Engineering Approach to Computer Networking‖, Addison-Wesley, 1997.
9. Comer D. E., ―Internetworking with TCP/IP‖, Volume 1, 3rd Edition, Prentice Hall of India, 1995.

CS-303	FORMAL LANGUAGE & AUTOMATA THEORY	L T P	Cr
		3-1-0	4

OBJECTIVES

To understand the theory and practice of compiler implementation. To learn finite state machines and lexical scanning. To learn context free grammars, compiler parsing techniques, construction of abstract syntax trees, push down Automata and Turing Machine.

PRE-REQUISITES

Knowledge of mathematics and Programming Languages

COURSE OUTCOMES

CO1: Understand the basic concepts of formal languages, automata and grammar types, as well as the use of formal languages and reduction in normal forms
CO2: Demonstrate the relation between regular expressions, automata, languages and grammar with formal mathematical methods
CO3: Design push down automata, cellular automata and turing machines performing tasks of moderate complexity
CO4: Analyze the syntax and formal properties, parsing of various grammars such as LL(k) and LR(k)
CO5: Describe the rewriting systems and derivation languages

UNIT I

FINITE AUTOMATA AND REGULAR EXPRESSIONS: Finite state systems; basic definitions non-deterministic finite automata (NDFA), deterministic finite automata (DFA), equivalence of DFA and NDFA finite automata with e-moves;, limitations of FSM, Moore and Mealy Machines; Equivalence of Moore and Mealy Machines., Minimization of Finite Automata. Concept of basic machine; properties

UNIT II

PROPERTIES OF REGULAR SETS: regular expressions; equivalence of finite automata and regular expressions, regular expression conversion and vice versa, Arden's theorem; The Pumping Lemma for regular sets; applications of the pumping lemma; closure properties of regular sets.

UNIT III

CONTEXT FREES GRAMMARS & PDA: Definition, Context free and context sensitive grammar; ambiguity regular grammar; reduced forms; removal of useless symbols and unit production; Chomsky Normal Form (CNF), Greibach Normal Form (GNF). Introduction to pushdown machines; design of PDA; conversion of PDA to CFG and vice versa, application of pushdown machines.

UNIT IV

TURING MACHINES: Basic concepts, Deterministic and non-deterministic Turing machines; design of Turing machines; halting problem of Turing machines.

UNIT V

INTRODUCTION TO COMPILER DESIGN AND PARSING: Introduction to translators and its need, structure of Compilers and its different phases. **:** Introduction to Parser and role of Parser (Syntax analyzer), Types of parsers: Bottom up and Top down Parser.

TEXT BOOK

Hopcroft, Ullman O. D. and Mothwani R., “Introduction to Automata Theory, Language & Computations”, Addison Wesley, 2001

REFERENCE BOOKS

1. Mishra K. L. P. and Chandrasekaran N., “Theory of Computer Science - Automata, Languages and Computations”, Prentice Hall of India, 2000
2. Linz Peter, “Introduction to Formal Languages & Automata”, Narosa Publications, 2001
3. Greenlaw Ramond and Hoover H. James, “Fundamentals of the Theory of Computation - Principles and Practice”, Harcourt India Pvt. Ltd., 1998
4. Lewis H. R. and Papaditriou C. H., “Elements of Theory of Computation”, Prentice Hall of India, 1998
5. Martin John C., “Introduction to Languages and Theory of Computations”, Tata McGraw Hill, 2003

CS-305	ARTIFICIAL INTELLIGENCE	L T P	Cr
		3 0 0	3

OBJECTIVES

To introduce about artificial intelligence approaches to problem solving, various issues involved and application areas

PRE-REQUISITES: Knowledge of neural networks, data structures

COURSE OUTCOMES

CO1: Demonstrate fundamental understanding of artificial intelligence (AI) and expert systems. Solve basic AI based problems

CO2: Define the concept of Artificial Intelligence and Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

CO3: Apply AI techniques to real-world problems to develop intelligent systems.

CO4: Select appropriately from a range of techniques when implementing intelligent systems.

CO5: Discuss the basics of ANN and different optimizations techniques

UNIT I

INTRODUCTION TO AI AND SEARCH TECHNIQUES: Foundation and history of AI; data, information and knowledge; AI problems and techniques – AI programming languages, problem space representation with examples; blind search strategies, breadth first search, depth first search, heuristic search techniques: hill climbing: best first search, A * algorithm AO* algorithm, Minimax search procedure for Game Playing.

UNIT II

KNOWLEDGE REPRESENTATION ISSUES AND TECHNIQUES: Predicate logic; representing knowledge using rules. Semantic nets, partitioned nets, parallel implementation of semantic nets; frames, forward and backward chaining; frame based systems.

UNIT III

REASONING UNDER UNCERTAINITY: Reasoning under uncertainty, non monotonic reasoning; Review of probability; Baye's probabilistic interferences and Dumpster Shafer theory; statistical reasoning, fuzzy reasoning.

UNIT IV

PLANNING & LEARNING: Goal stack planning; non linear planning, hierarchical planning representation for planning; partial order planning algorithm. Basic concepts of Learning ; rote learning, learning by taking advices, learning by problem solving, learning from examples, discovery as learning, learning by analogy; explanation based learning; neural nets; genetic algorithms.

UNIT V

EXPERT SYSTEM AND APPLICATIONS OF ARTIFICIAL INTELLIGENCE: Expert systems: rule based systems architecture: Principles of natural language processing: knowledge acquisition concepts; AI application to robotics, and current trends in intelligent systems; parallel and distributed AI.

TEXT BOOK

Rich Elaine and Knight Kevin, ―Artificial Intelligence 3rd Edition, Tata McGraw Hill, 1991

REFERENCE BOOKS

1. Nilson Nils J., ―Artificial Intelligence‖, McGraw-Hill, New York 1971
2. Russell Stuart and Norvig Peter, ―Artificial Intelligence: A Modern Approach‖, Prentice Hall of India, 1998
3. Negnevitsky, ―Artificial Intelligence: A Guide to Intelligent System ‖, Pearson Education, 2004.
4. Patterson O. W., ―Introduction to Artificial Intelligence & Expert Systems‖, Prentice Hall of India, 1996.
5. Winston Patrick Henry, ―Artificial Intelligence, 3rd Edition, Addition Wesley, 1992
6. Clockson & Mellish, ―Programming PROLOG‖, 3rd Edition, Narosa Publications, 2002.

CS-307	MACHINE LEARNING	L T P	CR
		3 0 0	3

COURSE OUTCOMES

CO1: Appreciate the importance of visualization in the data analytics solution
CO2: Apply structured thinking to unstructured problems
CO3: Understand a very broad collection of machine learning algorithms and problems
CO4: Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory
CO5: Develop an appreciation for what is involved in learning from data.

UNIT I

INTRODUCTION TO MACHINE LEARNING: The Origins of Machine Learning, Uses and Abuses of Machine Learning, How do Machines Learn? - Abstraction and Knowledge Representation, Generalization, Assessing the Success of Learning, Steps to Apply Machine Learning to Data, Choosing a Machine Learning Algorithm - Thinking about the Input Data, Thinking about Types of Machine Learning Algorithms, Matching Data to an Appropriate Algorithm.

UNIT II

SIMPLE LINEAR REGRESSION: Introduction to Simple Linear Regression, Simple Linear Regression Model Building, Estimation of Parameters Using Ordinary Least Squares, Interpretation of Simple Linear Regression Coefficients, Validation of Simple Linear Regression Model, Coefficient of Determination (R-squared) and Adjusted R-Squared, Spurious Regression, Hypothesis Test for Regression Coefficients (t-Test), Test for Overall Model: Analysis of Variance (F-Test), Residual Analysis.

UNIT III

MULTIPLE REGRESSION AND MODEL BUILDING: Introduction, Ordinary Least Squares Estimation for Multiple Linear Regression, Multiple Linear Regression Model Building, Partial Correlation and Regression Model Building, Interpretation of Multiple Linear Regression Coefficients - Partial Regression Coefficients, Standardized Regression Coefficient, Regression Models with Categorical (i.e., Qualitative) Variables - Interpretation of Regression Coefficients of Categorical Variables, Interaction Variables in Regression Models, Validation of Multiple Regression Model, Coefficient of Multiple Determination (R - Squared), Adjusted R-Squared, Statistical Significance of Individual Variables in Multiple Linear Regression: t-Test, Validation of Overall Regression Model: F-Test, Validation of Portions of a Multiple Linear Regression Model - Partial F-Test, Residual Analysis in Multiple Linear Regression.

