ARTIFICIAL INTELLIGENCE & MACHINE LEARNING
COURSE STRUCTURE
B. TECH I SEMESTER

S.No.	Course Code	Course Category	Course Title	Hours per week			Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20AM1T01	BSC	Linear Algebra and Differential Equations	3	-	-	3	3
2	20AM1T02	BSC	Applied Chemistry	3	-	-	3	3
3	20AM1T03	HSMC	English	3	-	-	3	3
4	20AM1L04	ESC	Computer Engineering Workshop	1	-	4	3	3
5	20AM1T05	ESC	Problem Solving through C	3	-	-	3	3
6	20AM1L06	HSMC	English Communication Skills Lab	-	-	3	3	1.5
7	20AM1L07	BSC	Applied Chemistry Lab	-	-	3	3	1.5
8	20AM1L08	ESC	Problem Solving through C Lab	-	-	3	3	1.
9	20AM1M09	MC	Environmental Science	2	-	-	2	-
Total number of credits								19.5

B. TECH II SEMESTER

S.No.	Course Code	Course Category	Course Title	Hours per week			Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20AM2T01	BSC	Transform Techniques	3	-	-	3	3
2	20AM2T02	BSC	Applied Physics	3	-	-	3	3
3	20AM2T03	ESC	Computer organization	3	-	-	3	3
4	20AM2T04	ESC	Data Structures	3	-	-	3	3
5	20AM2T05	ESC	Python Programming	3	-	-	3	3
6	20AM2L06	BSC	Applied Physics Lab	-	-	3	3	1.5
7	20AM2L07	ESC	Data Structures Lab	-	-	3	3	1.5
8	20AM2L08	ESC	Python Programming Lab	-	-	3	3	1.5
Total number of credits								**19.5**

B. TECH III SEMESTER

S.No.	Course Code	Course Category	Course Title	Lecture	Tutorial	Practical	Contact Hours	Credits
				Hours per week				
1	20AM3T01	BSC	Numerical Methods & Vector Calculus	3	-	-	3	3
2	20AM3T02	PCC	Introduction to Artificial Intelligence	3	-	-	3	3
3	20AM3T03	PCC	Object Oriented Programming through Java	3	-	-	3	3
4	20AM3T04	PCC	Data Base Management Systems	3	-	-	3	3
5	20AM3T05	PCC	Operating Systems	3	-	-	3	3
6	20AM3L06	PCC	Object Oriented Programming through Java Lab	-	-	3	3	1.5
7	20AM3L07	PCC	Data Base Management Systems Lab	-	-	3	3	1.5
8	20AM3L08	PCC	UNIX and Shell programming Lab	-	-	3	3	1.5
9	20AM3S09	SC	Data analysis and visualization with python	-	-	4	4	2
10	20AM3M10	MC	Constitution of India	2	-	-	2	-
Total number of credits								**21.5**

B. TECH IV SEMESTER

S.No	Course Code	Course Category	Course Title	Lecture	Tutorial	Practical	Contact Hours	Credits
				Hours per week				
1	20AM4T01	BSC	Probability and Statistics	3	-	-		3
2	20AM4T02	ESC	Discrete Mathematical Structures	3	-	-		3
3	20AM4T03	PCC	Design and Analysis of Algorithms	3	-	-		3
4	20AM4T04	PCC	Machine Learning	3	-	-		3
5	20AM4T05	HSMC	Managerial Economics and Financial Analysis	3	-	-		3
6	20AM4L06	ESC	R Programming Lab	-	-	3		1.5
7	20AM4L07	PCC	Machine Learning Using Python Lab	-	-	3		1.5
8	20AM4L08	PCC	Design and analysis of Algorithms Lab	-	-	3		1.5
9	20AM4S09	SC	Basic Web programming	-	-	4		2
Total number of credits								**21.5**
Internship 2 Months (Mandatory) during summer vacation								
Honors/Minor courses				4	0	0	-	4

B.TECH V SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20AM5T01	PCC	Theory of Automata	3	0	0	3	3
2	20AM5T02	PCC	Data Warehousing & Mining	3	0	0	3	3
3	20AM5T03	PCC	Software Engineering	3	0	0	3	3
			Program Elective-I					
4	20AM5T04		Computer Graphics	3	0	0	3	3
5	20AM5T05	PE-I	E-Commerce					
6	20AM5T06		Data Science and Visualization					
7			**Open Elective-I**	3	0	0	3	3
8	20AM5L08	PCC	CASE Tools Lab	0	0	3	3	1.5
9	20AM5L09	PCC	Data Warehousing and Mining Lab	0	0	3	3	1.5
10	20AM5S10	SC	Testing Tools Lab	0	0	4	4	2
11	20AM5M11	MC	Disaster Management	2	0	0	2	-
12	20AM5I12	I	Summer Internship	0	0	0	1.5	1.5
			Total number of credits					21.5
			Honors/Minor courses	4	0	0	-	4

B.TECH VI SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Contact Hours	Credits
				Lecture	Tutorial	Practical		
1	20AM6T01	PCC	Deep Learning	3	0	0	3	3
2	20AM6T02	PCC	Computer Networks	3	0	0	3	3
3	20AM6T03	PCC	Big Data Analytics	3	0	0	3	3
			Program Elective-II					
4	20AM6T04		MEAN Stack Technologies	3	0	0	3	3
5	20AM6T05	PE-II	Compiler Design					
6	20AM6T06		Software Architecture and Design patterns					
7			**Open Elective-II**	3	0	0	3	3
8	20AM6L08	PCC	Deep Learning Lab	0	0	3	3	1.5
9	20AM6L09	PCC	Computer Networks Lab	0	0	3	3	1.5
10	20AM6L10	PCC	BDA Lab	0	0	3	3	1.5
11	20AM6S11	SC	Soft Skills	0	0	4	4	2
12	20AM6M12	MC	Essence of Indian traditional knowledge	2	0	0	2	-
13	20AM6P13	P	Community Service Project	-	-	-	-	4
			Total number of credits					25.5
			Honors/Minor courses	4	0	0	-	4

B.TECH VII SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Contact Hours	Credits
				Lecture	Tutorial	Practical		
		Program Elective-III						
1	20AM7T01		Cloud Computing	3	0	0	3	3
2	20AM7T02	PE-III	Natural Language Processing					
3	20AM7T03		Software Project Management					
		Program Elective-IV						
4	20AM7T04		Software Testing Methodologies	3	0	0	3	3
5	20AM7T05	PE-IV	Information Security					
6	20AM7T06		Business Intelligence					
		Program Elective-V						
7	20AM7T07		Soft Computing	3	0	0	3	3
8	20AM7T08	PE-V	Robotics and its Applications					
9	20AM7T09		Internet of Things					
10		**Open Elective-III**		3	0	0	3	3
11		**Open Elective-IV**		3	0	0	3	3
12	20AM5L12	HSMC	Universal Human Values Understanding Harmony	0	0	3	3	3
13	20AM5S13	SC	Data Visualization using Tableau	0	0	4	4	2
14	20AM5I14	I	Industrial Internship	-	-	-	-	3
Total number of credits								**23**
Honors/Minor courses				**4**	**0**	**0**	**-**	**4**

B.TECH VIII SEMESTER

S.No	Course Code	Course Category	Course Title	Hours per week			Total Contact Hours	Credits
				Lecture	Tutorial	Practical		
2	20AM8P01	P	Project	0	0	0	-	8
Total number of credits								**8**

OPEN ELECTIVE –I:

S. No.	Course Code	Course Name	L	T	P	C	Offered by
1	20CE5T04	Architecture and Town Planning	3	0	0	3	CE
2	20CE5T05	Elements of Civil Engineering	3	0	0	3	CE
3	20EE5T04	Basics of Control Systems	3	0	0	3	EEE
4	20EE5T05	Special Electrical Machines	3	0	0	3	EEE
5	20ME5T04	Design Thinking & Product Innovation	3	0	0	3	ME
6	20ME5T05	Nanotechnology	3	0	0	3	ME
7	20EC5T04	Linear System Analysis	3	0	0	3	ECE
8	20EC5T05	Digital Logic Design	3	0	0	3	ECE
9	20EC5T06	Solid State Devices	3	0	0	3	ECE
10	20CS5T07	Introduction to Artificial Intelligence	3	0	0	3	CSE
11	20CS5T08	Operating Systems	3	0	0	3	CSE
12	20CS5T09	Software Engineering	3	0	0	3	CSE
13	20IT5T07	Computer Networks	3	0	0	3	IT
14	20IT5T08	Computer Graphics	3	0	0	3	IT
15	20HS5T02	Operations Research	3	0	0	3	BED
16	20MB5T01	Principles of Management	3	0	0	3	DMS
17	20MB5T02	Technology Management	3	0	0	3	DMS
18	20AD5T07	Foundations of Data Science	3	0	0	3	AIDS
19	20AM5T07	Introduction to Machine Learning	3	0	0	3	AIML

OPEN ELECTIVE –II:

S. No.	Course Code	Course Name	L	T	P	C	Offered by
1	20CE6T08	Remote Sensing and GIS	3	0	0	3	CE
2	20CE6T09	Environmental Impact Assessment	3	0	0	3	CE
3	20EE6T08	Renewable Energy Sources	3	0	0	3	EEE
4	20EE6T09	Energy Audit, Conservation and Management	3	0	0	3	EEE
5	20ME6T07	Industrial Robotics	3	0	0	3	ME
6	20ME6T08	Additive manufacturing	3	0	0	3	ME
7	20EC6T07	Electronic Circuits and Networks	3	0	0	3	ECE
8	20EC6T08	Principles of Communications	3	0	0	3	ECE

9	20EC6T09	Microcontrollers & its Applications	3	0	0	3	ECE
10	20CS6T07	Introduction to Machine Learning	3	0	0	3	CSE
11	20CS6T08	Information Security	3	0	0	3	CSE
12	20CS6T09	Agile Technologies	3	0	0	3	CSE
13	20IT6T07	Fundamentals of Machine Learning	3	0	0	3	IT
14	20IT6T08	Database Management Systems	3	0	0	3	IT
15	20HS6T02	Quantitative Aptitude and Reasoning	3	0	0	3	BED
16	20MB6T01	Organizational Behaviour	3	0	0	3	DMS
17	20MB6T02	Project Management	3	0	0	3	DMS
18	20AD6T07	Visual Analytics	3	0	0	3	AIDS
19	20AM6T07	Big data Analytics	3	0	0	3	AIML

OPEN ELECTIVE –III:

S. No.	Course code	Course Name	L	T	P	C	Offered by
1	20CE7T13	Construction Technology and Management	3	0	0	3	CE
2	20CE7T14	Green Buildings	3	0	0	3	CE
3	20EE7T13	Concept of Power System Engineering	3	0	0	3	EEE
4	20EE7T14	Instrumentation	3	0	0	3	EEE
5	20ME7T10	Green Engineering Systems	3	0	0	3	ME
6	20ME7T11	Hybrid Electric Vehicles	3	0	0	3	ME
7	20EC7T10	Data Communications	3	0	0	3	ECE
8	20EC7T11	Mechatronics	3	0	0	3	ECE
9	20EC7T12	Bio Medical Instrumentation	3	0	0	3	ECE
10	20CS7T10	Artificial Neural Networks	3	0	0	3	CSE
11	20CS7T11	Cyber Security	3	0	0	3	CSE
12	20CS7T12	Software Testing Methodologies	3	0	0	3	CSE
13	20IT7T10	Internet of Things	3	0	0	3	IT
14	20IT7T11	Computer Vision	3	0	0	3	IT
15	20HS7T01	Fuzzy sets	3	0	0	3	BED
16	20MB7T01	Digital Media management	3	0	0	3	DMS
17	20MB7T02	Entrepreneurship Development	3	0	0	3	DMS
18	20AD7T10	Data Analysis and Visualization with Python	3	0	0	3	AIDS

B.Tech in Artificial Intelligence & Machine Learning

| 19 | 20AM7T10 | NoSQL Databases | 3 | 0 | 0 | 3 | AIML |

OPEN ELECTIVE –IV:

S. No.	Course Code	Course Name	L	T	P	C	Offered by
1	20CE7T15	Waste water treatment	3	0	0	3	CE
2	20CE7T16	Repair and Rehabilitation of Concrete Structures	3	0	0	3	CE
3	20EE7T15	Power Quality	3	0	0	3	EEE
4	20EE7T16	Electric Vehicles	3	0	0	3	EEE
5	20ME7T12	Micro-Electro- Mechanical Systems	3	0	0	3	ME
6	20ME7T13	Solar Energy Systems	3	0	0	3	ME
7	20EC7T13	Introduction to Embedded Systems	3	0	0	3	ECE
8	20EC7T14	Internet of Things	3	0	0	3	ECE
9	20EC7T15	Analog and Digital IC applications	3	0	0	3	ECE
10	20CS7T13	Data Analytics	3	0	0	3	CSE
11	20CS7T14	Block Chain Technology	3	0	0	3	CSE
12	20CS7T15	Software Project Management	3	0	0	3	CSE
13	20IT7T13	Cloud Computing	3	0	0	3	IT
14	20IT7T14	Business Intelligence	3	0	0	3	IT
15	20HS7T02	Polymer Chemistry	3	0	0	3	BED
16	20MB7T03	Total Engineering Quality Management	3	0	0	3	DMS
17	20MB7T04	Stress Management	3	0	0	3	DMS
18	20AD7T11	Natural Language Processing	3	0	0	3	AIDS
19	20AM7T11	Deep Learning	3	0	0	3	AIML

MINOR COURSES OFFERED BY THE DEPARTMENT

Minor Course Fulfillments:
- The 20 additional credits need to be acquired, 16 credits can be earned by undergoing specified courses, with each carrying 4 credits.
- The remaining 4 credits must be acquired through two online MOOCs (SWAYAM /NPTEL), which shall be domain specific, each with 2 credits and with a minimum duration of 8/12weeks as recommended by the Board of Studies.
- Minor Engineering subjects are offered to other branches by AIML Department (except for AIML Students).
- Honors engineering subjects are offered to AIML Students.
- The head of the department will float the list of allowed MOOC electives in each academic year, based on the list floated by MOOCs (SWAYAM/NPTEL).

MINOR COURSES

S.No.	Course code	Course Name	L	T	P	C	Offered by
1	20AMMN01	=blfcXi Wjcb˙lc Data Science	3	1	0	4	AIML
2	20AMMN02	Introduction to AI	3	1	0	4	AIML
3	20AMMN03	NOSQL Databases	3	1	0	4	AIML
4	20AMMN04	Social Network Analysis	3	1	0	4	AIML
5	20AMMN05	Natural Language Processing	3	1	0	4	AIML
6	20AMMN06	Robotic Process Automation	3	1	0	4	AIML
7	20AMMN07	MOOC1	-	-	-	2	AIML
8	20AMMN08	MOOC2	-	-	-	2	AIML

B.Tech in Artificial Intelligence & Machine Learning

	L	**T**	**P**	**C**
B.TECH I SEMESTER **BSC**	**3**	**0**	**0**	**3**

20AM1T01 LINEAR ALGEBRA AND DIFFERENTIAL EQUATIONS

Pre-requisite: Basic knowledge about matrices, differentiation and integration

Course Objective: Objective of the course is to impart

- Basic understanding of mathematical methods to solve simultaneous linear systems
- Understanding of formation and solutions of ordinary differential equations
- Knowing the mathematical methods to solve applications of differential equations

Course Outcomes:

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

CO1: Apply the knowledge to solve a system of homogeneous and non homogeneous linear equations

CO2: Illustrate the methods of computing eigen values and eigen vectors

CO3: Able to analyze the real life situations, formulate the differential equations and then applying the methods

CO4: Determine the solutions of linear differential equations

CO5: Optimize functions of several variables and able to find extreme values of constrained functions

SYLLABUS

UNIT-I: Linear systems of equations:

Rank of a matrix, Echelon form, Normal form, PAQ is in normal form, linear dependence and independence of vectors, Consistency of linear system of equations, System of linear homogeneous equations, Gauss-elimination and Gauss -Jordan methods.

UNIT-II: Eigen values & Eigen vectors:

Eigen values, Eigen vectors, Properties of Eigen values (without proofs), Cayley-Hamilton theorem (without proof), finding inverse and powers of a matrix using C-H theorem, Reduction to diagonal form, reduction of quadratic form to canonical form using orthogonal reduction, nature of quadratic forms.

UNIT-III: Ordinary Differential Equations of first order:

Linear equations, Bernoulli's equation, Exact differential equations. Equations reducible

to exact equations, **Applications:** Orthogonal Trajectories, Newton's Law of cooling, Rate of decay & growth, R-L series circuits.

UNIT-IV: Linear Differential Equations higher order:

Definitions, Complete solution (without proof), Operator D, Rules to find complementary function, Inverse operator, Rules to find the particular integral(nonhomogeneous term of the form e^{ax} , sin(ax+b), cos(ax+b), polynomials in x^m, $e^{ax}V(x)$, any other function), Method of variation of parameters.

UNIT-V: Partial Differentiation:

Functions of two variables, Partial derivatives, Homogeneous functions, Euler's theorem, Total derivative, Jacobian and functional dependence, Taylor's theorem for functions of two variables. **Applications:** Maxima and Minima of functions of two variables, Lagrange's method of undetermined multipliers.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
2. N. P. BALI & Dr. MANISH GOYAL**,** A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

	L	**T**	**P**	**C**
B.TECH I SEMESTER BSC	**3**	**0**	**0**	**3**

20AM1T02   APPLIED CHEMISTRY

Pre-requisite: Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources

Course Objective: Objective of the course is to impart

- Importance of usage of plastics in household appliances and composites (FRP) in aerospace and automotive industries.
- Outline the basics for the construction of electrochemical cells, batteries and fuel cells. Understand the mechanism of corrosion and how it can be prevented.
- Explain the preparation of semiconductors and nanomaterials, engineering applications of nanomaterials, superconductors and liquid crystals.
- Recall the increase in demand for power and hence alternative sources of power are studied due to depleting sources of fossil fuels. Advanced instrumental techniques are introduced.
- Outline the basics of green chemistry and molecular switches

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

CO1: Analyze the different types of composite plastic materials and interpret the mechanism of conduction in conducting polymers.

CO2: Utilize the theory of construction of electrodes, batteries and fuel cells in redesigning new engineering products and categorize the reasons for corrosion and study methods to control corrosion.

CO3: Synthesize nanomaterials for modern advances of engineering technology. Summarize the preparation of semiconductors; analyze the applications of liquid crystals and superconductors.

CO4: Design models for energy by different natural sources.
Analyze the principles of different analytical instruments and their applications.

CO5: Obtain the knowledge of green chemistry and molecular machines

SYLLABUS

UNIT-I: Polymer Technology

Polymerisation: Introduction, methods of polymerization (addition and Condensation), Physical and mechanical properties.

Plastics: Compounding, fabrication (compression, injection, blown film and extrusion), preparation, properties and applications (PVC, polycarbonates and Bakelite), mention some examples of plastic materials used in electronic gadgets.