UNIT IV

INTRODUCTION TO CLASSIFICATION & CLASSIFICATION ALGORITHMS: What is Classification? General Approach to Classification, k-Nearest Neighbor Algorithm, Logistic Regression, Decision Trees, Naive Bayesian Classifier, Ensemble Methods: Bagging, Boosting and AdaBoost and XBoost, Random Forests, Advanced Classification Methods: Backpropagation in Multilayer Feed-Forward Neural Networks, Support Vector Machines, Rough Set and Fuzzy Set Approaches, Classification Model Evaluation and Selection: Sensitivity, Specificity, Positive Predictive Value, Negative Predictive Value, Lift Curves and Gain Curves, ROC Curves, Misclassification Cost Adjustment to Reflect Real-World Concerns, Decision Cost/Benefit Analysis.

UNIT V

INTRODUCTION TO CLUSTER ANALYSIS & CLUSTERING METHODS: The Clustering Task and the Requirements for Cluster Analysis , Overview of Some Basic Clustering Methods, Hierarchical Methods: Agglomerate versus Divisive Hierarchical Clustering, Distance Measures, Probabilistic Hierarchical Clustering, Multiphase Hierarchical Clustering Using Clustering Feature Trees, Partitioning Methods: k-Means Clustering, k-Medoids Clustering, Density-Based Clustering: DBSCAN - Density-Based Clustering Based on Connected Regions with High Density, Measuring Clustering Goodness

TEXT-BOOKS

1. Machine Learning: An Algorithmic Perspective by Stephen Marsland, Chapman and Hall/CRC.
2. T. Mitchell, Machine Learning, McGraw Hill.
3. M. Gopal, Applied Machine Learning, McGraw Hill.
4. Sutton R. S. and Barto, A. G., Reinforcement Learning: An Introduction, The MIT Press (2017).

REFERENCE-BOOKS

1. Introduction to Machine Learning by Ethem Alpaydin, PHI Learning.
2. M. Evangelia, Supervised and Unsupervised Pattern Recognition, CRC Press.
3. G. James, D. Witten, T. Hastie, R. Tibshirani, Introduction to Statistical Learning, Springer

EC-351	MICROPROCESSORS & MICROCONTROLLER LAB	L T P	CR
		0 0 2	1

LIST OF EXPERIMENTS

1. Familiarization with the operation of 8085 Microprocessor kit.
2. Write a program using 8085 for: a) Addition of two 8-bit numbers. b) Addition of two 16-bit numbers
3. Write a program using 8085 for : a) 8-bit subtraction b) 16-bit subtraction
4. Write a program using 8085 for a) Multiplication of two 8- bit numbers
   b)Division of two 8- bit numbers
5. Write a program using 8085 to arrange an array of 10 Nos in-
   a) Ascending order b) Descending order
6. Familiarization with the operation of 8086 microprocessor kit
7. Write a program using 8086 for copying 12 bytes of data from source to destination.
8. Write a program using 8086 for:
   a) Finding the largest number from an array.
   b) Finding the smallest number from an array.
9. Write a program using 8086 for arranging an array of numbers in descending order and ascending order
10. Write a program for finding square of a number using look-up table and verify.
11. Write a program to interface a two digit number using seven-segment LEDs. Use 8085 microprocessor and 8255 PPI.

CS-355	ARTIFICIAL INTELLIGENCE LAB	L T P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

1. Study of Python programming language.
2. Write a program to find out route distance between two cities using Python.
3. Write a program to implement Tower of Hanoi using Python.
4. Write a program to calculate factorial of a number using Python.
5. Write a program to print the list of customer having different colored cars with price and model available using Python.
6. Write a program to implement water jug problem using Python.
7. Write a program to implement Breadth First Search using Python
8. Write a program to implement Depth First Search using Python
9. Write a program to solve 8-Queens problem using Python.
10. Write a program to solve Monkey Banana problem using Python.

CS-357	MACHINE LEARNING LAB	L T P	CR
		0 0 2	1

COURSE OUTCOMES (COS):

After completion of course, students would be able to:

CO1: Understand the implementation procedures for the machine learning algorithms.
CO2: Design Python programs for various Learning algorithms.
CO3: Apply appropriate data sets to the Machine Learning algorithms.
CO4: Identify and apply Machine Learning algorithms to solve real world problems

HARDWARE REQUIREMENT: i5 Processor, 8GB RAM, Internet Connection
SOFTWARE ENVIRONMENT: IDE recommended PYCHARM (Recommended), JUPYTER, VISUAL STUDIO

LIST OF EXPERIMENTS

1. i. Introduction to pandas

   ii. Introduction to NumPy

   iii. Wine Quality Prediction

   iv. Housing Price Prediction
2. Program to demonstrate Simple Linear Regression
3. Program to demonstrate Logistic Regression using SCIKIT learn
4. Program to demonstrate Multiple Linear Regression
5. Program to demonstrate k-Nearest Neighbor flowers classification
6. Program to demonstrate Decision Tree – ID3 Algorithm
7. Program to demonstrate Naïve- Bayes Classifier
8. Program to demonstrate Back-Propagation Algorithm
9. Program to demonstrate k-means clustering algorithm
10. Program to demonstrate DBSCAN clustering algorithm
11. Program to demonstrate SVM based classification

CS-381	MINOR PROJECT-II/TRAINING	L T P	Cr
		0-0-4	2

OBJECTIVE

The student shall be capable of identifying a problem related to the program of study and carry out wholesome research on it leading to findings which will facilitate development of a new/improved product, process for the benefit of the society.

B.Tech projects should be socially relevant and research oriented ones. Student is expected to do an individual project or in group of 3 members. The minor project work is carried out in three phases – Minor Project in IV, V & VI semesters. Major project proposed in VII & VIII semesters and the project work shall be in continuation of Minor Project only. At the completion of a project the student will submit a project report, which will be evaluated (end semester assessment) by duly appointed examiner(s). This evaluation will be based on the project report and a viva voce examination on the project. Student will be allowed to appear in the final viva voce examination only if he / she has submitted his / her project work in the form of paper for presentation / publication in a conference / journal and produced the proof of acknowledgement of receipt of paper from the organizers / publishers.

PEP-301	LEADERSHIP & MANAGEMENT SKILLS	L T P	Cr
		1-0-2	2

Pre-requisites/Exposure: K12 level of English Language
Co-requisites: Knowledge of Word processing using MS Word, basic IT skills

Module 1- Leadership Skills 4 Hours

a. Understanding Leadership and its Importance

- What is leadership?
- Why Leadership required?
- Whom do you consider as an ideal leader?

b. Traits and Models of Leadership

- Are leaders born or made?
- Key characteristics of an effective leader
- Leadership styles
- Perspectives of different leaders

c. Basic Leadership Skills

- Motivation
- Team work
- Negotiation
- Networking

Module 2 - Managerial Skills 6 Hours

a. Basic Managerial Skills

- Planning for effective management
- How to organise teams?
- Recruiting and retaining talent
- Delegation of tasks
- Learn to coordinate

- Conflict management

b. Self-Management Skills

- Understanding self-concept
- Developing self-awareness
- Self-examination
- Self-regulation

Module 3 - Entrepreneurial Skills 4 Hours

a. Basics of Entrepreneurship

- Meaning of entrepreneurship
- Classification and types of entrepreneurships
- Traits and competencies of entrepreneur

b. Creating Business Plan

- Problem identification and idea generation
- Idea validation
- Pitch making

Module 4 - Innovative Leadership and Design Thinking 6 Hours

a. Innovative Leadership

- Concept of emotional and social intelligence
- Synthesis of human and artificial intelligence
- Why does culture matter for today's global leaders

b. Design Thinking

- What is design thinking?
- Key elements of design thinking:
  - Discovery
  - Interpretation
  - Ideation
  - Experimentation
  - Evolution.
- How to transform challenges into opportunities?

• How to develop human-centric solutions for creating social good?

Module 5- Ethics and Integrity 4 Hours

a. Learning through Biographies

- What makes an individual great?
- Understanding the persona of a leader for deriving holistic inspiration
- Drawing insights for leadership
- How leaders sail through difficult situations?

b. Ethics and Conduct

- Importance of ethics
- Ethical decision making
- Personal and professional moral codes of conduct
- Creating a harmonious life

Pedagogy

Pedagogy for the modules is as follows:

1. Leadership Skills - Lectures (augmented with videos); role-plays for leadership models; team building games
2. Managerial Skills - Lectures (augmented with videos), case studies (AMUL, TESLA, Toyota, DMRC, Tata Group, Google, The Mumbai Dabbawala), SWOT analysis, Johari window
3. Entrepreneurial Skills - Lectures (augmented with videos), case studies and practicing business plans
4. Innovative Leadership and Design Thinking- Concept discussion through lecture and videos followed by role-plays and exercises for each set of intelligence, activities using 5 steps – discovery, interpretation, ideation, experimentation, and evolution (Ref.: Workbook of Design Thinking by IDEO)
5. Ethics and Integrity- Experiential learning through stories suggested list (Ahilya Bai,

Holkar, Abdul Kalam, Raja Harishchandra, Mahatma Gandhi, Abraham Lincoln), audio visual augmented role plays and storytelling (leaders from varied fields like academics, corporate, social, sports, art, etc.)

Bibliography and Suggested Readings

Books

- Ashokan, M. S. (2015). *Karmayogi: A Bbiography of E. Sreedharan*. Penguin, UK.
- Brown, T. (2012). *Change by Design.* Harper Business
- Elkington, J., & Hartigan, P. (2008). *The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change the World*. Harvard Business Press.
- Goleman D. (1995). *Emotional Intelligence*. Bloomsbury Publishing India Private Limited
- Kalam A. A. (2003). *Ignited Minds: Unleashing the Power within India*. Penguin Books India
- Kelly T., Kelly D. (2014). *Creative Confidence: Unleashing the Creative Potential Within Us All.* William Collins
- Kurien V., & Salve G. (2012). *I Too Had a Dream*. Roli Books Private Limited
- Livermore D. A. (2010). *Leading with cultural intelligence: The New Secret to Success.* New York: American Management Association
- McCormack M. H. (1986). *What They Don't Teach You at Harvard Business School: Notes From A Street-Smart Executive*. RHUS
- O'Toole J. (2019) *The Enlightened Capitalists: Cautionary Tales of Business Pioneers Who Tried to Do Well by Doing Good.* Harpercollins
- Sinek S. (2009). *Start with Why: How Great Leaders Inspire Everyone to Take Action*. Penguin
- Sternberg R. J., Sternberg R. J., & Baltes P. B. (Eds.). (2004). *International Handbook of Intelligence*. Cambridge University Press.

E-Resources

- Fries, K. (2019). 8 Essential Qualities That Define Great Leadership. *Forbes*. Retrieved 2019-02-15 from https:/www.forbes.com/sites/ kimberlyfries/ 2018/02/08/8-essentialqualities-that-define-great-leadership/#452ecc963b63.
- How to Build Your Creative Confidence, Ted Talk by David Kelly - https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence
- India's Hidden Hot Beds of Invention Ted Talk by Anil Gupta - https://www.ted.com/talks/anil_gupta_india_s_hidden_hotbeds_of_invention

- Knowledge@Wharton Interviews Former Indian President APJ Abdul Kalam - ."A Leader Should Know How to Manage Failure" https://www.youtube.com/watch?v=laGZaS4sdeU
- Martin, R. (2007). How Successful Leaders Think. *Harvard Business Review*, *85*(6): 60.
- NPTEL Course on Leadership - https://nptel.ac.in/courses/122105021/9

Syllabus

of

B.Tech(CSE-AIML)

3rd Year

6th Semester

f

CS-302	STATISTICAL LEARNING THEORY	L T P	Cr
		3-0-0	3

COURSE OUTCOMES

CO1: To learn existing statistical algorithms of Machine Learning (ML) and Pattern Recognition (PR).
CO2: To understand the difference between Classification and Regression
CO3: To have hands-on experience in implementing various ML and PR techniques on different datasets.
CO4: To learn to compare the performance of two learning systems.
CO5: To study few optimization methods used to estimate the parameters of a model during training.

UNIT I

Probabilistic formulations of prediction problems, Plug-in estimators, empirical risk minimization linear threshold functions, perceptron algorithm

UNIT II

Risk bounds, Concentration inequalities, Uniform convergence, Rademacher averages; combinatorial dimensions, Convex surrogate losses for classification

UNIT III

Game-theoretic formulations of prediction problems, Minimax strategies for log loss, linear loss, and quadratic loss, Universal portfolios, Online convex optimization

UNIT IV

Neural network, Stochastic gradient methods, Combinatorial dimensions and Rademacher averages,Hardness results for learning,Efficient learning algorithms

UNIT V

Kernel methods, Reproducing kernel Hilbert spaces, Mercer's theorem, Convex optimization for kernel methods, Representer theorem, Ensemble methods, AdaBoost, AdaBoost as I-projection, Convergence and consistency of AdaBoost

REFERENCES

1. A Probabilistic Theory of Pattern Recognition, Devroye, Gyorfi, Lugosi, Springer
2. The Elements of Statistical Learning, Hastie, et al, Springer
3. Combinatorial methods in density estimation, Devroye and Lugosi, Springer
4. Statistical Learning Theory, Vapnik, Wiley
5. An Introduction to Computational Learning Theory, Kearns and Vazirani, MIT Press

CS-304	SOFTWARE ENGINEERING	L T P	Cr
		3 0 0	3

COURSE OBJECTIVE

To provide basic knowledge of properties of software and its development processes, software quality, CASE tools, etc.

PRE-REQUISITES

Knowledge of computer programming, principles of management

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Plan a software engineering process life cycle, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements

CO2: Able to elicit, analyze and specify software requirements through a productive working relationship with various stakeholders of the project

CO3: Analyze and translate a specification into a design, and then realize that design practically, using an appropriate software engineering methodology.

CO4: Know how to develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice

CO5: Able to use modern engineering tools necessary for software project management, time management and software reuse.

UNIT I

INTRODUCTION: Definition and Emergence of Software Engineering, Evolving Role of Software, Software Life Cycle Models, Software Characteristics, Applications, Software Product, Software Process, Software Crisis, Software Myths.

UNIT II

SOFTWARE PROJECT MANAGEMENT: Project management concepts, software process and project metrics project planning, project size estimation metrics, project estimation techniques, empirical estimation techniques, COCOMO- a heuristic estimation techniques, staffing level estimation, team structures, staffing, risk analysis and management, project scheduling and tracking.

UNIT III

REQUIREMENTS ANALYSIS AND SPECIFICATION: Requirements engineering, system modeling and simulation, analysis principles: modeling, partitioning, software, prototyping: methods and tools; specification principles, representation, the software requirements specification and reviews analysis modeling: data modeling, functional modeling and information flow: data flow diagrams, behavioral modeling; the mechanics of structured analysis: creating entity/ relationship diagram, data flow model, control flow model, the control and process specification.

UNIT IV

SYSTEM DESIGN AND COMPUTERAIDEDSOFTWARE ENGINEERING: Design Process: design and software quality, design principles; design concepts: abstraction, refinement, modularity, software architecture, control hierarchy, structural partitioning, software procedure, information hiding; functional independence, cohesion, coupling; design heuristics for effective modularity; design model; design documentation, architectural design: software architecture, CASE, building blocks; integrated case environments and architecture, repository.

UNIT V

TESTING AND MAINTENANCE: Software testing techniques, software testing fundamentals: objectives, principles, testability; test case design, white box testing, basis path testing: control structure testing: black box testing, testing for specialized environments, architectures and applications. software testing strategies: verification and validation, unit testing, integration testing, validation testing, alpha and beta testing; system testing, acceptance testing debugging approaches; software re-engineering, reverse engineering, restructuring, forward engineering, Software maintenance, Adaptive , corrective and perfective, software reliability: measures of reliability and availability, software safety.