Elastomers: Natural rubber-Drawbacks-vulcanization, preparation, properties and applications (Buna S, thiokol and polyurethanes).

Composite materials: Fiber reinforced plastics – GFRP and Aramid FRP

Conducting polymers: Intrinsic and extrinsic conducting polymers

Biodegradable polymers: preparation and applications

UNIT-II: Electrochemical Cells And Corrosion

Part I: ELECTROCHEMICAL CELLS: Single electrode potential, electrochemical series and uses of series, standard hydrogen electrode, calomel electrode, batteries (Dry cell, Li ion battery and zinc air cells), fuel cells (H_2-O_2, CH_3OH-O_2, phosphoric acid and molten carbonate).

Part II: Corrosion: Definition, theories of corrosion (chemical and electrochemical), galvanic corrosion, differential aeration corrosion, stress corrosion, galvanic series, factors influencing rate of corrosion, corrosion control (cathodic protection), Protective coatings (cathodic coatings, anodic coatings, electroplating and electroless plating)

UNIT-III: Material Chemistry

Part I: Non-elemental semiconducting materials: Stoichiometric, controlled valency & chalcogen photo/semiconductors-preparation of semiconductors (distillation, zone refining, Czochralski crystal pulling technique) - Semiconductor devices (p-n junction diode as rectifier, junction transistor).

Super conductors:-Type –I, Type II-characteristics and applications

Part II: Nano materials: Introduction, sol-gel method, characterization by (Brunauer Emmet Teller[BET]), (scanning electron microscopy [SEM]) and (transmission electron microscopy [TEM]), applications of graphene and fullerenes, carbon nanotubes (types, preparation and applications)

Liquid crystals: Introduction-types-applications.

UNIT-IV: Non-Conventional Energy Sources & Spectroscopy

Part I: NON-CONVENTIONAL ENERGY SOURCES

Design, working, schematic diagram, advantages and disadvantages of photovoltaic cell, hydropower, geothermal power, tidal and wave power, ocean thermal energy conversion.

Part II: SPECTROSCOPY

UV spectroscopy- Basic principle-Instrumentation-Applications

IR spectroscopy- Basic principle-Instrumentation-Applications

NMR spectroscopy- Basic principle-Instrumentation-Applications

UNIT-V: Advanced Concepts/Topics In Chemistry

Part-I: Green chemistry: Introduction, Principles of green chemistry, Green synthesis-Aquaeous Phase method-Microwave method-Phase transfer catalysis method, R4M4 principles (Econoburette).

PART-II: Molecular switches: characteristics of molecular motors and machines, Rotaxanes and Catenanes as artificial molecular machines, prototypes – linear motions in rotaxanes, an acid- base controlled molecular shuttle, a molecular elevator, an autonomous light-powered molecular motor.

Text Books:

1. P.C. Jain and M. Jain "Engineering Chemistry", 15/e, Dhanpat Rai & Sons, Delhi,(Latest edition).
2. Shikha Agarwal, "Engineering Chemistry", Cambridge University Press, New Delhi,(2019).
3. S.S. Dara, "A Textbook of Engineering Chemistry", S.Chand & Co, (2010).
4. Shashi Chawla, "Engineering Chemistry", Dhanpat Rai Publicating Co. (Latest edition).

References:

1. K. Sesha Maheshwaramma and Mridula Chugh, "Engineering Chemistry", Pearson India
2. O.G. Palana, "Engineering Chemistry", Tata McGraw Hill Education Private Limited,(2009).
3. CNR Rao and JM Honig (Eds) "Preparation and characterization of materials" Academic press, New York (latest edition)
4. B. S. Murthy, P. Shankar and others, "Textbook of Nanoscience and Nanotechnology",University press (latest edition)

			L	T	P	C
B.TECH I SEMESTER		**HSMC**	3	0	0	3

20AM1T03   ENGLISH

Pre-requisite:

Course Objective:

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers

- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials

- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations

- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information

- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

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

CO1 understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information

CO2 ask and answer general questions on familiar topics

CO3 employ suitable strategies to master the art of letter writing and email writing

CO4 recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs

CO5 form sentences using proper grammatical structures and correct word forms

SYLLABUS

UNIT-I   A Drawer full of happiness (Detailed Study)

Deliverance (Non-detailed Study)

UNIT-II   Nehru's letter to his daughter Indira on her birthday(Detailed Study)

Bosom Friend (Non-detailed Study)

UNIT-III   Stephen Hawking-Positivity 'Benchmark' (Detailed Study)

Shakespeare's Sister(Non-detailed Study)

UNIT-IV   Liking a Tree, Unbowed: Wangari Maathai-biography (Detailed Study)

B.Tech in Artificial Intelligence & Machine Learning

Telephone Conversation(Non-detailed Study)

UNIT-V   Stay Hungry-Stay foolish (Detailed Study)

Still I Rise(Non-detailed Study)

Text Books

1. "Infotech English", Maruthi Publications. (Detailed)

2. "The Individual Society", Pearson Publications.(Non-detailed)

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.

2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.

3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.

4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.

	L	**T**	**P**	**C**
B.TECH I SEMESTER **ESC**	**1**	**0**	**4**	**3**

20AM1L04   COMPUTER ENGIENERING WORKSHOP

Course Objectives:

Skills and knowledge provided by this subject are the following:

- **PC Hardware:** Identification of basic peripherals, Assembling a PC, Installation of system software like MS Windows, device drivers, etc. Troubleshooting of PC Hardware and Software issues.

- **Internet & World Wide Web:** Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums. Awareness of cyber hygiene (protecting the personal computer from getting infected with the viruses), worms and other cyber attacks.

- **Productivity Tools:** Understanding and practical approach of professional word documents, excel spread sheets, power point presentations and personal web sites using the Microsoft suite office tools.

Course Outcomes:

CO1: Identify, assemble and update the components of a computer

CO2: Configure, evaluate and select hardware platforms for the implementation and execution of computer applications, services and systems

CO3: Make use of tools for converting pdf to word and vice versa

CO4: Develop presentation, documents and small applications using productivity tools such as word processor, presentation tools, spreadsheets, HTML, LaTex

LIST OF EXERCISES

Task 1: Identification of the peripherals of a computer - Prepare a report containing the block diagram of the computer along with the configuration of each component and its functionality. Describe about various I/O Devices and its usage.

Task 2: Practicing disassembling and assembling components of a PC

Task 3: Installation of Device Drivers, MS Windows, Linux Operating systems and Disk Partitioning, dual boating with Windows and Linux.

Task 4: Introduction to Memory and Storage Devices, I/O Port, Assemblers, Compilers, Interpreters, Linkers and Loaders.

Task 5: Demonstration of Hardware and Software Troubleshooting

Task 6: Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC, Bluetooth Technology, Wireless Technology, Modem, DSL, and Dialup Connection.

Task 7: Surfing the Web using Web Browsers, Awareness of various threats on the Internet and its solutions, Search engines and usage of various search engines, Need of anti-virus, Installation of anti-virus, configuring personal firewall and windows update.

(Students should get connected to their Local Area Network and access the Internet. In the process they should configure the TCP/IP setting and demonstrate how to access the websites and email. Students customize their web browsers using bookmarks, search toolbars and popup blockers)

Productivity Tools:

Task 8: Basic HTML tags, Introduction to HTML5 and its tags, Introduction to CSS3 and its properties. Preparation of a simple website/ homepage,

Assignment: Develop your home page using HTML Consisting of your photo, name, address and education details as a table and your skill set as a list.

Features to be covered:- Layouts, Inserting text objects, Editing text objects, Inserting Tables, Working with menu objects, Inserting pages, Hyper linking, Renaming, deleting, modifying pages, etc.,

Task 9: Demonstration and Practice of various features of Microsoft Word

Assignment:

1. Create a project certificate.

2. Creating a news letter

Features to be covered:-Formatting Fonts, Paragraphs, Text effects, Spacing, Borders and Colors, Header and Footer, Date and Time option, tables, Images, Bullets and Numbering, Table of Content, Newspaper columns, Drawing toolbar and Word Art and Mail Merge in word etc.,

Task 10: Demonstration and Practice of various features Microsoft Excel

Assignment: 1. Creating a scheduler

2. Calculating GPA

3. Calculating Total, average of marks in various subjects and ranks of students

based on marks

Features to be covered:Format Cells, Summation, auto fill, Formatting Text, Cell Referencing, Formulae in excel, Charts, Renaming and Inserting worksheets, etc.,

Task 11: Demonstration and Practice of various features Microsoft Power Point

Features to be covered:Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Hyperlinks Tables and Charts, Master Layouts, Types of views, Inserting – Background, textures, Design Templates, etc.,

Task 12: Demonstration and Practice of various features LaTeX – document preparation, presentation (Features covered in Task 9 and Task 11 need to be explored in LaTex)

Task 13: Tools for converting word to pdf and pdf to word

Task 14: Internet of Things (IoT): IoT fundamentals, applications, protocols, communication models, architecture, IoT devices

Reference Books:

1. Computer Fundamentals, Anita Goel, Pearson India Education, 2017

2. PC Hardware Trouble Shooting Made Easy, TMH

3. Introduction to Information Technology, ITL Education Solutions Limited, 2nd Edition, Pearson, 2020

4. Upgrading and Repairing PCs, 18th Edition, Scott Mueller, QUE, Pearson, 2008

5. LaTeX Companion – Leslie Lamport, PHI/Pearson

6. Introducing HTML5, Bruce Lawson, Remy Sharp, 2nd Edition, Pearson, 2012

7. Teach yourself HTML in 24 hours, By Techmedia

8. HTML 5 and CSS 3.0 to the Real World by Alexis Goldstein, Sitepoint publication.

9. Internet of Things, Technologies, Applications, Challenges and Solutions, B K Tripathy, J Anuradha, CRC Press

10. Comdex Information Technology Course Tool Kit, Vikas Gupta, Wiley Dreamtech.

11. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme, CISCO Press, Pearson Education.

12. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr. N. B. Venkateswarlu, S. Chand Publishers

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B.TECH I SEMESTER   ESC   3   0   0   3

20AM1T05   PROBLEM SOLVING THROUGH C

Pre-requisite:

Course Objective:

- To learn about the computer systems, computing environments, developing of a computer program and Structure of a C Program
- To gain knowledge of the operators, selection, control statements and repetition in C. To learn about the design concepts of arrays, strings, enumerated structure and union types and their usage. To assimilate about pointers, dynamic memory allocation and know the significance of Preprocessor. To assimilate about File I/O and significance of functions

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

CO1: Understand the basic concepts of programming

CO2: Understand and Apply loop construct for a given problem

CO3: Demonstrate the use pointers

CO4: Understand the use of functions and develop modular reusable code

CO5: Understand File I/O operations

SYLLABUS

UNIT-I:

INTRODUCTION TO COMPUTERS: Functional Components of computer, computer software, categories of memory, types of programming languages, Development of algorithms, flow charts, software development process, Computer Numbering system

BASICS OF C PROGRAMMING: Introduction to programming paradigms, Structure of C program, Data Types, C Tokens, Operators: Precedence and Associativity, Expressions Input/output statements, Assignment statements

UNIT-II:

Decision making statements: if, if else, nester if. Multi way decision making statements: else if, Switch statement. **Loop statements**: while, do while, for, Compilation process.

UNIT-III:

Introduction to Arrays: Declaration, Initialization, One dimensional array, Example Programs on one dimensional array, Selection sort, linear and binary search, two

dimensional arrays, Matrix Operations, Multi-dimensional Arrays

Strings: Declaration, String operations: length, compare, concatenate, copy, String handling functions.

UNIT-IV:

FUNCTIONS: Introduction to functions: Function prototype, function definition, function call, Built-in functions, Recursion, Storage classes, Passing Arrays & Strings to the functions, Preprocessor directives

POINTERS: Pointers, Pointer operators, Pointer arithmetic, Arrays and pointers, Array of pointers, Parameter passing: Pass by value, Pass by reference, Dynamic Memory Allocation

UNIT-V:

STRUCTURES AND UNIONS: Structure, Nested structures, Pointer and Structures, Array of structures, Example Program using structures and pointers, Self-referential structures, Unions.

FILE PROCESSING: Files, Types of file processing: Sequential access, Random access, Sequential access file, Random access file, Command line arguments

Text Books:

1. Krnighan. B.W and Ritche, D.M, "The C Programming Language", Second Edition, Pearson Education, 2006

2. ReemaThareja, "Programming in C", Oxford University Press, Second Edition, 2016.

References:

1. Pradepdey, Manas Ghosh, "Fundamentals of Computing and programming in C", First Edition, Oxford University Press, 2009.

2. Paul Deitel and Harvey Deitel, "C How to Program", Seventh Edition, Pearson Publication.

3. E Balagursamy, "Programming in C, Sixth Edition, Tata McGraw Hill.

4. Ajay Mittal, "Programming in C A practical Approach", Pearson education

		L	T	P	C
B.TECH I SEMESTER	**HSMC**	0	0	3	1.5

20AM1L06 ENGLISH COMMUNICATION SKILLS LAB

Course Objectives:

- Facilitate effective usage of functional English through role plays
- Focus on vocabulary enhancement
- Foster various nuances of phonetics and accent neutralization

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

CO1: Acquire basic proficiency in English by learning functional aspects of English language

CO2: Learn the methods of enhancing vocabulary

CO3: Acquaint himself/herself with nuances of Phonetics

LIST OF EXPERIMENTS

1. Greetings and Introductions
2. Requesting Permission & Giving Directions
3. Inviting/Complaining/Congratulating
4. Root Words
5. Phonetics-Sounds and Symbols
6. Pronunciation Rules

References:

1. Strengthen Your Steps, Maruti Publications

2. Interact, Orient Blackswan

3. Word Power Made Easy, Pocket Books

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B.TECH I SEMESTER	**BSC**	**0**	**0**	**3**	**1.5**

20AM1L07 APPLIED CHEMISTRY LAB

Pre-requisite: Acquire some experimental skills.

Course Objective: Objective of the course is to impart

- The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations.
- A few instrumental methods of chemical analysis.

Course Outcomes:

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

CO1: The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

LIST OF EXPERIMENTS

1. Determination of HCl using standard Na_2CO_3 solution.

2. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH.

3. Determination of Mn^{+2} using standard oxalic acid solution.

4. Determination of ferrous iron using standard $K_2Cr_2O_7$ solution.

5. Determination of Cu^{+2} using standard hypo solution.

6. Determination of temporary and permanent hardness of water using standard EDTA solution.

7. Determination of Fe^{+3} by a colorimetric method.

8. Determination of the concentration of acetic acid using sodium hydroxide (pH-metry method).

9. Determination of iso-electric point of amino acids using pH-metry method/conductometric method

10. Determination of the concentration of strong acid vs strong base (by conductometric method).

11. Determination of strong acid vs strong base (by potentiometric method).

12   Determination of Mg+2 present in an antacid.

13   Determination of CaCO3 present in an egg shell.

14   Estimation of Vitamin C.

15   Determination of phosphoric content in soft drinks.

16   Adsorption of acetic acid by charcoal.

17   Preparation of nylon-6, 6 and Bakelite (demonstration only).

B.TECH I SEMESTER	ESC	L T P C
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20AM1L08 PROBLEM SOLVING THROUGH C LAB

Course Objectives:

- Apply the principles of C language in problem solving.
- To design flowcharts, algorithms and knowing how to debug programs.
- To design & develop of C programs using arrays, strings pointers &functions.
- To review the file operations, preprocessor commands.

Course Outcomes:

- Demonstrate Knowledge on various concepts of a C language.
- Able to draw flowcharts and write algorithms.
- Able design and development of C problem solving skills.
- Able to design and develop modular programming skills.
- Able to trace and debug a program

Exercise 1:

1. Write a C program to print a block F using hash (#), where the F has a height of six characters and width of five and four characters.
2. Write a C program to compute the perimeter and area of a rectangle with a height of 7 inches and width of 5inches.
3. Write a C program to display multiple variables.

Exercise 2:

1. Write a C program to calculate the distance between the two points.
2. Write a C program that accepts 4 integers p, q, r, s from the user where r and s are positive and p is even. If q is greater than r and s is greater than p and if the sum of r and s is greater than the sum of p and q print "Correct values", otherwise print "Wrong values".

Exercise 3:

1. Write a C program to convert a string to a long integer.
2. Write a program in C which is a Menu-Driven Program to compute the area of the various geometrical shape.
3. Write a C program to calculate the factorial of a given number.

Exercise 4:

1. Write a program in C to display the n terms of even natural number and their sum.

2. Write a program in C to display the n terms of harmonic series and their sum. $1 + 1/2 + 1/3 + 1/4 + 1/5 \dots 1/n$ terms.

3. Write a C program to check whether a given number is an Armstrong number or not.

Exercise 5:

1. Write a program in C to print all unique elements in an array.

2. Write a program in C to separate odd and even integers in separate arrays.

3. Write a program in C to sort elements of array in ascending order.

Exercise 6:

1. Write a program in C for multiplication of two square Matrices.

2. Write a program in C to find transpose of a given matrix.

Exercise 7:

1. Write a program in C to search an element in a row wise and column wise sorted matrix.

2. Write a program in C to print individual characters of string in reverse order.

Exercise 8:

1. Write a program in C to compare two strings without using string library functions.

2. Write a program in C to copy one string to another string.

Exercise 9:

1. Write a C Program to Store Information Using Structures with Dynamically Memory Allocation

2. Write a program in C to demonstrate how to handle the pointers in the program.

Exercise 10:

1. Write a program in C to demonstrate the use of & (address of) and *(value at address) operator.

2. Write a program in C to add two numbers using pointers.

Exercise 11:

1. Write a program in C to add numbers using call by reference.

2. Write a program in C to find the largest element using Dynamic Memory Allocation.

Exercise 12:

1. Write a program in C to swap elements using call by reference.

2. Write a program in C to count the number of vowels and consonants in a string using a pointer.

Exercise 13:

1. Write a program in C to show how a function returning pointer.

2. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc( )function.

Exercise 14:

1. Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc( ) function. Understand the difference between the above two programs

2. Write a program in C to convert decimal number to binary number using the function.

Exercise 15:

1. Write a program in C to check whether a number is a prime number or not using function.

2. Write a program in C to get the largest element of an array using the function.

Exercise 16:

1. Write a program in C to append multiple lines at the end of a text file.

2. Write a program in C to copy a file in another name

3. Write a program in C to remove a file from the disk.

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B.TECH I SEMESTER	**MC**	**2**	**0**	**0**	**--**

20AM1M09 ENVIRONMENTAL SCIENCE

Course objective:

To understand the importance of Environment and the importance of biodiversity

Course outcomes:

- The importance of environment, Natural resources and current global environmental challenges for the sustenance of the life on planet earth.
- The concepts of the ecosystem and its function in the environment.
- 3.The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- The various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
- The environmental legislations of India and Social issues and the possible means
- Environmental assessment and the stages involved in EIA.

SYLLABUS

UNIT-I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Introduction- Scope of Environmental Studies- Importance of Environmental Studies- Need for public awareness, Environmental ethics- Contemporary Environmentalists- Environmental Global moves: Stockholm conference, Earth summit

Concept of an ecosystem - Structure of an ecosystem- function of an ecosystem- Food chains, food webs- ecological pyramids- Energy flow in the ecosystem- Ecological succession- Nutrient cycling- 1^oproduction& 2^oproduction- Major ecosystems: Forest ecosystem- Grassland ecosystem, Desert ecosystem- Aquatic ecosystem: pond, Lake Ecosystem- Streams, river ecosystem, Oceans

UNIT-II: NATURAL RESOURCES AND CONSERVATION

Introduction and classification of natural resources-Forest resources**:** Use and over-exploitation- Deforestation-Timber extraction-Mining- Conservation-Water resources**:** Use and over utilization of surface and ground water,- Floods, drought, Dams and associated problems- Water conservation, rain water harvesting, water shed management-Energy resources**:** renewable energy sources –solar-wind-hydro-

tidal- Ocean thermal-geo thermal-bio mass-bio gas-bio fuels- Hydrogen.- Non-renewable energy sources-coal-petroleum-natural gas-Nuclear energy

UNIT-III: BIODIVERSITY AND ITS CONSERVATION

Definition, classification- Value of biodiversity-Threats to biodiversity: habitat loss, man-wildlife conflicts- Endangered and endemic species of India-Conservation of biodiversity- Biodiversity at national and local levels, Hot-sports of biodiversity

UNIT-IV: ENVIRONMENTAL PROBLEMS

Global warming, Climate change- Acid rain, Ozone depletion- Air pollution- Water pollution- Soil pollution- Noise pollution, Nuclear hazards- Solid Waste Management: Causes, Consequences and Control methods- Solid Waste Management- Population growth and explosion, effects, control measures- Pollution case studies- Role of an individual in prevention of pollution

UNIT-V: ENVIRONMENTALLEGISLATION & MANAGEMENT

Sustainable development- Air (Prevention and Control of Pollution) Act-Drawbacks- Water (Prevention and control of Pollution) Act- Drawbacks- Wildlife Protection Act- Drawbacks- Forest Conservation Act- Drawbacks- Environmental Protection Act- Drawbacks- Environmental Impact Assessment and its significance- Preparation of Environmental Management Plan and Environmental Impact Statement- Ecotourism

TEXT BOOKS:

1. Environmental Studies, Anubha Kaushik, C P Kaushik, New Age Publications, New Delhi

2. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada

3. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.

4. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCES:

1. Text Book of Environmental Studies, Deeshita Dave & P. UdayaBhaskar, Cengage Learning.

2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi

3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi

4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Delhi

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B.TECH II SEMESTER	**BSC**	3	0	0	3

20AM2T01 TRANSFORM TECHNIQUES

Pre-requisite: Linear Algebra and Differential Equations

Course Objective: Objective of the course is to impart

- Learning the techniques of Laplace transforms to solve ordinary differential equations
- knowledge of Fourier series & Fourier transforms for piecewise continuous functions
- knowledge of solving boundary valued problems

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

CO1: Able to analyze a class of integrals in terms of beta and gamma functions

CO2: Provide the techniques of Laplace transformations and able to solve problems related to digital signal processing

CO3: Analyze the general periodic functions in the form of an infinite convergent sine and cosine series

CO4: Illustrate the methods to solve the boundary value problems

CO5: Determine a solution of a discrete system using Z- transforms

SYLLABUS

UNIT-I: Special functions:

Beta function, Properties & problems, Gamma function, properties & problems, Relation between Beta and Gamma functions, Evaluation of improper integrals.

UNIT-II: Laplace Transforms (all properties without proofs):

Definition, Transforms of elementary functions, properties of Laplace transforms, Transforms of periodic functions, Transforms of derivatives and integrals, Multiplication by t^n, Division by t, Evaluation of improper integrals.
Inverse Laplace transforms–Method of partial fractions, other methods of finding inverse transforms, Convolution theorem (without proof). **Application:** Application to differential equations.

UNIT-III: Fourier Series & Fourier Transforms:

Euler's formulae (without proof), Conditions of Fourier expansion, Functions having points of discontinuity, Change of inerval, Even and odd functions, Half-range series. Fourier Integral theorem (without proof), Fourier cosine & sine integral, complex form of Fourier integral, Fourier transform, Fourier sine & cosine transforms, properties of Fourier transforms (without proof), Convolution theorem(without proof), finite & infinite Fourier sine & cosine transforms.

UNIT-IV: Partial Differential Equations:

Formation of partial differential equations by eliminating arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange) equation and nonlinear (standard type) equations. Method of separation of Variables, Applications: One-dimensional wave and heat equations, two-dimensional heat equation.

UNIT-V: Z-Transforms: (all properties without proofs)

Introduction, definition, some standard z-transforms, linearity property, damping rule, some standard results, shifting U_n to the right, multiplication by n, initial and final value theorems, Inverse z-transforms, convolution theorem, evaluation of inverse z-transforms by partial fractions, applications to difference equations.

Text Books:

1. B. S. GREWAL, Higher Engineering Mathematics, Khanna Publishers, 43rd Edition, 2014.
2. B. V. RAMANA, Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007.

Reference Books:

1. ERWIN KREYSZIG, Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015.
2. N. P. BALI & Dr. MANISH GOYAL, A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

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B.TECH II SEMESTER	**BSC**	**3**	**0**	**0**	**3**

20AM2T02   APPLIED PHYSICS

Pre-requisite: Knowledge of basic concepts of waves, Optics, Electricity and Magnetism

Course Objective: Objective of the course is to impart

- *Knowledge* of fundamentals of Physics which helps them in the study of advanced topics of Engineering.
- *Develop* analytical capability and understand various Engineering concepts.

Course Outcomes:

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

CO1: *Impart* knowledge of Physical Optics phenomenon Polarization and identify these phenomenon in natural processes

CO2: *Gain* knowledge of applications of lasers and optical fibers in various fields .

CO3: *Classify* magnetic and dielectric materials and their Engineering applications.

CO4: *Understand* basic quantum mechanics and free electron theories.

CO5: *Obtain* the concept of concept of holes and electrons in semiconductors.

SYLLABUS

UNIT-I: Wave Optics:

Interference: Introduction-Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Colors in thin films-Newton's rings-Determination of wave length nd refractive index.

Diffraction: C Introduction- Fresnel and Fraunhofer diffraction - Fraunhofer Diffraction due to Single slit, Double slit, N –slits(Qualitative) - Diffraction Grating – Resolving Power of Grating(Qualitative).

Polarizations: Introduction- Types of polarization-polarization by reflection, refraction and Double refraction-Nicol's prism –Half and Quarter wave plates.

UNIT-II: Lasers and Fiber Optics:

Lasers:: Introduction – Characteristics of laser – Spontaneous and Stimulated emissions of radiation – Einstein's coefficients – Population inversion – Lasing action - Pumping Schemes – Ruby laser – He-Ne laser - Applications of lasers.

*Fiber optics***:** Introduction –Principle of optical fiber-Construction- - Acceptance Angle - Numerical Aperture -Classification of optical fibers based on refractive index profile and modes .

UNIT-III: Magnetic   and Dielectric Materials:

*Magnetic Materials***:** Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Bohr magneton – Classification of magnetic materials: Dia, para ferro, anti ferro & ferri – Domain concept of Ferromagnetism(Qualitative) - Hysteresis – soft and hard magnetic materials .

*Dielectric Materials***:** Introduction - Dielectic polarization **–** Dielectric Polarizability, Susceptibility and Dielectric constant-types of polarizations: Electronic and Ionic (Quantitative), Orientational polarizations (qualitative) – Lorentz Internal field – Claussius-Mossoti equation.

UNIT-IV: Quantum Mechanics,Free Electron Theory:

*Quantum Mechanics***:** Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

*Free Electron Theory***:** Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory– Equation for electrical conductivity based on quantum free electron theory- Fermi**-**Dirac distribution- Density of States(3D),Fermi energy.

UNIT-V: Band Theory of Solids and Semiconductors:

Band theory of Solids: Introduction- Bloch's Theorem (Qualitative) - Kronig - Penney model (Qualitative)- E vs K diagram - V vs K diagram - effective mass of electron – Classification of crystalline solids–concept of hole.

*Semiconductors:***:**Introduction– Intrinsic semi conductors - density of charge carriers - Electrical conductivity – Fermi level – extrinsic semiconductors - p-type & n-type - Density of charge carriers - Dependence of Fermi energy on carrier concentration and temperature – Drift and Diffusion currents – Einstein's equation-Hall effect- Hall coefficient - Applications of Hall effect.

Text Books

1. "A Text book of Engineering Physics" by M.N. Avadhanulu, P.G. Kshirsagar - S. Chand Publications, 2019.
2. "Engineering Physics" by D.K. Bhattacharya and Poonam Tandon, Oxford press (2015).

3. "Engineering Physics" by R.K Gaur. and S.L Gupta., - Dhanpat Rai publishers, 2012.

Reference Books

1. Applied Physics by P.K. Palanisamy, Scitech publications (2014).

2. Engineering Physics by M. Arumugam, Anuradha Publication (2014).

3. Physics for Engineers by M.R. Srinivasan, New Age international publishers (2009).

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B.TECH II SEMESTER ESC	3	0	0	3

20AD2T03   COMPUTER ORGANIZATION

Course Objectives:

- The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.

- It provides an in depth understanding of basic organization, design, programming of a simple digital computer, computer arithmetic, instruction set design, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems.

Course Outcomes

By the end of the course the student will be able to

CO1: Demonstrate an understanding of the design of the functional units **of** a digital computer system. Relate Postulates of Boolean algebra and minimize combinational functions

CO2: Design and analyze combinational and sequential circuits

CO3: Implementation of computer arithmetic operations and to know the basic computer instruction formats

CO4: Obtain how micro programmed control is used to interact with units of components of CPU

CO5: Understanding of **o**rganization and architecture of input output and memory

SYLLABUS

UNIT I:

Digital Components and Data Representation:

Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation, other Binary codes, Error Detection Codes

Digital Components: Digital Components, logic gates, Boolean Algebra, Map Simplification

UNIT II:

Digital logic circuits: Combinatorial Circuits: Introduction, Combinatorial Circuit Decoders, Multiplexers.

Sequential Circuits: Flip-Flops-SR Flip flop, D Flip flop, JK Flip flop, T Flip flop, Edge Triggered File flop. Sequential Circuits: flip flop input equations, state table, state diagram, Design example and procedure Registers, Shift Registers, Binary Counters

UNIT III:

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT IV:

Micro programmed Control: Control memory, Address sequencing, micro program example, design of control unit.

Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

UNIT V:

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access

Text Books:

   1. Computer System Architecture, 3rded., M.MorrisMano, PHI

Reference Books:

   1. Digital Logic and Computer Organization, Rajaraman, Radhakrishnan, PHI, 2006
   2. Computer Organization, 5thed., Hamacher, Vranesic and Zaky,TMH,2002
   3. Computer Organization & Architecture: Designing for Performance, 7thed., William Stallings, PHI,

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B.TECH II SEMESTER	**ESC**	**3**	**0**	**0**	**3**

20AM2T04   DATA STRUCTURES

Course Objectives:

- Introduce the fundamental concept of data structures and abstract data types
- Emphasize the importance of data structures in developing and implementing efficient algorithms
- Describe how arrays, records, linked structures, stacks, queues, trees, and graphs are represented in memory and used by algorithms

Course Outcomes:

CO1: Understand the properties, interfaces, and behaviors of basic abstract data types.

CO2: Understand and apply linked lists

CO3: Apply Stacks and Queue data structures.

CO4: Demonstrate different methods for traversing trees.

CO5: Demonstrate the application of Graphs

SYLLABUS

UNIT I

Data Structures - Definition, Classification of Data Structures, Operations on Data Structures, Abstract Data Type (ADT), Preliminaries of algorithms. Time and Space complexity.

Searching - Linear search, Binary search, Fibonacci search.

Sorting- Insertion sort, Selection sort, Exchange (Bubble sort, quick sort), distribution (radix sort), merging (Merge sort) algorithms.

UNIT II

Linked List: Introduction, Single linked list, Representation of Linked list in memory, Operations on Single Linked list-Insertion, Deletion, Search and Traversal, Reversing Single Linked list, Applications on Single Linked list- Polynomial Expression Representation, Addition and Multiplication, Sparse Matrix Representation using Linked List, Advantages and Disadvantages of Single Linked list, Double Linked list-Insertion, Deletion, Circular Linked list-Insertion, Deletion.

UNIT III

Queues: Introduction to Queues, Representation of Queues-using Arrays and using Linked list, Implementation of Queues-using Arrays and using Linked list, Application of Queues- Circular Queues

Stacks: Introduction to Stacks, Array Representation of Stacks, Operations on Stacks, Linked list Representation of Stacks, Operations on Linked Stack, Applications- Infix to Postfix Conversion, Evaluating Postfix Expressions.

UNIT IV

Trees: Basic Terminology in Trees, Binary Trees-Properties, Representation of Binary Trees sing Arrays and Linked lists. Binary Search Trees- Basic Concepts, BST Operations: Insertion, Deletion, Tree Traversals, Applications-Expression Trees, Heap Sort, Balanced Binary Trees- AVL Trees, Insertion, Deletion and Rotations.

UNIT V

Graphs: Basic Concepts, Representations of Graphs-Adjacency Matrix and using Linked list, Graph Traversals (BFT & DFT), Applications- Minimum Spanning Tree Using Prims &Kruskals Algorithm, Dijkstra's shortest path, Transitive closure, Warshall's Algorithm.

Text Books:

1. Data Structures Using C. 2ndEdition. Reema Thareja, Oxford.
2. Data Structures and algorithm analysis in C, 2nded, Mark Allen Weiss.

Reference Books:

1. Fundamentals of Data Structures in C, 2nd Edition, Horowitz, Sahni, Universities Press.
2. Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg, Behrouz A. Forouzon, Cengage.
3. Data Structures with C, Seymour Lipschutz TMH

		L	T	P	C
B.TECH II SEMESTER	**ESC**	**3**	**0**	**0**	**3**

20AM2T05   PYTHON PROGRAMMING

Course Objectives:

- Identify/characterize/define a problem
- Design a program to solve the problem
- Create executable code
- Read most Python code

Course Outcomes:

CO1: Understand the fundamentals of Python programming language.

CO2: Understand Data Structures

CO3: Understand the use of functions in Python

CO4: Understand the Object-Oriented Programming concepts of Python

CO5: Apply regular expressions for different situations.

SYLLABUS

UNIT – I:

Introduction: History of Python, Need of Python Programming, Applications of Python Programming Variables, Assignment, Keywords, Input-Output, Indentation.

Types, Operators, and Expressions: Types – Integers, Strings, Booleans; Operators-Arithmetic Operators, Comparison (Relational) Operators, Assignment Operators, Logical Operators, Bitwise Operators, Membership Operators, Identity Operators, Expressions and order of evaluations Control Flow- if, if-elif-else, for, while break, continue, pass

UNIT – II:

Data Structures Lists – Operations, Slicing, Methods; Tuples, Sets, Dictionaries, Sequences. Comprehensions.

UNIT – III:

Functions – Defining Functions, Calling Functions, Passing Arguments, Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function- Global and Local Variables. Modules: Creating modules, import statements, from. The import statement, name spacing, Python packages, Introduction to PIP, Installing Packages via PIP, Using Python Packages

B.Tech in Artificial Intelligence & Machine Learning

UNIT – IV:

Object-Oriented Programming OOP in Python: Classes, 'self-variable', Methods, Constructor Method, Inheritance, Overriding Methods, Data hiding, Error, and Exceptions: Difference between an error and Exception, Handling Exception, try except for block, Raising Exceptions, User Defined Exceptions

UNIT – V:

Regular expressions: Power of pattern matching and searching using regex in python, Meta characters and Sequences used in Patterns, Password, email, URL validation using regular expression, Pattern finding programs using regular expression.

Text Books:

1. Learning Python, Mark Lutz, Orielly

2. Guido van Rossum and Fred L. Drake Jr, ―An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011.

3. Reema Thareja, "Python Programming using Problem Solving Approach", ISBN-13:978-0-19- 948017-3, Oxford University Press, 2017.

Reference Books:

1. Think Python, Allen Downey, Green Tea Press
2. Core Python Programming, W.Chun, Pearson.
3. Introduction to Python, Kenneth A. Lambert, Cengage
4. "Python in easy steps In Easy Steps", Mike MC Grath, illustrated edition, In easy steps 2013 publishers.
5. Professional Python Frameworks: Web 2.0 Programming, Dana Moore, Raymond Budd, William Wright, Wrox Publication, ISBN: 978-0-470-13809-0, October 2007.

B.TECH II SEMESTER   BSC

L	T	P	C
0	0	3	1.5

20AM2L06   APPLIED PHYSICS LAB

Pre-requisite: Fundamental understanding of usage of an instrument with proper care.

Course Objective: Objective of the course is to impart

- Training Engineering graduates to handle instruments and their usage methods to improve the accuracy of measurements.

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

CO1:   **Outcomes**: The student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

CO2:   Implement the basic principles of Mechanics to measure different physical parameters.

CO3:   Enhance the knowledge of Usage of electronic devices in various applications

SYLLABUS

1. Newton's rings –Determination of radius of curvature of Plano Convex Lens.
2. Determination of wavelength of spectral lines -Diffraction Grating
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of wavelength of laser source using diffraction grating
5. Determination of Numerical Aperture and bending loss of a given Optical Fiber.
6. Determination of dispersive power of prism.
7. Determination of Rigidity modulus of a material- Torsional Pendulum.
8. Determination of Acceleration due to Gravity and Radius of Gyration-Compound Pendulum.
9. Determination of Young's modulus by method of single cantilever oscillations
10. Verification of laws of vibrations in stretched strings – Sonometer.

11. Estimation of Planck's Constant using Photo electric Effect

12. Study of I /V Characteristics of Semiconductor diode.

13. I/V characteristics of Zener diode.

14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus

15. Energy Band gap of a Semiconductor using p - n junction diode

Reference Books

1. A Text book of Practical Physics, Balasubramanian S, Srinivasan M.N, S Chand Publishers, 2017.

	L	T	P	C
B.TECH II SEMESTER ESC	0	0	3	1.5

20AM2L07 DATA STRUCTURES LAB

Course Objectives:

The objective of this lab is to

- Demonstrate the different data structures implementation.

Course Outcomes:

- Use basic data structures such as arrays and linked list.
- Programs to   demonstrate fundamental algorithmic   problems including Tree Traversals, Graph traversals, and shortest paths.
- Use various searching and sorting algorithms.

List of Experiments:

Exercise -1 (Searching)

a) Write C program that use both recursive and non-recursive functions to perform Linear search for a Key value in a given list.

b) Write C program that use both recursive and non-recursive functions to perform Binary search for a Key value in a given list.

Exercise -2 (Sorting-I)

a) Write C program that implement Bubble sort, to sort a given list of integers in ascending order.

b) Write C program that implement Quick sort, to sort a given list of integers in ascending order.

c) Write C program that implement Insertion sort, to sort a given list of integers in ascending order.