TEXT BOOK

Pressman Roger S., ―Software Engineering – A Practitioner‘s Approach‖ , McGraw Hill, 2004

REFERENCE BOOKS

1. Jalote P ankaj, ―An Integrated Approach to Software Engineering‖, 3rd edition, Narosa Book Distributors Private Ltd, 2005
2. Mall R a j i b, ―Fundamentals ofSoftware Eng ineering ‖, Prentice Hall of India,2003
3. Sommerville Ian, ―Software Engineering‖, 8th edition, Addison Wesley, 2007
4. Gustafson David, ―Software Eng ineering ‖, Tata McGraw Hill, 2002
5. Behforooz Ali and Hudson Frederick J., ―Software Engineering Fundamentals‖, Oxford University press, John Wiley & Sons, 2005.

CS-306	CRYPTOGRAPHY AND NETWORK SECURITY	L T P	Cr
		3-0-0	3

OBJECTIVES

The main objective behind this course is to learn about the various network attacks and preventing attacks. This course is designed to cover Application security, Network security, Web security etc.

PREREQUISITE

Data Communications and Computer Networks, Computer Programming, Data Structures, Prime Number Theory

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Understand and analyze public-key cryptography, RSA and other public-key cryptosystems

CO2: Analyze and design hash and MAC algorithms, and digital signatures.

CO3: Design network application security schemes, such as PGP, S/ MIME, IPSec, SSL, TLS, HTTPS, SSH, etc.

CO4: Understand key management and distribution schemes and design User Authentication Protocol

CO5: Know about Intruders and Intruder Detection mechanisms, Types of Malicious software, Firewall Characteristics, Types of Firewalls, Firewall Location and Configurations.

UNIT I

ATTACKS ON COMPUTERS & COMPUTER SECURITY: Introduction; The need of Security ; Security Approaches; Principal of Security; Types of Attacks,

CRYPTOGRAPHY : Introduction; Plain Text & Cipher Text; Substitution Techniques; Transposition Techniques; Types of Cryptography; Steganography; Symmetric Key Algorithm: Algorithm Types and Modes, DES; Asymmetric Key Algorithm: RSA, Digital Signatures

UNIT II

DIGITAL CERTIFICATES AND PUBLIC KEY INFRASTRUCTURE: Digital Certificates ; Private Key Management; The PKIX Model ; Public Key Cryptography Standards; Creating Digital certificates using Java

UNIT III

INTERNET SECURITY PROTOCOLS: Introduction; Secure Socket Layer(SSL); Secure Electronic Transaction (SET); Electronic Money; Email security; Wireless application protocol (WAP); Security in GSM: Security in 3G

UNIT IV

USER AUTHENTICATION AND KERBEROS: Introduction, Authentication Basics; Passwords; Authentication Tokens; Certificate Based Authenticaton; Biometric Authentication; Kerberos

UNIT V

NETWORK SECURITY, FIREWALL AND VPN: Introduction, Firewalls: Types of Firewalls ; IP Security; Virtual Private Network; Intrusion,

CASE STUDIES ON NETWORK SECURITY : Introduction ; secure Inter branch payment transactions; Denial of Service attacks; IP Spoofing attacks; Contract Signing; Secret Splitting ; Virtual elections

TEXT BOOKS

1. Stallings William, "Cryptography and Network Security", 4th Edition, Prentice-Hall, Englewood Cliffs, 2006
2. Behrouz A. Forouzan "Cryptography and Network Security", TMH

REFERENCE BOOKS

1. Atul Kahate , "Cryptography and Network Security", 3rd Edition, Tata Mcgraw Hill.
2. Mani Subramanian, "Network Management Principles & Practices", Addison Wesley, 1999
3. Kauffman C., Perlman R. and Spenser M., "Network Security", 2nd Edition, Prentice Hall, 2002.
4. Menezes Alfred, van Oorschot Paul, and Vanstone Scott, "Handbook of Applied Cryptography", CRC Press, NY, 2004.
5. Bellovin S. and Chesvick W., "Internet Security and Firewalls", 2nd Edition, Addison Wesley, 1998.
6. Schneier Bruce, "Applied Cryptography", Wiley Student Edition, 2nd Edition

CS-308	COMPILER DESIGN	L T P	Cr
		3-0-0	3

COURSE OBJECTIVE

To make the student to understand the process involved in a compiler, create an overall view of various types of translators, linkers, loaders, and phases of a compiler, understand what is syntax analysis, various types of parsers especially the top down approach, awareness among students the various types of bottom up parsers, understand the syntax analysis and, intermediate code generation, type checking, the role of symbol table and its organization, Code generation, machine independent code optimization and instruction scheduling.

PRE-REQUISITES

Knowledge of automata theory, context free languages, computer architecture, data structures and simple graph algorithms, logic or algebra.

COURSE OUTCOMES

The students undergoing this course will be able to:

CO1: Student will be familiar with the front-end as well as back-end stages of compiler design and Design Lexical analyzer for given language using LEX tools

CO2: understand the differences between constructing lexers/parsers by hand versus using automated generators

CO3: Hands-on experience with generating intermediate representations, which in turn will let them appreciate the importance of designing simpler languages

CO4: To appreciate the nuances of analyzing and transforming programs for performance

CO5: Experience of working with relatively large programming environments, which will also inculcate a sense of good software design

UNIT I

INTRODUCTION TO COMPILING & LEXICAL ANALYSIS: Introduction of Compiler, Major data Structure in compiler, BOOT Strapping & Porting, Compiler structure: analysis-synthesis model of compilation, various phases of a compiler, Lexical analysis: Input buffering, Specification & Recognition of Tokens, LEX

UNIT II

SYNTAX ANALYSIS: Basic Parsing Techniques: Parsers, Shift reduce parsing, Operator precedence parsing, top down parsing, predictive parsers Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR(0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables, using ambiguous grammars, an automatic parser generator, implementation of LR parsing tables.

UNIT III

SYNTAX DIRECTED TRANSLATION: Syntax directed definitions: Construction of Syntax trees, Bottom up evaluation of S-attributed definition, L-attribute definition, Top down translation, Bottom Up evaluation of inherited attributes Recursive Evaluation, Analysis of Syntax directed definition.

UNIT IV

CODE GENERATION: Intermediate code generation: Declarations, Assignment statements, Boolean expressions, Case statements, Procedure calls Code Generation: Issues in the design of code generator, Basic block and flow graphs, Register allocation and assignment, DAG representation of basic blocks, peephole optimization, generating code from DAG.

UNIT V

CODE OPTIMIZATION: Introduction to Code optimization: sources of optimization of basic blocks, loops in flow graphs, dead code elimination, loop optimization, Introduction to global data flow analysis, Code Improving transformations ,Data flow analysis of structure flow graph Symbolic debugging of optimized code.

REFERENCES:

1. V. Aho, R. Sethi, and J. D. Ullman. Compilers: Principles, Techniques andTools , Pearson Education
2. Raghavan, Compiler Design, TMH Pub.
3. Louden. Compiler Construction: Principles and Practice, Cengage Learning
4. Holub. Compiler Design in C , Prentice-Hall Inc., 1993.
5. Mak, writing compiler & Interpreters, Willey Pub.

CS-310	ARTIFICIAL NEURAL NETWORK	L T P	Cr
		3-0-0	3

OBJECTIVE

To introduce about incorporating more mathematical approach (beyond conventional logic system) into the artificial intelligence approaches for problem solving such as fuzzy logic, genetic algorithms, etc.

PRE-REQUISITES

Knowledge of mathematics, statistics and probability

COURSE OUTCOMES

The students undergoing this course will be able to:
CO1: Model Neuron and Neural Network, and to analyze ANN learning, and its applications
CO2: Perform Pattern Recognition, Linear classification.
CO3: Develop different single layer/multiple layer Perception learning algorithms
CO4: Design of another class of layered networks using deep learning principles.

UNIT I

OVERVIEW OF BIOLOGICAL NEURONS: Structure of biological neurons relevant to ANNs.

FUNDAMENTAL CONCEPTS OF ARTIFICIAL NEURAL NETWORKS: Models of ANNs; Feedforward & feedback networks; learning rules; Hebbian learning rule, perception learning rule, delta learning rule, Widrow-Hoff learning rule, correction learning rule, Winner –lake all elarning rule, etc.

UNIT II

SINGLE LAYER PERCEPTION CLASSIFIER: Classification model, Features & Decision regions; training & classification using discrete perceptron, algorithm, single layer continuous perceptron networks for linearly separable classifications.

UNIT III

MULTI-LAYER FEED FORWARD NETWORKS: Linearly non-seperable pattern classification, Delta learning rule for multi-perceptron layer, Generalized delta learning rule, Error back-propagation training, learning factors, Examples.

UNIT IV

SINGLE LAYER FEED BACK NETWORKS: Basic Concepts, Hopfield networks, Training & Examples.

ASSOCIATIVE MEMORIES: Linear Association, Basic Concepts of recurrent Auto associative memory: rentrieval algorithm, storage algorithm; By directional associative memory, Architecture, Association encoding & decoding, Stability.

UNIT V

SELF ORGANIZING NETWORKS: UN supervised learning of clusters, winner-take-all learning, recall mode, Initialisation of weights, seperability limitations

TEXT BOOK

Introduction to artificial Neural systems by Jacek M. Zurada, 1994, Jaico Publ. House.

REFERENCE BOOKS

1. "Neural Networks :A Comprehensive formulation", Simon Haykin, 1998, AW
2. "Neural Networks", Kosko, 1992, PHI.
3. "Neural Network Fundamentals" – N.K. Bose , P. Liang, 2002, T.M.H
4. Neural Network , T.N.Shankar, University Science Press
5. Neuro Fuzzy Systems, Lamba, V.K., University Science Press

CS-312	COMPUTER VISION	L T P	Cr
		3-0-0	3

COURSE OUTCOMES

CO1: identify basic concepts, terminology, theories, models and methods in the field of computer vision.
CO2: describe known principles of human visual system.
CO3: describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition.
CO4: suggest a design of a computer vision system for a specific problem**.**

UNIT I

COMPUTER VISION: AN INTRODUCTION: Introduction to computer vision and images, Basic image operation, Mathematical operations on images, Sunglass filter: A simple application, Bitwise operations, Image Annotation

UNIT II

IMAGE FORMATION MODELS: Monocular imaging system , Radiosity: The 'Physics' of Image Formation, Radiance, Irradiance, BRDF, color etc, Orthographic & Perspective Projection,• Camera model and Camera calibration, Binocular imaging systems, Multiple views geometry, Structure determination, shape from shading , Photometric Stereo, Depth from Defocus , Construction of 3D model from images

UNIT III

OBJECT RECOGNITION: TRADITIONAL AND DEEP LEARNING METHODS: HoG/ SIFT features, Bayes classifiers, SVM classifiers, Image classification, object detection and semantic segmentation, adversarial attacks. Various neural network architectures, visualization techniques

UNIT IV

INTRODUCTION TO NEURAL NETWORKS: Artificial neural networks, loss functions, back propagation and SGD, Batch Normalization.

UNIT V

MOTION ANALYSIS AND ACTIVITY RECOGNITION: Motion detection and tracking, Inference of human activity from image sequences

TEXT BOOKS

1. Computer Vision - A modern approach, by D. Forsyth and J. Ponce, Prentice Hall Robot Vision, by B. K. P. Horn, McGraw-Hill.
2. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.

REFERENCE BOOKS

1. E. R. Davies, Computer & Machine Vision, Fourth Edition, Academic Press, 2012
2. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University Press, 2012

CS-352	STATISTICAL LEARNING THEORY LAB	L T P	Cr
		0-0-2	1

LIST OF PROGRAMS

1. Excel for data management
2. Basic data analysis and visualization in Excel
3. Intro to SPSS platform & data mgmt.
4. Basic descriptive & inferential statistics in SPSS
5. Visualizing data in SPSS
6. Intro to SAS platform & data mgmt
7. Basic descriptive & inferential statistics in SAS
8. Visualizing data in SAS
9. Qualitative data analysis (QDA) programs

REFERENCES

1. The Little SAS Book
2. Basic Introduction to R (Harden, 2010)
3. Saunders & Brown, 2008, Ch. 3; Lewis-Beck, 1995, Ch. 1-3; Agresti & Finlay, 2009
4. Patton, Carl V. and David S. Sawicki, Basic Methods of Policy Analysis and Planning. 2nd Edition, Prentice-Hall, 1993.

CS-356	CRYPTOGRAPHY & NETWORK SECURITY LAB	L T P	Cr
		0-0-2	1

LIST OF PROGRAMS

1. To implement Ceaser Cipher Encryption-Decryption.
2. To implement Monoalphabetic Substitution.
3. To implement Polyalphabetic Substitution.
4. To implement Play fair Cipher.
5. To implement Hill Cipher Encyption-Decryption
6. To implement Diffie Hellman Key Exchange.
7. To implement RSA Encryption-Decryption.
8. To implement DES Encryption-Decryption
9. Implementation of SSL
10. Authentication through passwords
11. Configuration of firewall and VPN

CS-360	ARTIFICIAL NEURAL NETWORKS USING LAB	L T P	Cr
		0-0-2	1

LIST OF PROGRAMS

1. Write a program to perform the basics matrix operations.
2. WAP to plot the Straight line.
3. WAP to plot the Sine curve.
4. How the weight & bias value effects the output of neurons.
5. How the choice of activation function effect the output of neuron experiment with the following function purelin(n), bimary threshold(hardlim(n) haradlims(n)) ,Tansig(n) logsig(n)
6. How the weight and biased value are able to represent a decision boundary in the feature space.
7. How the Perceptron Learning rule works for Linearly Separable Problem.
8. How the Perceptron Learning rule works for Non-Linearly Separable Problem.
9. Write a program to draw a graph with multiple curve.

CS-362	COMPUTER VISION LAB	L T P	Cr
		0-0-2	1

LIST OF EXPERIMENTS

1. Introduction to MATLAB Programming
2. Write a Program to display the Negative of a digital Image
3. Write a Program to perform thresholding on an input Image
4. Write a Program to perform gray level slicing without background.
5. Write a Program to perform gray level slicing with background
6. Write a Program to perform bit-plane slicing
7. Write a Program to display Histogram of an image
8. Write a Program to perform Log Transformation of an image
9. Write a Program to implement Ideal low pass filter
10. Write a Program to implement Butterworth low pass filter

REFERENCE BOOKS

1. Rafael C. Gonzalez & Richard E. Woods, “Digital Image Processing”, 2nd edition, Pearson Education.
2. David A. Forsyth, Jean Ponce, “Computer Vision: A Modern Approach”, Prentice Hall
3. A.K. Jain, “Fundamental of Digital Image Processing”, PHI
4. W.K. Pratt, “Digital Image Processing”

CS-382	MINOR PROJECT-III	L T P	Cr
		0-0-4	2

OBJECTIVE

The student shall be capable of identifying a problem related to the program of study and carry out wholesome research on it leading to findings which will facilitate development of a new/improved product, process for the benefit of the society.

B.Tech projects should be socially relevant and research oriented ones. Student is expected to do an individual project or in group of 3 members. The minor project work is carried out in three phases – Minor Project in IV, V & VI semesters. Major project proposed in VII & VIII semesters and the project work shall be in continuation of Minor Project only. At the completion of a project the student will submit a project report, which will be evaluated (end semester assessment) by duly appointed examiner(s). This evaluation will be based on the project report and a viva voce examination on the project. Student will be allowed to appear in the final viva voce examination only if he / she has submitted his / her project work in the form of paper for presentation / publication in a conference / journal and produced the proof of acknowledgement of receipt of paper from the organizers / publishers.