Exercise -3 (Sorting-II)

a) Write C program that implement radix sort, to sort a given list of integers in ascending order

b) Write C program that implement merge sort, to sort a given list of integers in ascending order

Exercise -4 (Singly Linked List)

a) Write a C program that uses functions to create a singly linked list

b) Write a C program that uses functions to perform insertion operation on a singly linked list

c) Write a C program that uses functions to perform deletion operation on a singly linked list

d) Write a C program to reverse elements of a single linked List.

Exercise -5 (Queue)

a) Write C program that implement Queue (its operations) using arrays.

b) Write C program that implement Queue (its operations) using linked lists

Exercise -6 (Stack)

a) Write C program that implement stack (its operations) using arrays

b) Write C program that implement stack (its operations) using Linked list

c) Write C program for implementing infix to postfix conversion

d) Write a C program that uses Stack operations to evaluate postfix expression

Exercise -7 (Binary Tree)

Write a recursive C program for traversing a binary tree in preorder, in-order and post-order.

Exercise -8 (Binary Search Tree)

a) Write a C program to Create a BST

b) Write a C program to insert a node into a BST.

c) Write a C program to delete a node from a BST.

Exercise-9

Write a program for implementing Heap Sort.

	L	T	P	C
B.TECH II SEMESTER ESC	0	0	3	1.5

20AM2L08 PYTHON PROGRAMMING LAB

Course Objectives:

The objective of this lab is to

- To elucidate problem solving through python programming language.
- To introduce function-oriented programming paradigm through python.
- To train in development of solutions using modular concepts.
- To teach practical Python solution patterns

Course Outcomes

CO1: Develop fundamental programs in python programming language.

CO2: Develop Python programs for numerical and text-based problems.

CO3: Develop Python programs on object-oriented programming and regular expressions.

CO4: Develop python programs on data structures.

LIST OF EXPERIMENTS

1. Write a program to perform various list of operations (eg: Arithmetic, logical, bitwise etc) in python.
2. Write a program to implement control flow statements.
3. Write a program implementing various predefined function of Lists, Sets, Tuples and Dictionaries.
4. Write a program covering various arguments for a function.
5. Write a program to implement various types of functions.
6. Write a program to implement recursion.
7. Write a program to implement command line arguments.
8. Write a program to create a class and its constructors.
9. Write a program to implement inheritance.
10. Write a program for exception handling.
11. Write a program to perform various linear algebra operations like finding eigen values and vectors, determinant and trace for a matrix.

12. Write a program to perform matrix operations like addition, subtraction, multiplication of matrices using Numpy Module.

13. Write a program to use System, math etc., packages.

14. Write a Python program to find the occurrence and position of the substrings within a string.

15. Write a Python program to replace all occurrences of space, comma, or dot with a colon.

16. Write a Python program to match a string that contains only upper and lowercase letters, numbers, and underscores.

B.TECH III SEMESTER

	L	T	P	C
BSC	3	0	0	3

20AM3T01 NUMERICAL METHODS & VECTOR CALCULUS

Course Objectives:

- Understand the basic numerical methods to solve simultaneous linear equations.
- Knowledge of numerical methods to solve ordinary differential equations.
- The types of integration over the lines, surfaces & volumes.

Course Outcomes:

By the end of the course students shall be able to

CO1: Determine the solution of transcendental equations by different numerical methods

CO2: Provide the interpolation techniques which analyze the data of an unknown function.

CO3: Illustrate the numerical methods to determine solutions for a class of ordinary differential equations involving irregularly shaped boundaries.

CO4: Evaluate areas and volumes using double & triple integrals.

CO5: Apply the concepts of calculus to scalar and vector fields and establish the relation between line, surface and volume integrals.

SYLLABUS

UNIT-I: Numerical Solution of Equations:

Solution of Algebraic and transcendental equations: Bisection method, Method of false position and Newton-Raphson method. Iterative methods of solution of linear simultaneous equations: Jacobi's and Gauss-Seidel iteration methods.

UNIT-II: Interpolation:

Forward and backward, relation between these operators, Differences of a polynomial, Interpolation with unequal intervals: Lagrange's interpolation formula, Newton's forward & backward interpolation formulae & problems

UNIT-III: Numerical Integration & Numerical Solutions of ordinary differential equations with initial conditions:

Numerical Integration: Trapezoidal rule, Simpson's 1/3rd and 3/8th rules. Numerical Solution of ODE: Picard's method, Taylor's series method, Euler's method, Modified Euler's method, Runge-Kutta method of 4th order.

UNIT-IV: Multiple Integrals:

Double integrals in Cartesian & polar coordinates, Change of order of integration, Triple integrals, Change of variables (Cartesian to Polar, Rectangular coordinates to Cylindrical & Rectangular coordinates to Spherical polar coordinate systems).

Applications: Area enclosed by plane curves, Volume of solids.

UNIT-V: Vector Differentiation & Vector Integration:

Introduction, Scalar and Vector point functions, Del applied to scalar point functions- Gradient, directional derivatives, Del applied to vector point functions- Div& Curl, physical interpretation of div & curl, Del applied twice to point functions, Del applied to products of point functions (Identities without proofs).

Line integral, Green's theorem in the plane (without proof), Surface integrals, Stoke's theorem (without proof), Volume integral, Gauss Divergence theorem (without proof)

TEXT BOOKS:

1. **B. S. GREWAL,** Higher Engineering Mathematics, Khanna Publishers**,** 43rd Edition, 2014

2. **B.V.RAMANA,** Higher Engineering Mathematics, Tata MC Graw Hill, 1st Edition, 2007

REFERENCE:

1. **ERWINKREYSZIG,** Advanced Engineering Mathematics, John Wiley & Sons, 10th Edition, 2015

2. **N. P. BALI & Dr. MANISH GOYAL,** A Text book of Engineering Mathematics, Lakshmi Publications, 9th Edition, 2014.

B.TECH III SEMESTER

PCC	L	T	P	C
	3	0	0	3

20AM3T02 OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Course Objectives:

- To learn the fundamentals of object-oriented programming.
- To implement object-oriented concepts using Java.
- To understand how to design object-oriented applications using Java.

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

CO1: Understand the concepts of Object-Oriented Programming and Java Programming constructs.

CO2: Demonstrate the concepts – Strings, Inheritance and Interfaces.

CO3: Build efficient and error-free codes using exception handling and demonstrate multi-threading

CO4: Design GUI applications using Event Handling and Abstract Window Toolkit.

CO5: Develop real-time applications using Applets and Swings.

SYLLABUS

UNIT - I:

Introduction to OOP, procedural programming language vs. object- oriented language, principles of OOP, applications of OOP, history of java, java features, JVM. Variables, primitive data types, identifiers, literals, operators, expressions, precedence rules and associativity, primitive type conversion and casting.

Control Statements: Introduction, if statement, Nested if statement, if–else statements, Ternary Operator, Switch Statement, Iteration Statements: while statement, do–while Loop, for Loop, Nested for Loop, For–Each for Loop, Break Statement, Continue Statement.

Classes and objects: class declaration, creating objects, methods, method overloading, constructors and constructor overloading, garbage collector.

UNIT - II:

Basic Input-Output Operations. String, String Buffer and String Tokenizer classes.

Inheritance: types of inheritance, super keyword, final keyword, overriding and abstract class.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, importance of static keyword, this keyword, arrays, command line arguments, nested classes

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B.Tech in Artificial Intelligence & Machine Learning

UNIT – III:

Packages and Java Library: creating and using packages, importance of CLASSPATH and java. Lang package.

Exception handling: importance of try, catch, throw, throws and finally block, user- defined exceptions, Assertions.

Multithreading: Introduction, thread life cycle, creation of threads, thread priorities, thread synchronization, communication between threads. File Handling: Reading data from files and writing data to files, random access file.

UNIT - IV:

Event Handling: Events, Event sources, Event classes, Event Listeners, Event Delegation model, handling mouse and key board events, Adapter classes, inner classes.

AWT: Class hierarchy, user- interface components- labels, button, canvas, scrollbars, text components, checkbox, checkbox groups, choices, list panes-scroll pane, dialogs, menu bar, graphics, layout manager- layout manager types- boarder, grid, flow, card and grid bag.

UNIT - V:

Applets: Concepts of Applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameter stoapplets.

Swings: Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing– JApplet, JFrame and J Component, I consand Labels, text fields, buttons-The J Button class, Check boxes, Radio Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees and Tables

TEXTBOOKS:

1. Herbert Schildt ―Java The Complete Reference, 11th Edition, McGraw-Hill Education.
2. E Balagurusamy ―Programming with Java: A Primer, 4th Ed, Tata McGraw Hill Education Pvt Ltd

REFERENCES:

1. Java Programming, K. Rajkumar. Pearson
2. Core Java, Black Book, R Nageswararao, Wiley, Dream Tech
3. Core Java for Beginners, Rashmi Kanta Das,vikas.
4. Object Oriented Programming Through java, P. Radha Krishna, Universities Press.
5. Introduction to java programming, 7th edition by Y Daniel Liang, Pearson.

B. TECH III SEMESTER

	L	T	P	C
PCC	**3**	**0**	**0**	**3**

20AM3T03 DATABASE MANAGEMENT SYSTEMS

Course Objectives:

* Understand the basic database concepts, applications, schema and various models
* Familiarize with entity relation model for a data base and write queries using SQL
* Emphasize the importance of normalization, transaction management and concurrency control in databases.

Course Outcomes:

Upon successful completion of the course, the student will be able to:

CO1: Understand the concept of database, database models and familiarize with Entity Relationship models.

CO2: Demonstrate the use of constraints, relational algebra operations.

CO3: Apply SQL queries to interact with database and understand the basics of NOSQL.

CO4: Apply normalization in database design to eliminate anomalies

CO5: Understand the basic concepts of transaction processing and concurrency control.

SYLLABUS

UNIT - I:

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS.

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model.

UNIT - II:

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT – III:

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values,

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complex integrity constraints in SQL, triggers and active data bases.

NOSQL: Definition of NOSQL, History of NOSQL and Different NOSQL products, Applications, features of NoSQL, Difference between SQL and NoSQL

UNIT – IV:

Schema Refinement (Normalization): Introduction to Schema Refinement, Functional Dependencies Reasoning about FDs, Normal Forms, Properties of decomposition, Normalization, Schema refinement in database design, Other kinds of dependencies

UNIT - V:

Transaction Management and Concurrency Control: Properties of transactions, Transactions and Schedules, Concurrent execution of transactions, Lock-based concurrency control, deadlocks, Performance of locking.

Concurrency Control: 2PL, Serializability, recoverability, Introduction to lock management, dealing with deadlocks.

TEXT BOOKS:

1. Raghu rama Krishnan, Johannes Gehrke, "Data base Management Systems", 3rd Edition, TATA McGraw Hill.
2. "Professional NOSQL" by Shashan k Tiwari, 2011, WROX Press

REFERENCES:

1. Peter Rob & Carlos Coronel, "Data base Systems design, Implementation, and Management", 7th Edition, Pearson Education, 2000.
2. Silberschatz, Korth, "Data base System Concepts", 6th Edition, McGraw Hill, 2010.
3. Elmasri Navathe, "Fundamentals of Database Systems", 5th Edition, Pearson Education, 2007.
4. C.J.Date, "Introduction to Database Systems", 7th Edition, Pearson Education,2002

	PCC	**L**	**T**	**P**	**C**
B. TECH III SEMESTER		**3**	**0**	**0**	**3**

20AM3T04 INTRODUCTION TO ARTIFICIAL INTELLIGENCE

Course Objective:

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs
- To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning

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

CO1: Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem

CO2: Apply the language/framework of different AI methods for a given problem.

CO3: Implement basic AI algorithms- standard search algorithms or dynamic programming

CO4: Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports

SYLLABUS

Unit-I:

Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

Unit-II:

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction.

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games

Unit-III:

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

Unit-IV:

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames. Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web.

Unit-V:

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory .Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

TEXT BOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning
2. Artificial intelligence, A modern Approach , 2nded, Stuart Russel, Peter Norvig, PEA

REFERENCES:

1. Artificial Intelligence- Deepak Khemani, TMH, 2013
2. Introduction to Artificial Intelligence, Patterson, PHI.
3. Atificial intelligence, structures and Strategies for Complex problem solving, - George F Lugar, 5thed, PEA.

E-RESOURCES:

1. https://nptel.ac.in
2. http://aima.cs.berkeley.edu/

B. TECH III SEMESTER		L	T	P	C
	PCC	3	0	0	3

20AM3T05 OPERATING SYSTEMS

Course Objectives:
- Understand the importance of Operating System and its services.
- To impart the concepts of process, memory and file management techniques.
- To familiarize with the deadlock handling techniques.

Course Outcomes:

CO1: Understand the importance, functions and structures of operating systems

CO2: Analyze and compare the performance of various CPU scheduling algorithms.

CO3: Develop software or hardware-based solutions for process synchronization.

CO4: Apply deadlock handling techniques to avoid deadlocks.

CO5: Compare various Memory Management Schemes and analyze various disk Scheduling Algorithms.

SYLLABUS

UNIT-I:

Introduction: Defining operating system, operating system structures, operating systems operations, User and Operating-System Interface, Operating-system services, System calls: Types of system calls, operating system debugging, System Boot.

Study of Linux System: Components of LINUX, Inter process Communication

UNIT–II:

Process Management: Process Concept, Process state, Process control block (PCB), Process scheduling, Scheduling queues, Schedulers, Operations on Processes, Process creation, Process Termination, Process, Inter process communication.

Multithreaded Programming: Multi threading models, Scheduling: Basic Concepts, Scheduling algorithms

UNIT–III:

Synchronization: The critical section problem, Peterson's solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors.

File System Interface: File attributes, File operations, Access methods, Directory and Disk structures

UNIT–IV:

B.Tech in Artificial Intelligence & Machine Learning

Deadlocks: Deadlock characterization, Methods for handling deadlocks: deadlock-Prevention - Mutual Exclusion, Hold and wait, No preemption, Circular wait, Avoidance-Safe state, Resource allocation, Bankers's Algorithm, Safety Algorithm, Detection-Single instance of each resource type, several instances of a resource type, Detection algorithm usage, recovery from Deadlock

UNIT–V:

Memory Management Strategies: Swapping, Contiguous memory allocation, Paging, Segmentation

Virtual-Memory Management: Demand paging, Page replacement Algorithms, Thrashing.

Mass-storage structure: Magnetic disk, Disk Scheduling.

TEXT BOOKS:

1. Abraham Silberschatz, Peter B, Galvin, Greg Gagne, Operating System, John Wiley, 9th edition. (Unit-1,2,3,4,5)
2. Stallings, Operating Systems - Internal and Design Principles, Pearson education, 6th edition –2005. (Unit-5).

REFERENCES:

1. D. M. Dhamdhere, Operating systems- A Concept based Approach, TMH, 2nd edition.
2. Andrew S Tanenbaum, Modern Operating Systems, PHI, 4th edition.
3. Charles Crowley, Operating Systems: A Design-Oriented Approach, Tata Mc Graw HillEducation, 1996.

		L	T	P	C
B. TECH III SEMESTER	PCC	0	0	3	1.5

20AM3L06 OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

Course Objectives:
- Understand fundamentals of Object-Oriented Programming in java including defining classes, invoking methods using class libraries etc.,
- Demonstrate an understanding of graphical user interfaces, multi-threaded programming and event driven programming.

Course Outcomes: At the end of the course, the students will be able to:

CO1: Implement java applications using OOP principles and proper program structuring.

CO2: Develop java programs using packages, inheritance and interfaces

CO3: Implement error and exception handling techniques

CO4: Design event driven GUI and real-time web related applications.

SYLLABUS

Exercise - 1 (Basics)

a) Write a JAVA program to display default value of all primitive data type of JAVA

b) Write a java program that display the roots of a quadratic equation $ax2+bx=0$. Calculate the discriminate D and basing on value of D, describe the nature of root.

Exercise –2 (Operations, Expressions, Control-flow, Strings)

a) Write a JAVA program to search for an element in a given list of elements using binary search mechanism

b) Write a JAVA program to sort for an element in a given list of elements using bubble sort

c) Write a JAVA program to sort for an element in a given list of elements using merge sort

d) Write a JAVA program using String Buffer to delete, remove character.

Exercise - 3 (Class, Objects)

Implement java programs using the concept of

a) Class mechanism. Create a class, methods and invoke them inside main method.

b) Constructor. c) Construct or over loading.   d) Method overloading

Exercise -4 (Inheritance) Implement java programs using the concept of

B.Tech in Artificial Intelligence & Machine Learning

a) Single Inheritance   b) Multilevel Inheritance   c) Abstract class

Exercise - 5 (Inheritance - Continued) Implement java programs using the concept of

a) "super" keyword.   b) Interfaces

Exercise – 6 (Runtime Polymorphism)

a) Write a JAVA program that implements Runtime polymorphism

Exercise – 7 (Exception)

Implement the programs by using the concepts of

a) Exception handling mechanism   b) Multiple catch clauses

c) Finally   d) Creating user defined exceptions

Exercise – 8 (Threads)

a) Write a JAVA program that creates threads by extending Thread class. First thread displays "Good Morning" every 1 sec, the second thread displays "Hello" every 2 seconds and the third display "Welcome" every 3 seconds, (Repeat the same by implementing Runnable)

b) Write a program illustrating is Alive and join()

c) Write a Program illustrating Daemon Threads.

Exercise – 9 (Packages)

a) Create a user defined package and demonstrate different ways of importing packages

Exercise - 10 (Applet)

a) Write a JAVA program to paint like paint brush in applet.

d) Write a JAVA program to create different shapes and fill colors using Applet.

Exercise -11 (Event Handling)

a) Write a JAVA program that display the x and y position of the cursor movement using Mouse.

b) Write a JAVA program that identifies key-up key-down event user entering text in a Applet.

		L	**T**	**P**	**C**
B. TECH III SEMESTER	**PCC**	**0**	**0**	**3**	**1.5**

20AM3L07 DATABASE MANAGEMENT SYSTEMS LAB

Course Objectives:

- Populate and query a database using SQL-DDL/DML `commands.
- Understand various advanced query executions such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL.
- Develop solutions using PL/SQL for database applications using procedures, cursors and triggers.

Course Outcomes:

CO1: Design database schema for a given application and apply normalization.

CO2: Acquire skills in using SQL commands for data definition and data manipulation.

CO3: Develop solutions for database applications using procedures, cursors and triggers

CO4: Develop solutions using PL/SQL procedures.

LIST OF EXPERIMENTS

1. Introduction to SQL: DDL, DML, DCL,TCL.
2. Queries for Creating Tables with Constraints, Views.
3. Example SQL Queries using select.
4. Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN).
5. Queries using Group By, Order By, and Having Clauses and Working with Index, Sequence, Synonym.
6. Queries to facilitate acquaintance of Built-In Functions, String Functions, Numeric Functions, Date Functions and Conversion Functions.
7. Queries on Joins and Correlated Sub-Queries.
8. Write a PL/SQL Code using Basic Variable, Anchored declarations, and Usage of Assignment Operation.
9. Write a PL/SQL Code Bind and Substitution Variables. Printing in PL/SQL.
10. Write a PL/SQL block using SQL and Control Structures in PL/SQL.
11. Write a PL/SQL Code using Cursors, Exceptions and Triggers.
12. Write a PL/SQL Code using Procedures, Functions, and Packages

Text Books:

1. ORACLE PL/SQL by example, Benjamin Rosen Zweig, Elena Silvestrova, Pearson.
2. ORACLE database log PL/SQL programming SCOTT URMAN, TMH.

3. SQL and PL/SQL for ORACLE10g, Black Book, Dr.P.S Deshpande.

4. Data Base Management System, Oracle SQL and PL/SQL, Pranab Kumar Das Gupta, P Radha Krishna, PHI

		L	T	P	C
B.TECH III SEMESTER	**PCC**	-	-	3	1.5

20AM3L08   UNIX AND SHELL PROGRAMMING LAB

Pre-Requisite:

Familiarity with the Unix/Linux command line and running simple commands

Course Objective:

Upon successful completion of this Lab the student will be able to

- Demonstrate how to use the following Bourne Shell commands: cat, grep, ls, more, ps, chmod, finger, ftp, etc.
- Use the following Bourne Shell constructs: test, if then, if then else, if then elif, for, while, until, and case.
- Learn tracing mechanisms (for debugging), user variables, Bourne Shell variables, read-only variables, positional parameters, reading input to a Bourne Shell script, command substitution, comments, and exporting variables. In addition, test on numeric values, test on file type, and test on character strings are covered.
- Copy, move, and delete files and directories
- Write moderately complex Shell scripts.
- Make a Shell script executable.
- Create a ".profile" script to customize the user environment.
- Use advanced features of File Transfer Protocol (FTP)
- Compile source code into object and executable modules.
- Execute programs written in c under UNIX environment.

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

CO1: Understand and usage of vi editor, file operations commands

CO2: Apply UNIX commands for File handling mechanism and illustrate the changing of File permissions and ownership

CO3: Analyze a given problem and apply requisite facets of Shell programming in order to devise a shell script to solve the problem

CO4: Develop various tasks by using Shell Scripting

CO5: Able to understand the various UNIX Commands

LIST OF EXPERIMENTS

Exercise 1:

a) Log in to the system

b) Use Vi editor to create a file called myfile.txt which contains some text.

c) Correct typing errors during creation

d) Save the file

e) Logout of the file.

Exercise2:

    a) Log into the system

    b) Open the file created in session 1

    c) Add some text

    d) Change some text

    e) Delete some text

    f) Save the changes

    g) Logout of the system

Exercise 3:

    a) log into the system

    b) Use the cat command to create a file containing the following data. Call it mutable use tabs to separate the fields

        1425   Ravi   15.65

        4320   Ramu 26.27

        6830   Sita   36.15

        1450   Raju   21.86

    c) Use the cat command to display the file, my table

    d) Use the vi command to correct any errors in the file, my table

    e) Use the sort command to sort the file my table according to the first field. Call the sorted file my table (same name)

    f) Print the file my table

    g) Use the cut & paste commands to swap fields 2 and 3 my table. Call it my table (same name)

    h) Print the new file, my table

    i) Logout of the system

Exercise4:

    a) Log in the system

    b) Use the appropriate commands to determine ur login shell

    c) Use the /etc/passwd file to verify the result of step b.

    d) Uses the who command redirect the result to a file called myfile1.Use the more command to see the contents of myfile1.

    e) Use the date and who commands in sequence ?(in one line) such that the output of date will display on the screen and the output of who will be redirected to a file called my file2.Use the more command to check the contents of myfile2.

    f) Write a sed command that deletes the first character in each line in a file

    g) Write a sed command that deletes the character before the last character in each line in a file.

h) Write a sed command that swaps the files and second words in each line in a file.

Exercise5:

a) pipe ur /etc/passwd file to awk and print out the home directory of each user.

b) Develop an interactive grep script that asks for a word and a file name and then tells how many lines contain that word

c) Repeat

d) Part using awk

Exercise6:

a) Write A shell script that takes a command –line argument and reports on whether it is directory, a file, or something else

b) Write a shell script that accepts one or more file name as a arguments and converts all of them to uppercase, provided they exist in the current directory

c) Write a shell script that determines the period for which a specified user is working on the system

Exercise 7:

a) Write a shell script that accepts a file name starting and ending line numbers as arguments and displays all the lines between the given line numbers

b) Write a shell script that deletes all lines containing a specified word I one or more files supplied as arguments to it

Exercise8:

a) Write a shell script that computes the gross salary of a employee according to the following rules:

    i) If basic salary is <1500 then HRA=10% of the basic and DA =90% of the basic

    ii) If basic salary is >=1500 then HRA=Rs500 and DA =98% of the basic

The basic salary is entered interactively through the key board

b) Write a shell script that accepts two integers as its arguments and computes the value of first number raised to the power of the second number

Exercise9:

a) Write an interactive file handling shell program. Let it offer the user the choice of copying, removing, renaming or linking files. Once the use has made a choice, have the program ask the user for necessary information, such as the file name, new name and so on.

b) Write a shell script that takes a login name as command –line argument and

reports when that person logs in

c) Write a shell script which receives two files names as arguments. It should check whether the two file contents are same or not. If they are same then second file should be deleted

Exercise10:

a) Write a shell script that displays a list of all files in the current directory to which the user has read write and execute permissions

b) Develop an interactive script that asks for a word and file name and then tells how many times that word occurred in the file.

c) Write a shell script to perform the following string operations:
   i) To extract a sub string from a given string
   ii) To find the length of a given string

Exercise11:

a) Write a C program that takes one or more file or directory names as command line input and reports the following information on the file:
   i) file type   ii) number of links   iii) read, write and execute permissions
   iv) time of last access   (Note: use /fstat system calls)

Exercise12:

a) Write C program that simulate the following UNIX commands:
   i) mv   ii) cp

Exercise13:

a) Write a C program that simulates ls command
   (Use system calls /directory API)

TEXT BOOKS:

1. The Unix programming Environment by Brain W. Kernighan & Rob Pike, Pearson.
2. Introduction to Unix Shell Programming by M. G. Venkateshmurthy, Pearson.

REFERENCE BOOKS:

1. Unix and shell programming by B.M. Harwani, OXFORD university press.

B. TECH III SEMESTER	**SC**	**L**	**T**	**P**	**C**
		0	0	4	2

20AM3S09 DATA ANALYSIS AND VISUALIZATION WITH PYTHON
(Skill Oriented Course)

Pre-Requisite: Python Programming

Course Objectives:

- To acquire programming skills in Python package NumPy and perform mathematical and statistical operations.
- To understand the fundamentals of the Pandas library in Python and how it is used to handle data and also develop basic skills in data analysis and visualization

Course Outcomes:

By the end of this lab the student is able to

CO1: Understand the workings of various numerical techniques, different descriptive measures of Statistics, correlation and regression to solve the engineering problems.

CO2: Understand how to apply some linear algebra operations to n-dimensional arrays.

CO3: Use Pandas to create and manipulate data structures like Series and Data Frames

CO4: Work with visualization of data frames

LIST OF EXPERIMENTS

1. NumPy Basics (np.array, np.arrange, np.linespace, np.zeros, np.ones, np.random.random, np.empty)

2. Arrays (array.shape, len(array), array.ndim, array.dtype, array.astype(type), type(array))

3. Array Manipulation (np.append, np.insert, np.resize, np.delete, np.concatenate, np.vstack, np.hstack)

4. Mathematical Operations(np.add, np.substract, np.divide, np.multiply, np.sqrt, np.sin, np.cos, np.log, np.dot, np.roots) , Statistical Operations(np.mean, np.median, np.std, array.corrcoef( ))

5. NumPy Linear Algebra Operations(norm,eigen values and vectors, determinant of a matrix, sum of diagonal elements, inner product, matrix

decomposition etc..)

6. Pandas DataFrames: Consider Sample Python dictionary data and list labels: exam_data = {'name': ['Anastasia', 'Dima', 'Katherine', 'James', 'Emily', 'Michael', 'Matthew', 'Laura', 'Kevin', 'Jonas'], 'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19], 'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1], 'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']} labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']

a. Write a Pandas program to create and display a DataFrame from a specified dictionary

   data which has the index labels.

b. Write a Pandas program to change the name 'James' to 'Suresh' in name column of the

   DataFrame.

c. Write a Pandas program to insert a new column in existing DataFrame.

d. Write a Pandas program to get list from DataFrame column headers.

e. Write a Pandas program to get list from DataFrame column headers.

7. Pandas Index:

a. Write a Pandas program to display the default index and set a column as an Index in a given dataframe.

b. Write a Pandas program to create an index labels by using 64-bit integers, using   floating-point numbers in a given dataframe.

8. Pandas Joining and merging DataFrame:

a. Write a Pandas program to join the two given dataframes along rows and assign all data.

b. Write a Pandas program to append a list of dictionaries or series to a existing

   DataFrame and display the combined data.

c. Write a Pandas program to join the two dataframes with matching records from   both

   sides where available.

9. Excel:

a. Write a Pandas program to import excel data into a Pandas dataframe.

b. Write a Pandas program to find the sum, mean, max, min value of a

column of file.

10. Pandas Library: Visualization: Write a program which use pandas inbuilt visualization to plot following graphs:

    i. Bar plots   ii. Histograms   iii. Line plots   iv. Scatter plots

B.TECH III SEMESTER

L T P C

MC 2 - - -

20AD3M10 CONSTITUTION OF INDIA

COURSE OBJECTIVES:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
- To understand the central and state relation financial and administrative

COURSE OUTCOMES:

At the end of the course, the student will be able to have a clear knowledge on the following:

CO1: Understand historical background of the constitution making, importance for building a democratic India, features and principles of Indian Constitution.

CO2: Understand the functioning of three wings of the government ie., executive, legislative and judiciary.

CO3: Understand the roles and powers of State Government and its Administration and value of the fundamental rights and duties for becoming good citizen of India.

CO4: Understand and analyze the decentralization of power between Union, State and Local self-Government and local administration.

CO5: Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission, UPSC, Welfare commissions for sustaining democracy.

SYLLABUS

UNIT I

Introduction to Indian Constitution: Constitution meaning of the term, Indian Constitution -Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

UNIT II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

UNIT III

State Government and its Administration Governor, Role and Position, CM and Council of ministers, State Secretariat: Organisation, Structure and Functions

UNIT IV

Local Administration, District's Administration Head, Role and Importance, Municipalities, Mayor and role of Elected Representative, CEO of Municipal Corporation Pachayati Raj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy(Different departments),Village level, Role of Elected and Appointed officials, Importance of grass root democracy

UNIT V

Election Commission: Election Commission, Role of Chief Election Commissioner and Election Commissionerate State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women

References:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice Hall of India Pvt. Ltd.

2. Subash Kashyap, Indian Constitution, National Book Trust

3. J.A. Siwach, Dynamics of Indian Government &Politics

4. D.C. Gupta, Indian Government and Politics

5. H. M. Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)

6. J.C. Johari, Indian Government and   Politics Hans

7. J. Raj Indian Government and Politics

8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. NewDelhi

9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Rights Guarantees in India, Oxford University Press2012

E-sources:

1. nptel.ac.in/courses/109104074/8

2. nptel.ac.in/courses/109104045/

3. nptel.ac.in/courses/101104065/

4. www.hss.iitb.ac.in/en/lecture-details

5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

B. TECH IV SEMESTER	**BSC**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

20AM4T01 PROBABILITY AND STATISTICS

Course Objectives:

- Computation of expectation and variance for probability distributions of a random variable
- Description of sampling, distribution of means, proportions &variances
- Knowledge of different distributions to test statistical hypothesis.

Course Outcomes:

By the end of the course students will be able to

CO1: Understand random variables and discrete probability distributions

CO2: Determine probabilities based on practical situations using the normal distributions.

CO3: Apply different distributions to compute confidence intervals.

CO4: Test the hypothesis concerning means and proportions.

CO5: Understand the concept of least square estimation linear regression

SYLLABUS:

UNIT-I: Discrete Random Variables and Distributions:

Introduction-Random variables- Discrete Random Variable-Distribution function-Expectation-Moment Generating Function-Moments and properties. Discrete distributions: Binomial and Poisson distributions.

UNIT-II: Continuous Random Variable and Distributions:

Introduction-Continuous Random Variable-Distribution function- Expectation-Moment Generating Function-Moments and properties. Continuous distribution: Normal distributions, Normal approximation to Binomial distribution.

UNIT-III: Sampling Theory:

Introduction - Population and samples- Sampling distribution of means (s known)-Central limit theorem- t-distribution- Sampling distribution of means (s unknown)- Sampling, distribution of variances, Point estimation- Maximum error of estimate - Interval estimation

UNIT-IV: Tests of Hypothesis:

Introduction –Hypothesis-Null and Alternative Hypothesis- Type I and Type II errors–Level of significance - One tail and two-tail tests- Tests concerning one mean and proportion, two means- Proportions and their differences- ANOVA for one-way and two-way classified data.

UNIT-V: Regression Analysis:

The method of Lease squares, Curvilinear Regression, Multiple regression,

Correlation.

TEXT BOOKS:

1. Richards A Johnson, Irvin Miller and Johnson E Freund. Probability and Statistics for Engineering, 9th Edition, PHI.
2. Jay l. Devore, Probability and Statistics for Engineering and the Sciences, 8th edition, Cengage.

REFERENCES:

1. Shron L. Myers, Keying   Ye, Ronald E Walpole, Probability and Statistics Engineers and the Scientists, 8th Edition, Pearson2007.
2. William Menden Hall, Robert J. Bever and Barbara Bever, Introduction to probability and statistics, Cengage learning, 2009.

	ESC	L	T	P	C
B. TECH IV SEMESTER		3	0	0	3

20AM4T02 DISCRETE MATHEMATICAL STRUCTURES

Course Objectives:

- The validity or the strength of any particular argument or reasoning
- Knowledge of the theory of relations and functions
- Knowledge of types of graphs to apply in real life problems.

Course Outcomes:

By the end of this course the student will be able to

CO1: Apply mathematical logic to design new programming languages.

CO2: Illustratethepropertiesofsetsandfunctionstodesignamodelingsoftware system.

CO3: Explain a structure of an algebra which is useful to understand the theory of sequential machines, formal languages and coding theory.

CO4: Apply the techniques of recursion for representing the data in the analysis of Algorithms

CO5: Provide the knowledge of graphs such as trees which is useful in maintaining files and directories by Operating Systems

SYLLABUS

UNIT - I: **Mathematical Logic**:

Introduction, Statements and Notation, Connectives and Truth tables, Normal forms, Theory of inference for Statement Calculus, The Predicate Calculus, Inference theory of Predicate calculus.

UNIT - II: **Set Theory & Functions**:

Introduction, Basic concepts of set theory, Principle of Inclusion and Exclusion, Properties of Binary relations, Relation matrix and Digraph, operations on relations, Partition and covering, Transitive closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams, Bijective functions, Inverse functions, Composition of functions, Recursive functions, Pigeonhole principle and its applications.

UNIT – III: **Algebraic Structures & Number Theory**:

Algebraic systems and examples, general properties, semigroup, monoid, groups and subgroups. Properties of integers, Division algorithm, Greatest common divisor, Euclidean algorithm (without proof), Least common multiple, testing of prime numbers, The fundamental theorem of Arithmetic, Fermat's theorem and Euler's

theorem (without proofs) and its applications.

UNIT - IV: Recurrence Relations:

Recurrence Relations: Recurrence relations, solving recurrence relations by substitution, the method of characteristic roots, Solutions of Inhomogeneous recurrence relations.

UNIT - V: Graph Theory:

Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, Planar Graphs, Euler's Formula, Graph Coloring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

TEXTBOOKS:

1. Discrete Mathematics for Computer Scientists and Mathematicians, J. L. Mott, A. Kandel, T.P. Baker, 2nd Edition, Prentice Hall of India.

2. Mathematical Foundation for Computer science, S. Santha, E.V. Prasad, Cengage publications

REFERENCES:

1. Discrete Mathematics and its Applications with Combinatorics and Graph Theory, K. H. Rosen, 7th Edition, Tata Mc Graw Hill.

2. Discrete Mathematical Structures, Bernand Kolman, Robert C. Busby, Sharon Cutler Ross, PHI.

	PCC	L	T	P	C
B. TECH IV SEMESTER		3	0	0	3

20AM4T03 DESIGN AND ANALYSIS OF ALGORITHMS

Pre-requisite: Data structures, Basic knowledge of programming and mathematics

Course Objectives:

- To provide an introduction to formalisms to understand, analyze and denote time complexities of algorithms.
- To introduce the different algorithmic approaches for problem solving through numerous example problems.
- To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP-completeness.

Course Outcomes:

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

CO1: Describe asymptotic notation used for denoting performance of algorithms.

CO2: Analyze the performance of a given algorithm and denote its time complexity using the asymptotic notation for recursive and non-recursive algorithms.

CO3: List and describe various algorithmic approaches.

CO4: Solve problems using divide and conquer, greedy, dynamic programming, backtracking and branch and bound algorithmic approaches.

CO5: Apply graph search algorithms to real world problems.

SYLLABUS

UNIT-I:

Introduction: Algorithm Definition, Algorithm Specification, performance Analysis, Randomized Algorithms.

Sets & Disjoint set union: introduction, union and find operations.

Basic Traversal & Search Techniques: Techniques for Graphs, connected components and Spanning Trees, Bi-connected components and DFS.

UNIT-II:

Divide and Conquer: General Method, Defective chessboard, Binary Search, finding the maximum and minimum, Merge sort, Quick sort.

The Greedy Method: The general Method, container loading, knapsack problem, Job sequencing with deadlines, minimum-cost spanning Trees.

UNIT-III:

Dynamic Programming: The general method, multistage graphs, All pairs-shortest paths, single-source shortest paths: general weights, optimal Binary search trees,

0/1 knapsack, reliability Design, The traveling salesperson problem.

UNIT-IV:

Backtracking: The General Method, The 8-Queens problem, sum of subsets, Graph coloring, Hamiltonian cycles, knapsack problem.

Branch and Bound: FIFO Branch-and-Bound, LC Branch-and-Bound, 0/1 Knapsack problem, Traveling salesperson problem.

UNIT-V:

NP-Hard and NP-Complete problems: Basic concepts, Cook's Theorem. String Matching: Introduction, String Matching-Meaning and Application, NaÏve String Matching Algorithm, Rabin-Karp Algorithm, Knuth-Morris-Pratt Automata, Tries, Suffix Tree.

TEXT BOOKS:

1. Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", 2nd Edition, Universities Press.
2. Harsh Bhasin, "Algorithms Design & Analysis", Oxford University Press

REFERENCE BOOKS:

1. Horowitz E. Sahani S: "Fundamentals of Computer Algorithms", 2nd Edition, Galgotia Publications, 2008.
2. S. Sridhar, "Design and Analysis of Algorithms", Oxford University Press.