Syllabus
Of
B.Tech (CSE- AIML)
4th Year
7th Semester

CS-401	R PROGRAMMING	L-T-P	Cr
		3 0 0	3

COURSE OUTCOMES

CO1: Access online resources for R and import new function packages into the R workspace
CO2: Import, review, manipulate and summarize data-sets in R
CO3: Explore data-sets to create testable hypotheses and identify appropriate statistical tests
CO4: Perform appropriate statistical tests using R
CO5: Create and edit visualizations with R

UNIT – I

INTRODUCTION: Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations

UNIT – II

Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes

VECTORS: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operation

UNIT – III

LISTS: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, DATA FRAMES, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations

UNIT - IV

FACTORS AND TABLES, Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables , Extracting a Subtable, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions

UNIT - V

OBJECT-ORIENTED PROGRAMMING: S Classes, S Generic Functions, Writing S Classes, Using Inheritance, S Classes, Writing S Classes, Implementing a Generic Function on an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation

TEXT BOOKS

1. R Programming for Data Science by Roger D.Peng
2. The Art of R Programming by Prashanthsingh, VivekMourya, CengageLearning India.

CS-403	DEEP LEARNING	L T P	Cr
		3 0 0	3

OBJECTIVES

The objective of this course is to cover the fundamental of neural networks as well as some advanced topics such as recurrent neural networks, long short term memory cells and convolutional neural networks. The course also requires students to implement programming assignments related to these topics.

COURSE OUTCOMES

CO1: Understand the fundamentals and current usage of the TensorFlow library for deep learning research and the graphical computational model of TensorFlow
CO2: Understand the context of neural networks and deep learning
CO3: Design recurrent neural networks with attention mechanisms for natural language classification, generation, and translation.
CO4: Perform regularization, training optimization, and hyperparameter selection on deep models.
CO5: Explore the parameters for neural networks

UNIT 1

BASICS: Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability. Convergence theorem for Perceptron Learning Algorithm.

FEEDFORWARD NETWORKS: Multilayer Perceptron, Gradient Descent, Backpropagation, Empirical Risk Minimization, regularization, autoencoders.

UNIT II

DEEP NEURAL NETWORKS: Difficulty of training deep neural networks, Greedy layerwise training.
BETTER TRAINING OF NEURAL NETWORKS: Newer optimization methods for neural networks (Adagrad, adadelta, rmsprop, adam, NAG), second order methods for training, Saddle point problem in neural networks, Regularization methods (dropout, drop connect, batch normalization).

UNIT III

RECURRENT NEURAL NETWORKS: Back propagation through time, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs
CONVOLUTIONAL NEURAL NETWORKS: LeNet, AlexNet.

UNIT IV

GENERATIVE MODELS: Restrictive Boltzmann Machines (RBMs), Introduction to MCMC and Gibbs Sampling, gradient computations in RBMs, Deep Boltzmann Machines.

UNIT V

RECENT TRENDS: Variational Autoencoders, Generative Adversarial Networks, Multi-task Deep Learning, Multi-view Deep Learning

APPLICATIONS: Vision, NLP, Speech (just an overview of different applications in 2-3 lectures)

TEXT BOOKS

Deep Learning, Ian Goodfellow and Yoshua Bengio and Aaron Courville, MIT Press, 2016.

REFERENCES

1. Neural Networks: A Systematic Introduction, Raúl Rojas, 1996
2. Pattern Recognition and Machine Learning, Christopher Bishop, 2007

CS-405	PATTERN RECOGNITION	L T P	Cr
		3 0 0	3

COURSE OUTCOMES

CO1: Explain and compare a variety of pattern classification, structural pattern recognition, and pattern classifier combination techniques.

CO2: Summarize, analyze, and relate research in the pattern recognition area verbally and in writing.

CO3: Apply performance evaluation methods for pattern recognition, and critique comparisons of techniques made in the research literature

CO4: Apply pattern recognition techniques to real-world problems such as document analysis and recognition.

CO5: Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.

UNIT I

INTRODUCTION: Basics of pattern recognition, Design principles of pattern recognition system, Learning and adaptation, Pattern recognition approaches, Mathematical foundations – Linear algebra, Probability Theory, Expectation, mean and covariance, Normal distribution, multivariate normal densities, Chi squared test.

UNIT II

STATISTICAL PATTEN RECOGNITION: Bayesian Decision Theory, Classifiers, Normal density and discriminant functions,

UNIT III

PARAMETER ESTIMATION METHODS: Maximum-Likelihood estimation, Bayesian Parameter estimation, Dimension reduction methods -Principal Component Analysis (PCA), Fisher Linear discriminant analysis, Expectation-maximization (EM), Hidden Markov Models (HMM), Gaussian mixture models.

UNIT IV

NONPARAMETRIC TECHNIQUES: Density Estimation, Parzen Windows, K-Nearest NeighborEstimation, Nearest Neighbor Rule, Fuzzy classification.

UNIT V

UNSUPERVISED LEARNING & CLUSTERING: Criterion functions for clustering, Clustering Techniques:Iterative square - error partitional clustering – K means, agglomerative hierarchical clustering, Cluster validation.

REFERENCES

1. Richard O. Duda, Peter E. Hart and David G. Stork, “Pattern Classification”, 2nd Edition, John Wiley, 2006.
2. C. M. Bishop, “Pattern Recognition and Machine Learning”, Springer, 2009.
3. S. Theodoridis and K. Koutroumbas, “Pattern Recognition”, 4th Edition, Academic Press, 2009.

CS-407	SPEECH AND NATURAL LANGUAGE PROCESSING	L T P	Cr
		3 0 0	3

COURSE OUTCOMES

CO1: Understand Natural Language Processing and Probabilistic model of defining language and techniques
CO2: Applying Hidden Markov model and Speech Recognition
CO3: Application of context free grammar and language parsing
CO4: Implement probabilistic and language parsing.
CO5: Differentiation of semantic and discourse in terms of NLP

UNIT I

INTRODUCTION TO NATURAL LANGUAGE PROCESSING: Why is NLP hard, Empirical Laws, Text Processing: Basics, Spelling Correction: Edit Distance, Weighted Edit Distance, Other Variations, Noisy Channel Model for Spelling Correction, N-Gram Language Models, Evaluation of Language Models, Basic Smoothing

UNIT II

LANGUAGE MODELING: Advanced Smoothing Models, Computational Morphology, Finite - State Methods for Morphology, Introduction to POS Tagging, Introduction to POS Tagging, Viterbi Decoding for HMM, Parameter Learning, Baum Welch Algorithm, Maximum Entropy Models – I,II, Conditional Random Fields

UNIT III

SYNTAX: Introduction, Parsing I, CKY, PCFGs- Inside-Outside Probabilities, Dependency Grammars and Parsing – Introduction, Transition Based Parsing : Formulation, Learning , MST-Based Dependency Parsing-Learning

UNIT IV

DISTRIBUTIONAL SEMANTICS: Introduction, Structured Models, Word Embeddings, Lexical Semantics – Wordnet, Word Sense Disambiguation, Novel Word Sense detection, Topic Models : Introduction, Latent Dirichlet Allocation : Formulation, Gibbs Sampling for LDA, Applications, LDA Variants and Applications , Entity Linking

UNIT V

INFORMATION EXTRACTION: Introduction, Relation Extraction, Text Summarization – LEXRANK, Optimization based Approaches for Summarization, Text Classification, Sentiment Analysis- Affective Lexicons, Learning Affective Lexicons , Aspect - Based Sentiment Analysis

TEXT BOOKS:

1. Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and ImedZitouni, PearsonPublication.
2. Natural Language Processing and Information Retrieval: TanvierSiddiqui, U.S. Tiwary.
3. “Natural Language Understanding” James Allen, -1995Benjamin/cummings Pub. Comp. Ltd

4. “Language as a cognitive process”, Terry Winograd 1983, AW
5. “Natural Language processing in prolog”, G. Gazder, 1989, Addison Wesley.
6. “ Introduction of Formal Language Theory”, MdljArbib&Kfaury, 1988, Springer

REFERENCES

1. Speech and Natural Language Processing - Daniel Jurafsky& James H Martin, Pearson Publications.
2. https://nptel.ac.in/course.html/Natural Language Processing