B. TECH IV SEMESTER		L	T	P	C
	PCC	3	0	0	3

20AM4T04 MACHINE LEARNING

Pre-requisite: Probability and Statistics, Linear Algebra

Course Objectives:

- To understand the need for machine learning for various problem solving
- To study the various supervised, semi-supervised and unsupervised learning algorithms in machine learning
- To understand the latest trends in machine learning
- To design appropriate machine learning algorithms for problem solving

Course Outcomes:

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

CO1: Differentiate between supervised, unsupervised, semi-supervised machine learning approaches

CO2: Discuss the decision tree algorithm and indentity and overcome the problem of over fitting

CO3: Discuss and apply the back propagation algorithm and genetic algorithms to various problems

CO4: Apply the Bayesian concepts to machine learning

CO5: Analyze and suggest appropriate machine learning approaches for various types of problems

SYLLABUS

UNIT-I: **Introduction:**

Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

UNIT-II: **Neural Networks and Genetic Algorithms:**

Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms –Advanced Topics in ANN, Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

UNIT-III: **Bayesian and Computational Learning**

Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes

Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

UNIT-IV: Instant Based Learning

K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning

UNIT-V: Advanced Learning

Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning.

TEXT BOOKS:

1. Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.

References:

1. Ethem Alpaydin, ―Introduction to Machine Learning (Adaptive Computation and

   Machine Learning), The MIT Press 2004.
2. Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009

B. TECH IV SEMESTER	**L**	**T**	**P**	**C**
HSMC	**3**	**0**	**0**	**3**

20AM4T05 MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

- The Learning objectives of this course are to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting
- To familiarize about the Production function, Input Output relationship, Cost- Output relationship and Cost-Volume-Profit Analysis
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation
- Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.

Course Outcomes:

CO1: The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product.

CO2: The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.

CO3: The pupils also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.

CO4: The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.

CO5: The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

SYLLABUS

UNIT–I: Introduction to Managerial Economics and demand Analysis

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

UNIT–II: Theories of Production and Cost Analyses:

Theories of Production function- Law of Variable Proportions - Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale- Different cost concepts: opportunity costs, explicit and implicit costs-Fixed costs, Variable Costs and Total costs –Cost – Volume-Profit analysis-Determination of Breakeven point(problems)-Managerial

significance and limitations of Breakeven point.

UNIT –III: Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing, Business Cycles: Meaning and Features – Phases of a Business Cycle. Features and Evaluation of Sole Trader, Partnership, Joint Stock Company–State/Public Enterprises and their forms.

UNIT – IV: Introduction to Accounting & Financing Analysis:

Introduction to Double Entry System, Journal, Ledger, Trail Balance and Preparation of Final Accounts with adjustments – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow analysis(Problems).

UNIT – V: Capital and Capital Budgeting:

Meaning of Capital- Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods (payback period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index).

TEXT BOOKS:

1. A R Aryasri, Managerial Economics and Financial Analysis, The McGraw – Hill companies.

REFERENCES:

1. Varshney R. L, K. L Maheswari, Managerial Economics, S. Chand & CompanyLtd.
2. JL Pappas and EF Brigham, Managerial Economics, Holt, R & W; New edition edition
3. N.P Srinivasn and M. Sakthivel Murugan, Accounting for Management, S. Chand & Company Ltd.
4. Maheswari S. N ,An Introduction to Accountancy, Vikas Publishing House Pvt Ltd
5. I. M Pandey, Financial Management , Vikas Publishing House Pvt Ltd
6. V. Maheswari, Managerial Economics, S. Chand &Company Ltd.

	L	**T**	**P**	**C**
B. TECH IV SEMESTER ESC	0	0	3	1.5

20AM4L06 R PROGRAMMING LAB

Course Outcomes:

  CO1: Understand the use of operators in R

  CO2: Use Data Structures to implement programs in R.

  CO3: Implement Mathematical functions in R

  CO4: Understand reading and writing files

  CO5: Analyze data from various sources

LAB EXPERIMENTS

Exercise 1: Implement programs in R to work with different types of operators

Exercise 2: Implement programs in R with data structures

Exercise 3: Implement programs in R using the concept of functions

Exercise 4: Working with simulation inR

  Math

  functions

  Calculus

  Linear algebraic

  operations Set operations

Exercise 5: Reading in your own data

  Working with files

  Accessing the keyboard and monitor

Exercise 6: Data visualization

  Charts and plots

Exercise 7:

  a) Program to implement simple and multiple linear regression.

  b) Program to implement non- linear regression.

Exercise8:

  a) Program to implement logistic regression.

Exercise9:

  a) Program to perform ANOVA test (one-way, two way)

B.Tech in Artificial Intelligence & Machine Learning

B. TECH IV SEMESTER	**PCC**	**L**	**T**	**P**	**C**
		0	**0**	**3**	**1.5**

20AM4L07: MACHINE LEARNING USING PYTHON LAB

COURSE DESCRIPTION

Machine Learning is concerned with computer programs that automatically improve their performance through experience. This course covers the theory and practical algorithms for machine learning from a variety of perspectives. We cover topics such as FIND-S, Candidate Elimination Algorithm, Decision tree (ID3 Algorithm), Back propagation Algorithm, Naïve Bayesian classifier, Bayesian Network, k-Means Algorithm, k-Nearest Neighbour Algorithm, Locally Weighted Regression Algorithm

COURSE OBJECTIVE: This course will enable students to

- Make use of Data sets in implementing the machine learning algorithms
- Implement the machine learning concepts and algorithms in any suitable language of choice

COURSE OUTCOMES: After studying this course, the students will be able to

CO1: Understand the implementation procedures for the machine learning algorithms

CO2: Design Java/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

LIST OF LAB EXPERIMENTS

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file

2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples

3. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample

4. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.

5. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

6. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.

7. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.

8. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.

9. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.

10. Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs

B. TECH IV SEMESTER	**PCC**	**L**	**T**	**P**	**C**
		0	0	3	1.5

20AM4L08: DESIGN AND ANALYSIS OF ALGORITHMS LAB

Prerequisites: Any Programming Language

Course Outcomes:

This course will enable students to,

- Employ various design strategies for problem solving.
- Measure and compare the performance of different algorithms.

Course Outcomes:

The students should be able to

CO1: Design algorithms using appropriate design techniques (brute-force, greedy, Dynamic programming, etc.).

CO2: Implement a variety of algorithms such as sorting, graph related, combinatorial, etc., in a high level language.

CO3: Apply and implement learned algorithm design techniques and data structures to solve real world problems

CO4: Analyze and compare the performance of algorithms using language feature

LIST OF LAB EXPERIMENTS

1. Sort a given set of elements using the Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted. The elements can be read from a file or can be generated using the random number generator

2. Implement a Merge Sort algorithm to sort a given set of elements and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted .The elements can be read from a file or can be generated using the random number generator.

3. A) Obtain the Topological ordering of vertices in a given digraph.
   B) Compute the transitive closure of a given directed graph using Warshall's algorithm

4. Implement 0/1 Knapsack problem using Dynamic Programming

5. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijikstra's algorithm

6. Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm

7. A) Print all the nodes reachable from a given starting node in a digraph using BFS method.

   B) Check whether a given graph is connected or not using DFS method

8. Find a subset of a given set S = {s1, s2,....., sN} of n positive integers whose sum is equal to a given positive integer d. For example, if S= {1, 2, 5, 6, 8} and d = 9 there are two solutions {1,2,6}and{1,8}.A suitable message is to be displayed if the given problem instance doesn't have a solution

9. Implement any scheme to find the optimal solution for the Traveling Salesperson problem and then solve the same problem instance using any approximation algorithm and determine the error in the approximation

10. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm

11. Implement All-Pairs Shortest Paths Problem using Floyd's algorithm

12. Implement N Queen's problem using Back Tracking

	SC	L	T	P	C
B. TECH IV SEMESTER		0	0	4	2

20AM4S09 BASIC WEB PROGRAMMING
(Skill Oriented Course)

Course Objectives:

- To acquire skills in developing web pages.
- To understand the use of HTML and CSS in designing web pages
- To gain knowledge on Java Script for performing validations.

Course Outcomes:

By the end of this lab the student is able to

CO1: Understand and use various HTML Tags and apply CSS.

CO2: Develop websites that include static pages.

CO3: Design Front end for Web Applications

LIST OF EXPERIMENTS:

1. Exercises to demonstrate the use of Basic HTML tags.
2. Exercises to demonstrate Tables, Lists and Forms
3. Implement forms using HTML Frames and CSS
4. Write an HTML page that has one input, which can take multi-line text and a submit button. Once the user clicks the submit button, it should show the number of characters, lines and words in the text enter educing an alert message. Words are separated with white space and lines are separated with new line character.
5. Write an HTML page that contains a selection box with a list of 5 countries In the above page when the user selects a country, its capital should be printed next to the list, and add CSS to customize the properties of the font of the capital.
6. Create a website using the HTML and CSS to create your personal portfolio.
7. Create a website using HTML and CSS for a Book Store.
8. Write a JavaScript to design a simple calculator to perform the operations: sum, product, difference and quotient
9. Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in HTML table format.
10. Write a JavaScript code that displays text "TEXT-GROWING" with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches

50pt it displays "TEXT-SHRINKING" in BLUE color. Then the font size decreases to 5pt.

11. Demonstrate the Login page with user id and password validations.

12. Develop and demonstrate a HTML5 file that includes JavaScript script that uses functions for the following problems:

   a) Parameter: A string Output: The position in the string of the left-most vowel

   b) Parameter: A number Output: The number with its digits in the reverse order

13. Write an HTML page with Java script that takes a number from one text field in the range 0-999 and display it in other text field in words. If the number is out of range, it should show "out of range" and if it is not a number, it should show "not a number" message in the result box.

	MN	**L**	**T**	**P**	**C**
B.TECH MINOR		**3**	**1**	**0**	**4**

20IAMMN01 INTRODUCTION TO DATA SCIENCE
(Minor Engineering Course)

Course Objectives:

The objective of this course is to explain the relevant parts of statistics, computer science, and machine learning that are crucial to data science. Data science draws on tools from the empirical sciences, statistics, reporting, analytics, visualization, business intelligence, expert systems, machine learning, databases, data warehousing, data mining, and big data. The goal is to present data science from a pragmatic, practice-oriented viewpoint.

Course Outcomes: By the end of the course the student will be able to

   CO1: **Understand** roles and stages of data science project

   CO2: **Loading** different data sets into R environment.

   CO3: **Visualize** the data using graphs

   CO4: **Learn** data preprocessing using R

   CO5: **Mapping** various business problems to machine learning tasks

SYLLABUS

UNIT-I: Introduction to Data Science:

The data science process, the roles in a data science project, Stages of a data science project, setting expectations, Summary.

UNIT-II: Loading data into R:

Working with data from files, working with well-structured data from files or URLs, Using R on less-structured data, Working with relational databases, A production-size example, Loading data from a database into R, Working with the PUMS data

UNIT-III: Exploring Data:

Using summary statistics to spot problems, Typical problems revealed by data summaries, Spotting problems using graphics and visualization, Visually checking distributions for a single variable, Visually checking relationships between two variables.

UNIT-IV: Managing data:

Cleaning data, Treating missing values (nas), Data transformations, Sampling for modeling and validation, Test and training splits, Creating a sample group column, Record grouping, Data provenance.

UNIT-V: Modeling methods:

Choosing and evaluating models, Mapping problems to machine learning tasks, Solving classification problems, Solving scoring problems, Working without known targets, Problem-to-method mapping, Evaluating models, Evaluating classification models, Evaluating scoring models, Evaluating probability models, Evaluating ranking models, Evaluating clustering models

Validating models, Identifying common model problems, Quantifying model soundness, Ensuring model quality.

TEXT BOOKS:

1. Practical Data Science with R by NINA ZUMEL JOHN MOUNT

REFERENCE:

1. Data Science from Scratch: First Principles with Python by Joel Grus

2. Data Science for Dummies is a book by Lillian Pierson

B.TECH MINOR

MN	L	T	P	C
	3	1	0	4

20AMMN02 INTRODUCTION TO ARTIFICIAL INTELLIGENCE
(Minor Engineering Course)

Course Objective:
- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs
- To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning

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

CO1: Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem

CO2: Apply the language/framework of different AI methods for a given problem.

CO3: Implement basic AI algorithms- standard search algorithms or dynamic programming

CO4: Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports

SYLLABUS

Unit-I:

Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

Unit-II:

Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction.

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

Unit-III: Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

B.Tech in Artificial Intelligence & Machine Learning

Unit-IV:

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames. Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web.

Unit-V:

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory .Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

TEXT BOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning.

2. Artificial intelligence, A modern Approach , 2nded, Stuart Russel, Peter Norvig, PEA

REFERENCES:

1. Artificial Intelligence- Deepak Khemani, TMH, 2013.
2. Introduction to Artificial Intelligence, Patterson, PHI.
3. Atificial intelligence, structures and Strategies for Complex problem solving, - George F Lugar, 5thed, PEA

E-RESOURCES:

1. **https://nptel.ac.in**

			L	T	P	C
B.TECH V SEMESTER		**PCC**	3	0	0	3

20AM5T01   THEORY OF AUTOMATA

Pre-requisite: Discrete Mathematics, Introduction to algorithms

Course Objective: Objective of the course is to impart

- To introduce the concepts in automata theory and theory of computation to design grammars and recognizers for different formal languages.
- To employ finite state machines to solve problems in computing.
- To introduce finite state machines, context free grammars and Turing Machines and their properties as the basis for the formal expressivity of computer languages for solving linguistic decision problems

Course Outcomes:

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

CO1: Understand the basic concepts of Automata Theory

CO2: Ability to describe the language accepted by an automata or generated by a regular expression or a context-free grammar.

CO3: Apply Pushdown Automata for problem solving.

CO4: Design context free grammars to generate strings from a context free language and convert them into normal forms.

CO5: Ability to understand the functioning of Finite-State Machines, Deterministic Finite-State Automata, Nondeterministic Finite-State Automata and Pushdown Automata and Turing Machines

SYLLABUS

UNIT-I: Introduction to Formal Language Theory and Regular Languages:

Introduction to formal language theory– Alphabets, Strings, Concatenation of strings, Languages. Regular Languages - Deterministic Finite State Automata (DFA) (Proof of correctness of construction not required),Nondeterministic Finite State Automata (NFA), Equivalence of DFA and NFA, Regular Grammar (RG), Equivalence of RGs and DFA. **(ref text book 1,2)**.

UNIT-II: Regular Expression:

Regular Expression (RE), Equivalence of REs and DFA, Homomorphism's, Necessary conditions for regular languages, Closure Properties of Regular Languages, DFA state minimization (No proof required). **(ref text book 1,2).**

UNIT-III: Context-Free Grammar:

Context-Free Grammar (CFG)- CFG representation of Context-Free Languages (proof of correctness is required), derivation trees and ambiguity, Normal forms for CFGs. Nondeterministic Pushdown Automata (PDA), Deterministic Pushdown Automata (DPDA) **(ref text book 1,2).**

UNIT-IV: Normal Forms for Context:

Free Grammars Equivalence of PDAs and CFGs (Proof not required), Pumping Lemma for Context-Free Languages (Proof not required),Closure Properties of Context-Free Languages.

Context-Sensitive Languages - Context Sensitive Grammar (CSG), Linear Bounded Automata. **(ref text book 1,2)**.

UNIT-V: Turing Machines:

Turing Machines - Standard Turing Machine, Robustness of Turing Machine, Universal Turing Machine, Halting Problem, Recursive and Recursively Enumerable Languages. Chomsky classification of formal languages. **(ref text book 1,2)**.

Text Books:

1. "Introduction to Automata Theory Languages and Computation". Hopcroft H.E. and Ullman J. D. Pearson Education.
2. Introduction to Theory of Computation –Sipser 2nd edition Thomson.

Reference Books:

1. Introduction to Computer Theory, Daniel I.A. Cohen, John Wiley.
2. Introduction to languages and the Theory of Computation ,John C Martin, TMH
3. "Elements of Theory of Computation", Lewis H.P. & Papadimition C.H. Pearson /PHI.
4. Theory of Computer Science – Automata languages and computation -Mishra and Chandrashekaran, 2nd edition, PHI.

		L	**T**	**P**	**C**
B.TECH V SEMESTER	**PCC**	**3**	**0**	**0**	**3**

20AM5T02   DATA WAREHOUSING & MINING

Course Objective:

- Understand Warehousing Architectures and tools for systematically organizing large database and use data to make strategic decisions.

- Understand data mining as a process of knowledge discovery and also about the preprocessing techniques to improve the quality of mining.

- Understand the kinds of patterns that can be discovered by Supervised and Unsupervised learning techniques.

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

CO1 Understand the fundamentals concepts of data warehousing

CO2 Understand KDD Process and data preprocessing.

CO3 Discover interesting patterns from large volumes of Data using supervised (classification) learning techniques

CO4 Characterize the kinds of patterns that can be discovered by Association Rule Mining

CO5 Demonstrate unsupervised (clustering) learning techniques

SYLLABUS

UNIT-I: Data Warehousing and Online Analytical Processing

Basic Concepts: What is a Data Ware House? Differences between Operational Database system (OLTP) and Data ware houses (OLAP). Data ware housing Architecture, fundamentals of ETL architecture, A Multidimensional Data Model, OLAP operations, Data Marts, Star, Snowflake and Fact Constellation Schema Design.

UNIT-II: Introduction: Fundamentals of data mining

Kinds of data, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining. Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration, Data Reduction. Data Transformation and Discretization.

UNIT-III: Classification and Prediction:

Basic concepts: What is Classification? General Approach to solving a Classification problem, Decision Tree Induction: Working of Decision Tree, building a Decision Tree, methods for express in gan Attribute test Conditions, measures for selecting the best split, Algorithm for Decision Tree Induction.

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Bayes Classification Methods:

Bayes' Theorem, Naive Bayesian Classification, Bayesian Belief Networks, K-Nearest-Neighbour Classifiers.

UNIT-IV: Association Analysis:

Basic Concepts and Algorithms: Frequent Item Set generation: The Apriority Principle, Frequent Item set Generation in the Apriority Algorithm, Candidate Generation and Pruning, Support counting. Rule generation: Confidence-Based Pruning, Rule Generation in Apriority Algorithm. Compact Representation of Frequent Item sets: Maximal Frequent Item sets, Closed Frequent Items sets. FP-Growth Algorithm: FP Tree Representation, Frequent Item set Generation in FP Growth Algorithm.

UNIT-V: Cluster Analysis:

What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters; K-means: The Basic K-means Algorithm, K-means Additional Issues, Bisecting K- means, Strengths and Weaknesses; Agglomerative Hierarchical Clustering: Basic Agglomerative Hierarchical Clustering Algorithm D B SCAN: Traditional Density Center-Based Approach, D B SCAN Algorithm, Strengths and Weaknesses.

Text Books

1. Jiawei Han Micheline Kamber, "Datamining & Techniques", Morgan Kaufmann Publishers. (Units-1,2,5)
2. Pang-Ning Tan, Michael Steinbach, VipinKumar, "Introduction to Data Mining", Pearson Publications. (Units-3,4)

Reference Books

1. S.N.Sivanandam, S. Sumathi, "Data Mining – Concepts, Tasks and Techniques", Thomson.
2. Ralph Kimball, "The Data Warehousing Toolkit", Wiley.
3. Margaret H. Dunham, "Datamining – Introductory and advanced topics", Pearson Education.
4. D.Hand, H.Mannila and P.Smyth, "Principles of Datamining", PHI (2001).

		L	T	P	C
B.TECH V SEMESTER	**PCC**	**3**	**0**	**0**	**3**

20AM5T03   SOFTWARE ENGINEERING

Course Objective:

- To understand the software life cycle models.
- To understand the software requirements and SRS document.
- To understand the importance of modeling and modeling languages.
- To design and develop correct and robust software products.

Course Outcomes:

CO1 Define and develop a software project from requirement gathering to implementation.

CO2 Obtain knowledge about principles and practices of software engineering.

CO3 Focus on the fundamentals of modeling a software project.

CO4 Obtain basic knowledge of coding

CO5 Obtain knowledge about estimation maintenance and reuse of software systems

SYLLABUS

UNIT-I: Software and Software Engineering

The Nature of Software, The Unique Nature of WebApps, Software Engineering, Software Process, Software Engineering Practice, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialized Process Models, the Unified Process, Personal and Team Process Models, Process Terminology, Product and Process. **(Text Book-1)**

UNIT-II: Requirements Analysis And Specification

Requirements Gathering and Analysis, Software Requirement Specification (SRS), Formal System Specification.

Software Design: Overview of the Design Process, How to Characterize of a Design, Cohesion and Coupling, Layered Arrangement of Modules, Approaches to Software Design

UNIT-III: Function-Oriented Software Design:

Overview of SA/SD Methodology, Structured Analysis, Developing the DFD Model of a System, Structured Design, Detailed Design, Design Review, over view of Object Oriented design.

B.Tech in Artificial Intelligence & Machine Learning

User Interface Design: Characteristics of Good User Interface, Basic Concepts, Types of User Interfaces, Fundamentals of Component-based GUI Development, A User Interface Design Methodology. **(Text Book-2)**.

UNIT-IV: Coding And Testing:

Coding, Code Review, Software Documentation, Testing, Unit Testing, Black-Box Testing, White-Box Testing, Debugging, Program Analysis Tool, Integration Testing, Testing Object-Oriented Programs, System Testing, Some General Issues Associated with Testing **(Text Book-2)**.

UNIT-V: Software Reliability And Quality Management:

Software Reliability, Statistical Testing, Software

Quality, Software Quality Management System, ISO 9000, SEI Capability Maturity Model.

Software Maintenance: Software maintenance, Maintenance Process Models, Maintenance Cost, Software Configuration Management.

Software Reuse: what can be reused? Why almost No Reuse So Far? Basic Issues in Reuse Approach, Reuse at Organization Level. **(Text Book-2)**

Text Books

1. Software engineering A practitioner's Approach, Roger S. Pressman, Seventh Edition McGraw Hill International Edition
2.   Fundamentals of Software Engineering, Rajib Mall, Third Edition, PHI.
3. Software Engineering, Ian Sommerville, Ninth edition, Pearson education.

Reference Books

1. Software Engineering: A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008.
2. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
3. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
4. Software Engineering 1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006

		L	**T**	**P**	**C**
B.TECH V SEMESTER	**PEC**	**3**	**0**	**0**	**3**

20AM5T04   **COMPUTER GRAPHICS**
(Professional Elective-I)

Course Objectives:

- To develop, design and implement two and three dimensional graphical structures.
- To enable students to acquire knowledge Multimedia compression and animations.
- To learn Creation, Management and Transmission of Multimedia objects.

Course Outcomes: After learning the course, the student will be able

CO1: Illustrate the basics of computer graphics, different graphics systems and applications of computer graphics with various algorithms for line, circle and ellipse drawing objects for 2D transformations.

CO2: Apply projections and visible surface detection techniques for display of 3D scene on 2D screen.

CO3: Illustrate able to create the general software architecture of programs that use 3D object sets with computer graphics.

CO4: Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).

CO5: Know and be able to discuss hardware system architecture for computer graphics. This Includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators/co-processors.

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SYLLABUS

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UNIT-I: **Introduction to Graphics :**

Application area of Computer Graphics, overview of graphics systems, video-display devices, graphics monitors and work stations and input devices. 2D Primitives: Output primitives-Line, Circle and Ellipse drawing algorithms, Attributes of output primitives, Two dimensional Geometric transformations, Two dimensional viewing Line, Polygon, Curve and Text clipping algorithms.

UNIT-II: 3D Concepts :

Parallel and Perspective projections, Three dimensional object representation- Polygons, Curved lines, Sp lines, Quadric Surfaces, Visualization of data sets, 3D transformations, Viewing, Visible surface identification

UNIT-III: Graphics Programming:

Color Models- RGB, YIQ, CMY, HSV, Animations -General Computer Animation, Raster, Key frame. Graphics programming using OPENGL-Basic graphics primitives, Drawing three dimensional objects, Drawing three dimensional scenes.

UNIT-IV: Rendering:

Introduction to shading models, Flat and Smooth shading, Adding texture to faces, Adding shadow of objects, Building a camera in a program, Creating shaded objects.

UNIT-V: Overview of Ray Tracing:

Intersecting rays with other primitives, Adding Surface texture, Reflections and Transparency, Boolean operations on Objects.

Text Books

1. Donald Hearn, Pauline Baker, Computer Graphics– C Version, second edition, Pearson Education, 2004

Reference Books

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007.

		L	**T**	**P**	**C**
B.TECH V SEMESTER	**PEC**	**3**	**0**	**0**	**3**

20AM5T05 **E-COMMERCE**
(Professional Elective-I)

Course Objectives:

- Identify the major categories and trends of e-commerce applications.
- Discuss the benefits and trade-offs of various e-commerce clicks and bricks alternatives.
- Understand the main technologies behind the e-commerce systems and how these technologies interact.
- Define various electronic payment types and associated security risks and the ways to protect against them.

Course Outcomes:

CO1: Identify, interpret and analyze stake holder needs.

CO2: Identify and apply relevant problem solving methodologies.

CO3: Design components, systems and/or processes to meet required specifications.

CO4: Design components, systems and/or processes to meet required specifications

CO5: Demonstrate research skills.

SYLLABUS

UNIT-I: Electronic Commerce:

Framework, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications. Consumer Oriented Electronic commerce –Mercantile Process models.

UNIT-II: Electronic payment systems:

Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems. Inter Organizational Commerce - EDI, EDI Implementation, Value added networks

UNIT-III: Intra Organizational Commerce:

Work Flow, Automation Customization and internal Commerce, Supply chain Management.

UNIT-IV: Corporate Digital Library:

Document Library, digital Document types, corporate Data Warehouses. Advertising and Marketing - Information based marketing, Advertising on Internet, on-line

marketing process, market research.

UNIT-V: **Consumer Search and Resource Discovery:**

Information search and Retrieval, Commerce Catalogues, Information Filtering Multimedia-key multimedia concepts, Digital Video and electronic Commerce, Desktop video processing, Desktop video conferencing.

Text Books

1. Frontiers of electronic commerce– Kalakata, Whinston, Pearson

Reference Books

1. E-Commerce fundamentals and applications Hendry Chan, Raymond Lee, Tharam Dillon, Ellizabeth Chang, John Wiley.

2. E-Commerce, S. Jaiswal–Galgotia.

3. E-Commerce, Efrain Turbon, Jae Lee, David King, H. Michael Chang.

4. Electronic Commerce – Gary P. Schneider– Thomson.

5. E-Commerce–Business, Technology, Society, Kenneth C. Taudon, Carol Guyerico Traver.

	L	**T**	**P**	**C**
B.TECH V SEMESTER	**PEC**			
	3	**0**	**0**	**3**

20AM5T06

DATA SCIENCE AND VISUALIZATION
(Professional Elective-I)

Course Objectives:

- Manipulating, processing, cleaning, and crunching data in Python
- Focus is specifically on Python programming, libraries
- Tools as opposed to data analysis methodology Kinds of Data.

Course Outcomes:

CO1: Define Data Science and its fundamentals.

CO2: Demonstrate the process in data science.

CO3: Explain Machine learning Algorithms for data sciences.

CO4: Illustrate the process of future selection and analysis of data analysis

CO5: Explain the future selection algorithms for data science.

SYLLABUS

UNIT-I: Introduction:

Introduction to Data Science, Exploratory Data Analysis and Data Science Process. Motivation for using Python for Data Analysis, Introduction of Python shell iPython and Jupyter Notebook. Exploratory Data Analysis and The Data Science Process: Basic tools (Plots, Graphs and Summary Statistics) of EDA

Essential Python Libraries: NumPy, pandas, matplotlib, SciPy, scikit-learn, stats models.

Exploratory Data Analysis and The Data Science Process: Basic tools(Plots, Graphs and Summary Statistics) of EDA.

UNIT-II: Getting Started with Pandas:

Arrays and vectorized computation, Introduction to pandas Data Structures, Essential Functionality, Summarizing and Computing Descriptive Statistics. Data Loading, Storage and File Formats. Reading and Writing Data in Text Format, Web Scraping, Binary Data Formats, Interacting with Web APIs, Interacting with Databases Data Cleaning and Preparation. Handling Missing Data, Data Transformation, String Manipulation. The basic Machine Learning Algorithms Linear Regression, K-Nearest Neighbors (K-NN), K-Means

UNIT-III: **Data Wrangling**:

Hierarchical Indexing, Combining and Merging Data Sets Reshaping and Pivoting.
Data Visualization matplotlib: Basics of matplotlib, plotting with pandas and sea born, other python visualization tools.

UNIT-IV: **Data Aggregation and Group operations:**

Group by Mechanics, Data aggregation, General split-apply-combine, Pivot tables and cross tabulation **Time Series Data Analysis**: Date and Time Data Types and Tools, Time series Basics, date Ranges, Frequencies and Shifting, Time Zone Handling, Periods and Periods Arithmetic, Re-sampling and Frequency conversion, Moving Window Functions.

UNIT-V: **Feature Generation and Feature Selection:**

(Extract a meaning from data), Feature Selection Algorithms: Filters, Wrappers, Decision trees, Random Forests.
Advanced Pandas: Categorical Data, Advanced Group By Use, Techniques for Method Chaining.

Text Books

1. McKinney, W.(2017). Python for Data Analysis: Data Wrangling with Pandas, NumPy and IPython. 2nd edition. O'Reilly Media O'Neil, C., & Schutt, R. (2013).
2. Doing Data Science: Straight Talk from the Frontline O'Reilly Media.
3. Doing Data Science :Cathy O ' Neil and published by Straight Talk from 2014

	L	**T**	**P**	**C**
B.TECH V SEMESTER **PCC**	**0**	**0**	**3**	**1.5**

20AM5L08   CASE TOOLS LAB

Pre-requisite: "A course on "Programming for Problem Solving"

Co-requisite: A Course on "Software Engineering"

Course Objective:

▪ To have hands on experience in developing a software project by using various software engineering principles and methods in each of the phases of software development

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

CO1: Ability to translate end-user requirements into system and software requirements.

CO2: Ability to generate a high-level design of the system from the software requirements

CO3: Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

LIST OF EXPERIMENTS

Do the following 8 exercises for any two projects given in the list of sample projects or any other projects

1. Development of problem statement.
2. Preparation of Software Requirement Specification Document, Design Documents   and Testing Phase related documents.
3. Preparation of Software Configuration Management and Risk Management related documents.
4. Study and usage of any Design phase CASE tool.
5. Performing the Design by using any Design phase CASE tools.
6. Develop test cases for unit testing and integration testing.
7. Develop test cases for various white box and black box testing techniques.

SAMPLE PROJECTS:

1. Passport automation System
2. Book Bank

3. Online Exam Registration

4. Stock Maintenance System

5. Online course reservation system

6. E-ticketing

7. Software Personnel Management System

8. Credit Card Processing

9. E-book management System.

10. Recruitment systemTask.

Text Books:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.

2. Software Engineering- Sommerville, 7th edition, Pearson Education.

3. The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

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20AM5L09   DATA WAREHOUSING AND MINING LAB

Course Objectives:

- Explore on data mining features.
- Create and perform preprocessing on new and existing data sets.
- Generate association rules on transactional data.
- Build the data models by using various classification and clustering algorithms.
- Analyze the data models accuracy by raying the sample size.

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

CO1: Understand Data Mining concepts and knowledge is covery process

CO2: Explore on data insights and preprocessing techniques

CO3: Extract association rules on frequent items in transaction data

CO4: Build and analyze the classification model using various algorithms

CO5: Perform clustering using partition algorithms

LIST OF EXPERIMENTS

EXERCISE 1:   INTRODUCTION

1. Introduction to Python libraries for Data Mining: NumPy, Pandas, Matplotlibetc.

EXERCISE 2:   UNDERSTANDING DATA

Write Python programs to do the following operations:

1. Loading data from CSV file
2. Compute the basic statistics of given data-shape, no. of columns, mean
3. Splitting a data frame on values of categorical variables
4. Visualize data using Scatter plot

EXERCISE 3:   CORRELATION MATRIX

Write a python programs to load the data set and understand the input data

1. Load data, describe the given data and identify missing, outlier data items
2. Find correlation among all attributes
3. Visualize correlation matrix

EXERCISE 4:   DATAPREPROCESSING–HANDLING MISSING VALUES

Write a python program to impute missing values with various techniques on given data set.

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1. Remove rows/attributes
2. Replace with mean or mode
3. Write a python program to perform transformation of data using Discretization (Binning) and normalization (Min Max Scaler or Max Abs Scaler) on given dataset.

EXERCISE 5: ASSOCIATION RULE MINING- APRIORI

Write a python program to find rules that describe associations by using Apriori algorithm

EXERCISE 6: CLASSIFICATION-DECISION TREES

Write a python program

1. To build a decision tree classifier to determine the kind off lower by using given dimensions.
2. Training with various split measures (Gini index, Entropy and Information Gain)
3. Compare the accuracy

EXERCISE 7: CLASSIFICATION–BAYESIAN NETWORK

1. Build Bayesian network model using existing default data
2. Visualize Tree Augmented Naïve Bayes model

EXERCISE 8: CLUSTERING–K-MEANS

Write a python program

1. To perform preprocessing
2. To perform clustering using k-means algorithm to cluster the records

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20AM5S10   **TESTING TOOLS LAB**
(Skill Oriented Course)

Course Objective:

- Learn the importance of web testing tool and bug tracking tool
- Develop test case and test plan document for banking application.
- Learn to write system specifications of any application and report various bugs in it.
- Use automated functional testing tool like Quick Test Professional.

Course Outcomes:

CO1:   Completely got an idea about testing tools.

CO2:   Use the tools and their importance of testing tools

LIST OF EXPERIMENTS

Exercise 1:   **CONSTRUCTS**

1. Write programs in C language to demonstrate the working of the following constructs:

   a) while b) switch c) for d) if-else e) do-while

Exercise 2:   **SYSTEM SPECIFICATIONS**

1. Study the system specifications of ATM system and report various bugs in it
2. Study the system specifications of banking application and report various bugs in it.

Exercise 3:   **TEST CASES**

1. Write the test cases for ATM system
2. Write the test cases for banking application.

Exercise 4:   **TEST PLAN**

1. Create a test plan document for any application (e.g. Library management system).

Exercise 5:   **TESTING TOOL**

1. Study of any testing tool (e.g. Win runner).

Exercise 6:   **SELENIUM**

1. Study of web testing tool (e.g. Selenium).

Exercise 7:   **BUG TRACKING TOOL**

1. Study of bug tracking tool (e.g. Bugzilla).

Exercise 8:   **BUGBIT**

1. Study of bug tracking tool (e.g. Bugbit).

Exercise 9:   **TEST MANAGEMENT TOOL**

1. Study of any test management tool (e.g. Testdirector).

Exercise 10:   **OPEN SOURCE TESTING TOOL**

1. Study of any Open Source Testing Tool (e.g. Test Link).

Exercise 11:   **AUTOMATED FUNCTIONAL TESTING TOOL**

1. Study of QTP (Quick Test Professional) automated functional testing tool.

Exercise 12:   **INTROSPECTION OF MATRIX MULTIPLICATION**

1. A program written in C language for matrix multiplication fails, introspect the causes for its failure and write down the possible reasons for its failure.

REFERENCES:

1. Boris Beizer, ―Software Testing Techniques‖, DreamTech Press, 2 nd Edition, 2000.
2. Dr. K. V. K. K. Prasad, ―Software Testing Tools‖, DreamTech Press, Revised Edition, 2004.
3. Perry, ―Effective methods of Software Testing‖, John Wiley, 2 nd Edition, 1999.

B.TECH V SEMESTER

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20AM5M11   DISASTER MANAGEMENT

Course objective: The objective of this course is to

- Understand Types of disasters like Earthquake, Landslide, Flood, Drought, Fire
- Know Panchayati Raj Institutions/Urban Local Bodies (PRIs/ ULBs), States, Centre, and other stakeholders.
- Understand Climate Change Adaptation - IPCC Scenario and Scenarios in the context of India.
- Understand Role of GIS and Information Technology Components   in Preparedness, Risk Assessment.
- Know various case studies

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

CO1: Differentiate the types of disasters, causes and their impact on environment and society.
CO2: Assess vulnerability and various methods of risk reduction measures as well as mitigation
CO3: Draw the hazard and vulnerability profile of India, Scenarios in the Indian context
CO4: Analyze the Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment
CO5: Understand about Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment

SYLLABUS

UNIT-I: Introduction To Disasters Definition:

Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters

UNIT-II: Approaches To Disaster Risk Reduction (Drr):

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies

(PRIs/ULBs), States, Centre, and other stakeholders- Institutional Processes and Framework at State and Central Level State Disaster Management Authority (SDMA) – Early Warning System – Advisories from Appropriate Agencies.

UNIT-III: **Inter-Relationship Between Disasters And Development:**

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources

UNIT-IV: Disaster Risk Management In India:

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

UNIT-V: Disaster Management: Applications And Case Studies And Field Works Landslide Hazard Zonation:

Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

TEXT BOOKS:

1. SinghalJ.P."Disaster Management", Laxmi Publications, 2010. ISBN-10: ISBN-13: 978-9380386423**.**

2. Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]

3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011.

REFERENCES:

1. Govt. of India: Disaster Management Act, Government of India, New Delhi, 2005
2. Government of India, National Disaster.

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B.TECH VI SEMESTER	**PCC**	**3**	**0**	**0**	**3**

20AM6T01   DEEP LEARNING

Course Objective:

- Demonstrate the major technology trends driving Deep Learning.
- Build, train and apply fully connected deep neural networks.
- Implement efficient (vectorized) neural networks.
- Analyze the key parameters and hyper parameters in a neural network's architecture.