CS-451	R PROGRAMMING LAB	L T P	Cr
		0-0-2	1

1. Write an R-Program to print HelloWorld
2. Write an R-Program to take input fromuser.
3. Write an R-Program to demonstrate working with operators (Arithmetic, Relational, Logical, Assignmentoperators).
4. Write an R Program to Check if a Number is Odd orEven
5. Write an R Program to check if the given Number is a PrimeNumber
6. Write an R Program to Find the Factorial of aNumber
7. Write an R Program to Find the Factors of aNumber
8. Write an R Program to Find the Fibonacci sequence Using RecursiveFunction
9. Write an R Program to Make a SimpleCalculator
10. Write an R Program to Find L.C.M of twonumbers
11. Write an R Program to create a Vector and to access elements in a Vector
12. Write an R Program to create a Matrix and access rows and columns usingfunctions
13. *colnames()* and *rownames()* .
14. Write an R Program to create a Matrix using *cbind()* and *rbind()*functions.
15. Write an R Program to create a Matrix from a Vector using ***dim()***function.
16. Write an R Program to create a List and modify itscomponents.
17. Write an R Program to create a DataFrame.
18. Write an R Program to access a Data Frame like aList.
19. Write an R Program to access a Data Frame like aMatrix.
20. Write an R Program to create aFactor.
21. Write an R Program to Access and Modify Components of aFactor.
22. Write an R Program to create an S3 Class and S3Objects.
23. Write an R Program to write a own generic function in S3Class.
24. Write an R Program to create an S4 Class and S4Objects.
25. Write an R Program to write a own generic function in S4 Class.
26. Write an R Program to create Reference Class and modify its Methods.

CS-453	DEEP LEARNING LAB	L T P	Cr
		0-0-2	1

PRACTICAL EXERCISES:

1. Implement Simple Programs like vector addition in TensorFlow.
2. Implement a simple problem like regression model in Keras.
3. Implement a perceptron in TensorFlow/Keras Environment.
4. Implement a Feed-Forward Network in TensorFlow/Keras.
5. Implement an Image Classifier using CNN in TensorFlow/Keras.
6. Implement a Transfer Learning concept in Image Classification.
7. Implement an Autoencoder in TensorFlow/Keras.
8. Implement a SimpleLSTM using TensorFlow/Keras.
9. Implement an Opinion Mining in Recurrent Neural network.
10. Implement an Object Detection using CNN.
11. Mini Project

CS-455	PATTERN RECOGNITION LAB	L T P	Cr
		0-0-2	1

PRACTICAL EXERCISES

1. Automatic classification
2. Analysis of sensor input data
3. speech recognition and understanding
4. computer vision
5. multiple criteria optimization,
6. image analysis,
7. image segmentation,
8. image fusion.

CS-485	MAJOR PROJECT-I	L-T-P	Cr
		0-0-8	4

OBJECTIVES

1. Identify and discuss the role and importance of research in the emerging Technology and Engineering
2. Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem
3. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
4. Ability to present the findings of their technical solution in a written report.
5. Presenting the work in International/ National conference or reputed journals

COURSE OUTCOMES

After undergoing this course, the students will be able to:

CO1: Develop aptitude for research and independent learning.

CO2: Demonstrate the ability to carry out literature survey and select unresolved problems in the domain of the selected project topic

CO3: Gain the expertise to use new tools and techniques for the design and development.

CO4: Acquire the knowledge and awareness to carry out cost-effective and environment friendly designs.

CO5: Develop the ability to write good technical report, to make oral presentation of the work, and to publish the work in reputed conferences/journals.

The Major project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study.

The Major research Project should have the following

- Relevance to social needs of society
- Relevance to value addition to existing facilities in the institute
- Relevance to industry need
- Problems of national importance
- Research and development in various domain
- Literature survey Problem Definition
- Motivation for study and Objectives
- Preliminary design / feasibility / modular approaches
- Implementation and Verification
- Report and presentation
- Experimental verification / Proof of concept
- Design, fabrication, testing of Communication System.

PEP-401	PROFESSIONAL SKILLS	L-T-P	Cr
		1-0-2	2

Prerequisites/Exposure: Min. B1/B2 level of English Language
Co-requisites: Knowledge of word processing using MS-Word, Basic IT skills

Course Outcomes

On completion of this course, the students will be able to

- Prepare their Resume/CV in an appropriate template without grammatical and other errors using proper syntax
- Demonstrate understanding of Cross-Cultural communication and requisites
- Participate in a simulated interview to gain insight on interviewing skills by analysing the common errors generally made by candidates in an interview
- Demonstrate personal grooming skills
- Demonstrate digital literacy and personal branding.
- Actively & effectively participate in group discussions towards gainful employment
- Identify career opportunities (offline & online) in consideration of their own potential and aspirations

Catalog Description

The objective of this course is to make students confident in presenting themselves and be industry ready. Preparation and managing their Personal Dossier along with Resume building activities help them to be more Industry ready. Training on Employability related communication to enhance the students' performance during their group discussions and Personal Interviews. We will combine traditional lectures with other active teaching methodologies, such as group discussions, cooperative group solving problems, analysis of video scenes and debates. Class participation is a fundamental aspect of this course. Students will be encouraged to actively take part in all group activities and to give an oral group presentation. Students will be expected to interact with media resources, such as, web sites, videos, DVDs, and newspapers etc.

Assessment

Mode of Evaluation: *Continuous Evaluation*

It can be combination of written evaluation, Presentations, Simulations, Assignments, case studies and business plan.

Module 1 – Preparing for the Transition – 12 hours

☐ Social & Cultural Graces

- Meaning, Social Grace at Work, Acquiring Social Graces.
- Need for etiquette (impression, image, earn respect, appreciation, etc)
- Aspects of social and cultural/corporate etiquette in promoting teamwork
- Importance of time, place, propriety and adaptability to diverse cultures

☐ Table Manners

- Meaning – Table Etiquettes in Multicultural Environment
- Dos and Don'ts of Table Etiquettes.

☐ Dress Code & Personal Grooming

- Dress Code for selected Occasions
- Dress Code for an Interview.

☐ Trust & Collaboration

- Importance of trust in creating a collaborative team
- Agree to Disagree and Disagree to Agree – Spirit of Team work
- Understanding fear of being judged and strategies to overcome fear

☐ Brainstorming

- Use of group and individual brainstorming techniques to promote idea generation.
- Learning and showcasing the principles of documentation of team session outcomes

Module 2: Career Skills – 12 hours

- Resume & CV Writing: Difference between a CV, Resume and Bio data
- Essential components of a good resume
- Group Discussion Skills

- Exploring Career Opportunities
- Personal Branding & Digital Literacy
- Oral Presentations
- Presentation Aids and their usage

☐ Interview Skills

- Definition, Types of skills – Employer Expectations –Planning for the Interview – Interview Questions Critical Interview Questions
- Meaning and types of interviews (F2F, telephonic, video, etc.)
- Dress Code, Background Research, Do's and Don'ts
- Situation, Task, Approach and Response (STAR Approach) for facing an
- interview
- Interview procedure (opening, listening skills, closure, etc.)
- Important questions generally asked in a job interview (open and closed ended questions)

☐ Exploring Career Opportunities

- Exploring Career Opportunities: The Process of getting hired
- Personal Branding
- Importance of digital literacy
- Knowledge about the world of work, requirements of jobs including self-employment.
- Sources of career information
- Preparing for a career based on their potentials and availability of opportunities

REFERENCE BOOKS:

- 10 Things Employers Want You to Learn in College, Revised: The Skills You Need to Succeed by Bill Coplin July 31, 2012
- Self-Esteem by Dr. Joe Rubino
- 73 Rules of Influencing the Interview by Chris Delaney, July 2012
- Developing Transferable Skills: Enhancing Your Research and Employment Potential by Pam Denicolo and Julie Reeves Dec 2013

BA-271 A	HUMAN RESOURCE MANAGEMENT	L-T-P 3-0-0

OBJECTIVE

The course aims to provide the insights into effective management of human resources to enable the students to meet the HR challenges in the present scenario.

1. **INTRODUCTION:** Meaning, scope, objective, functions, policies & roles and importance of Human Resource Management; HRM & HRD - a comparative analysis, personal management vs, HRM, evaluation of HRM, emerging challenges of HRM

2. **HUMAN RESOURCE PLANNING:** Definition, objectives; process and importance, factors effecting job analysis; job evaluation, Recruitment; selection; placement and introduction process; employee training & development, career planning & development process, method induction & orientation training career planning vis, HRP succession planning .

3. **PERFORMANCE MANAGEMENT:** concept and process, performance appraisal, Potential appraisal. Job Compensation; concept and significance; Promotions, demotions, transfers. separation, absenteeism and turnover; Quality of work life (QWL), Quality circle, stress in the workplace.

4. **JOB SATISFACTION AND MORALE:** Health, safety & employee welfare; Employee Participation & Empowerment: Concept, Relevance, Techniques, human resource development: definition, objectives & approaches to human relations; Employee grievances and discipline

5. **HR in KNOWLEDGE OVERVIEW:** Audit, IHRM. (A brief discussion) (global staffing, expatriate staffing) HRM practices in India-emerging trends in IHRM

TEXT BOOK

Rao V. 8. P., “Human Resource Management”, Excel Publications

REFERENCE BOOKS

1. C. B. Memoria “Personal Management”, Himalaya Publications, New Delhi

2. Edwin B. Flippo, “Personal Management” Tata McGraw Hill

3. Aswathappa K., “Human Resource Management”, Tata McGraw H ill

4. Dale Yoder, “Personnel Management & Industrial Relations”, Tata McGraw Hill

Syllabus

Of

B.Tech (CSE- AIML)

4th Year

8th Semester

CS-402	AIML TOOLS AND APPLICATIONS	L T P	Cr
		3-0-0	3

OBJECTIVES

Machine learning tools are algorithmic applications of artificial intelligence that give systems the ability to learn and improve without ample human input, similar concepts are data mining and predictive modeling. They allow software to become more accurate in predicting outcomes without being explicitly programmed.

COURSE OUTCOMES

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

CO1: Top tools to be used in AI Scikit Learn, Tensorflow, Theano, Caffe, MxNet, Keras, PyTorch, CNTK , etc.

CO2: Demonstrate various AI Tools, applications, languages and Machine Learning Techniques.

CO3: Solve problems using search strategies and understand the basic process of Machine Learning.

CO4: Apply classification and regression algorithms on real world data.

CO5: Develop an expert system.

CO6: Comprehend the structure of an artificial neural network and identify the building blocks of a convolutional neural network.

UNIT I

INTRODUCTION TO AI- Agents and Environments – Uninformed Search Strategies- Informed Search Strategies- Local Search Algorithm- Problem Formulation-Constraint Satisfaction Problem.

INFERENCE- Forward and Backward Chaining-Unification-Uncertainty-Inference in Bayesian Network – Learning from Observations-Forms of Learning-Inductive Learning-Neural Network-Learning Decision trees-Reinforcement Learning-Case Study-

TOOLS : Introduction to python, control statements, list, dictionary, object, class etc.

UNIT II

MACHINE LEARNING FUNDAMENTALS –Types of Machine Learning - Supervised, Unsupervised, Reinforcement- The Machine Learning process. Terminologies in ML- Testing ML algorithms Installation of Python Libraries/ MATLAB tools for Machine Learning (ii) Data pre-processing using Python Machine Learning libraries

INTRODUCTION TO TOOLS : Intro to scikit-learn, classification, regression, clustering, PCA, Dimension reduction.

PANDAS->>data cleaning, data wrangling, etc.

UNIT :- III

PERCEPTRON- Multilayer perceptron- Back Propagation – Initialization, Training and Validation Support Vector Machines(SVM) as a linear and non-linear classifier - Limitations of SVM Practical Component:

TOOLS : Introduction to TensorFlow Programming (Using TensorFlow Libraries / MATLAB) (i) Recognition of MNIST handwritten digits using Artificial Neural Network. (ii) Build an email spam classifier using SVM.

UNIT IV

PROBABILISTIC GRAPHICAL MODELS: Bayesian Networks - Learning Naive Bayes classifiers-Markov Models – Hidden Markov Models Sampling – Basic sampling methods – Monte Carlo -Reinforcement Learning Practical Component: (Using Python Libraries / MATLAB)

UNIT V

MINING COMPLEX DATA TYPES - Other Methodologies - Data Mining Applications **DATA MINING AND SOCIETY** – Data Mining Trends – Real world applications – Data Mining Tool study.

TOOLS : Pytorch Programming

SUGGESTED ACTIVITY: Prediction and Analysis of Student Performance by Data Mining in WEKA.

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TEXT BOOKS

1. Dr.Nilakshi Jain, Artificial Intelligence, As per AICTE: Making a System Intelligent, Wiley Publications, 1st Edition,2019.
2. Vijayvargia, Abhishek, Machine Learning with Python: An Approach to Applied Machine Learning, BPB Publications; 1st edition,2018.
3. Dr. S.Lovelyn Rose, Dr. L.Ashok Kumar, Dr.D.Karthika Renuka, Deep Learning using Python, Wiley India Pvt. Ltd 2019.

REFERENCES

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, Pearson
2. Publications, 4th Edition, 2020.
3. Saroj Kaushik, Artificial Intelligence, Cengage Learning India, 2011.

WEB REFERENCES

1. https://keras.io/
2. https://ai.google/
3. https://www.coursera.org/learn/neural-networks-d

CS-490	MAJOR PROJECT-II/PROJECT BASED ON INTERNSHIP	L-T-P	Cr
		0-0-24	12

OBJECTIVES

6. Identify and discuss the role and importance of research in the emerging Technology and Engineering
7. Ability to synthesize knowledge and skills previously gained and applied to an in-depth study and execution of new technical problem
8. Capable to select from different methodologies, methods and forms of analysis to produce a suitable research design, and justify their design.
9. Ability to present the findings of their technical solution in a written report.
10. Presenting the work in International/ National conference or reputed journals

COURSE OUTCOMES

After undergoing this course, the students will be able to:

CO1: Develop aptitude for research and independent learning.

CO2: Demonstrate the ability to carry out literature survey and select unresolved problems in the domain of the selected project topic

CO3: Gain the expertise to use new tools and techniques for the design and development.

CO4: Acquire the knowledge and awareness to carry out cost-effective and environment friendly designs.

CO5: Develop the ability to write good technical report, to make oral presentation of the work, and to publish the work in reputed conferences/journals.

The Major project topic should be selected / chosen to ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivity and thus reduce the gap between the world of work and the world of study.
The Major research Project should have the following

- Relevance to social needs of society
- Relevance to value addition to existing facilities in the institute
- Relevance to industry need
- Problems of national importance
- Research and development in various domain
- Literature survey Problem Definition
- Motivation for study and Objectives
- Preliminary design / feasibility / modular approaches
- Implementation and Verification
- Report and presentation
- Experimental verification / Proof of concept
- Design, fabrication, testing of Communication System.

CS-492	SEMINAR	L-T-P	Cr
		0-0-2	1

OBJECTIVES

The objective of the seminar is to impart training to the students in collecting materials on a specific topic in the broad domain of Engineering/Science from books, journals and other sources, compressing and organizing them in a logical sequence, and presenting the matter effectively both orally and as a technical report.

COURSE OUTCOMES

After undergoing this course, the students will be able to:

CO1: Organize and illustrate technical documentation with scientific rigor and adequate literal standards on the chosen topic strictly abiding by professional ethics while reporting results and stating claims

CO2: Demonstrate communication skills in conveying the technical documentation via oral presentations using modern presentation tools.

CO3: To impart training to students to face audience and present their ideas and thus creating in them self esteem and courage that are essential for engineers.

CO4: To assess the debating capability of the student to present a technical topic.

CO5: To learn real working condition and technologies of Industry.

Individual students are required to choose a topic of their interest. A committee consisting of at least three faculty members preferably Expertise in respective fields shall assess the presentation of the seminar and award marks to the students.

Each student shall submit two copies of a write up of his/her seminar topic. One copy shall be returned to the student after duly certifying it by the chairman of the assessing committee and the other will be kept in the departmental library. Internal continuous assessment marks are awarded based on the relevance of the topic, presentation skill, quality of the report and participation.

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