Course Outcomes:

CO1: Demonstrate the mathematical foundation of neural network

CO2: Describe the machine learning basics

CO3: Compare the different architectures of deep neural network

CO4: Build a convolutional neural network

CO5: Build and train RNN and LSTMs

SYLLABUS

UNIT-I:

Linear Algebra: Scalars, Vectors, Matrices and Tensors, Multiplying Matrices and vectors, Identity and inverse matrices, Linear Dependence and span, Norms, Special kinds of matrices and vectors, Eigen decomposition, Singular Value Decomposition, The Moore- Penrose Pseudo inverse, The trace operator, The determinant, Example : Principal component Analysis.

UNIT-II:

Machine Learning Basics : Learning Algorithms, Capacity : Over fitting and under fitting, Hyper parameters and validation sets, Estimators, Bias and variable, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent, Building a Machine Learning Algorithm, Challenges motivating deep learning.

UNIT-III:

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset

Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier.

Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies andMeta-Algorithms.

UNIT-IV:

Convolutional Networks: The Convolution Operation, Motivation, Pooling, Convolution and pooling as an Infinitely strong prior, Variants of the Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.

UNIT-V:

Sequence Modeling : Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies and other Gated RNNs.

Text Books:

1. IanGoodfellow, Yoshua Bengio,AaronCourville,"DeepLearning",MITPress,2016.
2. Josh Patterson and Adam Gibson, "Deep learning: practitioner's approach", O'Reilly Media, First Edition, 2017.

Reference Books:

1. Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers, 2019.
2. Deep learning Cook Book, Practical recipes to get started Quickly, Douwe Osinga, O'Reilly, Shroff Publishers, 2019

RESOURCES:

1. https://keras.io/datasets/
2. http://deeplearning.net/tutorial/deeplearning.pdf
3. https://arxiv.org/pdf/1404.7828v4.pdf
4. https://github.com/lisa-lab/DeepLearningTutorials

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20AM6T02   COMPUTER NETWORKS

Course Objective:

- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the students to basic principles of networking using the goals like protocol layering and top down approach.
- Build an understanding of the basics of the internetworking and routing used in the computer networks.
- To provide guidelines in developing network applications.

Course Outcomes:

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

CO1: Independently enumerate the layers of the OSI model and TCP/IP

CO2: Identify the different types of network topologies and protocols.

CO3: Compare and contrast methods to identify Errors and correct them.

CO4: Differentiate between various network routing algorithms.

CO5: Understand WWW and HTTP Architectures.

SYLLABUS

UNIT-I: Introduction:

OSI overview, TCP/IP and other networks models, Examples of Networks: Arpanet, Internet, Network Topologies Wide Area Networks (WAN), Local Area Networks (LAN), Metropolitan Area Networks (MAN).

UNIT-II: Physical Layer and overview of PL Switching:

Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, introduction to switching: Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks, Types of Transmission Media: Guided Media & Unguided Media.

UNIT-III: Data Link Layer:

Design issues, Framing: fixed size framing, variable size framing, variable size framing, flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, services provided to Network.

Elementary Data Link Layer protocols: Simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel.

Sliding window protocol: One bit, Go-back N, Selective Repetitive protocol, Stop and wait protocol.

UNIT-IV: Random Access:

ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, Controlled Access: Reservation, Polling, Token Passing, Channelization: Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA).

Network layer: Shortest Path, Distance Vector Routing Algorithm, Hierarchal routing algorithm,.

UNIT-V: Application layer (WWW and HTTP):

WWWARCHITECTURE: Client (Browser), Server, Uniform Resource Locator, Resource Record, HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Request Message Format, HTTP Response Message Format

Text Books

1. Data Communications and Networks-Behrouz A. Forouzan. Third Edition TMH, (Units 1,2,4,5)

2. Computer Networks – Andrew S Tanenbaum, 4th Edition. Pearson Education (Units 1,3,4)

Reference Books

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.

2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

B.TECH VI SEMESTER

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20AM6T03   BIG DATA ANALYTICS

Pre-requisite: Data Base Management System

Course Objectives: In this course student will learn about

- To understand the need of Big Data, challenges and different analytical architectures
- Installation and understanding of Hadoop Architecture and its ecosystems
- Processing of Big Data with Advanced architectures like Spark.
- Describe graphs and streaming data in Spark.

Course Outcomes

By the end of the course the student will be able to

CO1:   Discuss the challenges and their solutions in Big Data

CO2:   Understand and work on Hadoop Framework and eco systems.

CO3:   Explain and Analyze the Big Data using Map-reduce programming in Both Hadoop and Spark framework.

CO4:   Demonstrate spark programming with different programming languages.

CO5:   Demonstrate the graph algorithms and live streaming data in Spark.

SYLLABUS

UNIT I:

Introduction to big data: Data, Types of digital data, Evolution and Definition of big data, Challenges of big data, Characteristics and Need of big data.

Introduction to Hadoop: Introducing Hadoop, need of Hadoop, limitations of RDBMS, RDBMS versus Hadoop, Distributed Computing Challenges, History of Hadoop, Hadoop Overview, Hadoop Distributors.

HDFS (Hadoop Distributed File System): HDFS Daemons, Anatomy of file read, Anatomy of file write, working with HDFS commands

UNIT II:

Introduction to MAPREDUCE Programming: Processing Data with Hadoop, Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator), Mapper, Reducer, Combiner, Partitioner, Searching, Sorting , Compression, Hadoop EcoSystem.

B.Tech in Artificial Intelligence & Machine Learning

UNIT III:

Introduction to Pig: Key Features of pig, The Anatomy of Pig, Pig on Hadoop, Pig Philosophy, Pig Latin Overview, Data Types in Pig, Running Pig, Execution Modes of Pig, Relational Operators.

Introduction to HIVE: HIVE features, HIVE architecture, HIVE datatypes, HIVE File Formats, HIVE Query Language.

UNIT IV:

Spark: Introduction to data analytics with Spark, Spark Stack, Programming with RDDS, Working with key/value pairs, Spark SQL.

UNIT V:

Sparking Streaming: High level architecture of Spark Streaming, DStreams, Transformations on DStreams, Different Types of Transformations on DStreams.

Text Books:

1. Seema Acharya, Subhashini Chellappan, Big Data and Analytics, Wiley Publishers

2. Holden Karau, Andy Konwinski, Patrick Wendell, Matei Zaharia, "Learning Spark: Lightning-Fast Big Data Analysis", O'Reilly Media, Inc.

Reference Books:

1. Tom White, Hadoop,"The Definitive Guide", 3rd Edition,O'ReillyPublications, 2012.

2. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann Publishers, 2013

3. Hadoop in Practice by Alex Holmes, MANNING

4. Hadoop in Action by Chuck Lam, MANNING

5. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, "Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", 1st Edition, TMH,2012.

6. HienLuu, Beginning Apache Spark 2

E-resources and Other digital materials:

1. Big Data Use cases for Beginners | Real Life Case Studies | Success Stories https://www.youtube.com/watch?v=HHR0-iJp2sM

2. Alexey Grishchenko, Hadoopvs MPP, https://0x0fff.com/hadoop-vs-mpp/

3. Random notes on big data- Slide Share: Available www.slideshare.net/yiranpang/random-notes-on-big-data-26439474.

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B.TECH VI SEMESTER   **PEC**   3 0 0 3

MEAN STACK TECHNOLOGIES
20AM6T04   (Professional Elective-II)

Course Objectives:

- Translate user requirements into the overall architecture and implementation of new systems and Manage Project and coordinate with the Client.
- Writing optimized front end code HTML and JavaScript.
- Monitor the performance of web applications & infrastructure and Troubleshooting web application with a fast and accurate are solution.

Design and implementation of Robust and Scalable Front End Applications

Course Outcomes:

CO1: Enumerate the Basic Concepts of Web & Markup Languages.

CO2: Develop web Applications using Scripting Languages &Frameworks

CO3: Make use of Express JS and Node JS frameworks.

CO4: Illustrate the uses of web services concepts like restful, Angular.

CO5: Apply Deployment Techniques & Working with cloud platform

SYLLABUS

UNIT I: Introduction to Web:

Internet and World Wide Web, Domain name service, Protocols: HTTP, FTP, SMTP. Html5 concepts, CSS3, Anatomy of a webpage.XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

UNIT II: Java Script:

The Basic of Java Script: Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions. Angular Java Script Angular JS Expressions: ARRAY, Objects, oval, Strings, Angular JS Form Validation &Form Submission, Single Page Application development using Angular JS.

UNIT III: Node js:

Introduction, Advantages, Node.js Process Model, Node JS Modules. Express.js: Introduction to Express Frame work, Introduction to Node js, What is Node s, Getting Started with Express, Your first Express App, Express Routing, Implementing MVC in Express, Middleware, Using Template Engines, Error Handling, API Handling, Debugging, Developing Template Engines, Using Process Managers, Security & Deployment

UNIT IV: REST full Web Services:

Using the Uniform Interface, Designing URIs, Web Linking, Conditional Requests. React Js: Welcome to React, Obstacles and Road blocks, React's Future, Keeping Up with the Changes, Working with the Files, Pure React, Page Setup, The Virtual DOM, React Elements, React DOM, Children, Constructing Elements with Data, React Components, DOM Rendering, Factories.

UNIT V: Mongo DB:

Introduction, Architecture, Features, Examples, Database Creation &Collection in Mongo DB. Deploying Applications: Web hosting & Domains, Deployment Using Cloud Platforms.

Text Books:

1. Programming the World Wide Web, Robet W Sebesta, 7ed,Pearson.
2. Web Technologies, Uttam K Roy, Oxford.
3. Pro Mean Stack Development, Elad Elrom, Apress.
4. Restful Web Services Cookbook, Subbu Allamraju,O'Reilly.
5. JavaScript & j Query the missing manual, David saw yermc far land,O'Reilly.
6. Web Hosting for Dummies, Peter Pollock, John Wiley Brand

Reference Books:

1. Ruby on Rails up and Running, Lightning fast Web development, BruceTate, Curt Hibbs, Oreilly (2006).
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012).
3. Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. An Introduction to Web Design, Programming, Paul SWang, Sanda S Katila, Engage Learning.
5. Express. JS Guide, The Comprehensive Book on Express.js, Azat Mardan, Lean Publishing.

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20AM6T05 **COMPILER DESIGN (Professional Elective-II)**

Pre-requisite: Automata theory, Basic programming language skills using C

Course Objectives:

- To learn the fundamentals of design of Compilers by applying mathematics and engineering principles.
- To design a system for parsing the sentences in a compiler grammar.
- To design a system to translate into various intermediate codes.
- To analyze the methods of implementing a Code Generator for compilers.
- To analyze and design the methods of developing a Code Optimizer.

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

CO1: An ability to understand the basic functioning of compiler and its tools.

CO2: Demonstrate about scanning of tokens and perform the syntax analysis by using Parsing techniques

CO3: Perform Semantic analysis using attribute grammar

CO4: To implement various parsing, conversion, optimization and generation algorithms for the design of a compiler

CO5: Compare different memory management techniques in runtime environment.

SYLLABUS

UNIT – I: INTRODUCTION TO COMPILER:

Compilers, Phases of a compiler, Grouping of Phases ,Lexical Analysis – Role of Lexical Analyzer, Input Buffering – Specification of Tokens- design of lexical analysis (LEX), Derivation - parse tree – ambiguity **(ref text book 1,2)**

UNIT – II: SYNTAX ANALYSIS – PARSING:

Definition - role of parsers - top down parsing - bottom-up parsing, Left recursion - left factoring - Handle pruning , Shift reduce parsing, Operator precedence parsing, FIRST- FOLLOW, Predictive parsing, Recursive descent parsing, LR parsing – LR (0) items - SLR parsing, Canonical LR parsing, LALR parsing**(ref text book 1,2)**.

UNIT – III: INTERMEDIATE CODE GENERATION:

Intermediate Languages - prefix - postfix - Quadruple - triple - indirect triples, Syntax tree- Evaluation of expression - three-address code, Synthesized attributes –

B.Tech in Artificial Intelligence & Machine Learning

nherited attributes, Intermediate languages – Declarations, Assignment Statements

(ref text book 1,2)

UNIT – IV: CODE GENERATION:

Issues in the design of code generator, The target machine – Runtime Storage management, Basic Blocks and Flow Graphs, A simple Code generator, DAG representation of Basic Blocks, Peephole Optimization, Cross Compiler – T diagrams

(ref text book 1,2,3)

UNIT – V: CODE OPTIMIZATION:

Introduction– Principal Sources of Optimization, Optimization of basic Blocks, Loop optimization, Introduction to Global Data Flow Analysis –Runtime Environments – Source Language issues, Storage Organization, Storage Allocation strategies – Access to non-local names **(ref text book 1,2,3)**

Text Books:

1. Alfred V. Aho, Ravi Sethi& Jeffrey. D. Ullman, "Compilers Principles, Techniques & Tools", Pearson Education, third edition, 2011.
2. S.GodfreyWinster, S.Aruna Devi,R. Sujatha,"Compiler Design", Yesdee Publishing Pvt. Ltd, 2016.

Reference Books:

1. K.Muneeswaran, "Compiler Design", Oxford Higher Education,Fourth edition 2015.
2. David Galles, "Modern Compiler Design", Pearson Education, Reprint 2012.
3. Raghavan V., "Principles of Compiler Design", Tata McGraw Hill Education Pvt. Ltd., 2010.

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20AM6T06   SOFTWARE ARCHITECTURE AND DESIGN PATTERNS
(Professional Elective-II)

Course Objective:

- Understand the creational and structural patterns.
- Be capable of applying his knowledge to create an architecture for given application.
- Be able to explain the role of analyzing architectures.
- Be able to identify different structural patterns.

Course Outcomes:

CO1: Understand the architecture, creating it and moving from one to any, different structural patterns.

CO2: Analyze the architecture and build the system from the components

CO3: Design creational and structural patterns

CO4: Learn about behavioral patterns

CO5: Do a case study in utilizing architectural structures.

SYLLABUS

UNIT – I:

Envisioning Architecture: The Architecture Business Cycle, What is Software Architecture, Architectural patterns, reference models, reference architectures, architectural structures and views.

Creating an Architecture: Quality Attributes, Achieving qualities, Architectural styles and patterns, designing the Architecture, Documenting software architectures, Reconstructing Software Architecture

UNIT – II:

Analyzing Architectures: Architecture Evaluation, Architecture design decision making, ATAM, CBAM.

Moving from one system to many: Software Product Lines, Building systems from off the shelf components, Software architecture in future

UNIT – III:

Patterns: Pattern Description, Organizing catalogs, role in solving design problems, Selection and usage.

Creational and Structural patterns: Abstract factory, builder, factory method, prototype, singleton, adapter, bridge, composite, façade, flyweight, Proxy.

B.Tech in Artificial Intelligence & Machine Learning

UNIT – IV:

Behavioral patterns: Chain of responsibility, command, Interpreter, iterator, mediator, memento, observer state, strategy, template method, visitor.

UNIT – V:

Case Studies: A-7E– A case study in utilizing architectural structures,

The World Wide Web-a case study in inter operability, Air Traffic Control–a case study in designing for high availability, Celsius Tech– a case study in product line development.

Text Books:

1. Len Bass, Paul Clements & Rick Kazman, Software Architecture in Practice, 2nd Edition, Pearson Education, 2003.
2. Erich Gamma, Design Patterns, 1st Edition, Pearson Education, 1995

Reference Books:

1. Luke Hohmann, Beyond Software architecture, Addison wesley, 2003.
2. David M. Dikel, David Kane and James R. Wilson, Software architecture, 1st Edition, Prentiece all, 2001.
3. F.Buschmann, Pattern Oriented Software Architecture, Wiley & Sons, 1st Edition, 2001.

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B.TECH VI SEMESTER		**PCC**	**3**	**0**	**0**	**3**

20AM6L08   DEEP LEARNING LAB

Course Objective:

- To illustrate simple neural networks and deep neural networks.
- To interpret the model results and analyze the accuracy of the model.
- To explain different preprocessing operations on structured data or on unstructured data.
- To explain how to predict the results using a trained model

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

CO1: Perform different pre-processing operations on structured or unstructured data.

CO2: Design neural network layers for various learning problems.

CO3: Demonstrate binary as well as multi- class classification problems.

CO4: Interpret the model results and analyse the performance of the model.

CO5: Apply statistical concepts and perform Exploratory Data Analysis.

CO6: Implement, train, and validate their own neural network

SYLLABUS

1. Write a program to generate following logic functions using McCulloch-Pitts neuron and appropriate values for weights, bias and threshold.

    a. AND logic function

    b. OR logic function

    c. NOT logic function

    d. NOR logic function

    e. XOR logic function

2. Write a program to build a logistic regression classifier with a Neural Network mindset . Consider following guidelines.

    a. Consider any convenient dataset (Cats dataset etc.) and pre-process the dataset.

    b. Define the appropriate model structure.

    c. Evaluate the model performance.

    d. Analyze the obtained results

3. Design a neural network (NN) model with one hidden layer for classification problems. Use Planar data set or any other suitable data set

    a. Implement a 2-class classification neural network with a single hidden layer.

    b. Use units with a non-linear activation function, such as than.

c. Compute the cross-entropy loss.

d. Implement forward and backward propagation.

e. Evaluate the model performance.

f. Analyze the results.

4. Implement a multilayer perception (MLP) model for prediction such as house prices.

    a. Perform Exploratory Data Analysis

    b. Prepare dataset

    c. Build MLP model

    d. Evaluate Model performance

    e. Predict for test data

5. Build a Multiclass classifier using the CNN model. Use MNIST or any other suitable dataset.

    a. Perform Data Pre-processing

    b. Define Model and perform training

    c. Evaluate Results using confusion matrix (OR) Design an object detection model using deep neural networks for simple objects.

    a. Select appropriate dataset and perform data pre-processing

    b. Define architecture in terms of layers

    c. Evaluate Model performance Label the object with appropriate text.

6. Install Open Cv package on your system and perform following operations on images.

    a. Image Sharpening

    b. Edge Detection & Image Gradients

    c. Cropping d. Blurring Background Subtraction Method

Reference Books:

1. Jacek M. Zurada,"Introduction to artificial neural systems", West Publishing Co., 1992, ISBN: 0-3 14-93391 -3.

2. Goodfellow I., BengioY., and Courville A., "Deep Learning", MIT Press, 2016, ISBN: 978-0262035613. 3. Bishop C. M., "Pattern Recognition and Machine Learning", Springer, 2006, ISBN: 978-0-387-31073-2

Web References:

1. https://www.youtube.com/watch?v=oXlwWbU8l2o

2. https://www.datacamp.com/community/tutorials/exploratory-data-analysis-python

3. https://www.analyticsvidhya.com/blog/2020/02/learn-image-classification-cnn-convolutional-neural-networks-3- datasets/

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B.TECH VI SEMESTER PCC | 0 | 0 | 3 | 1.5 |

20AM6L09 COMPUTER NETWORKS LAB

Pre-requisite: Operating Systems lab, C programming

Course Objectives:

- To provide Practical orientation of networking concepts and commands.

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

CO1: Practical orientation of networking concepts.

CO2: To teach students various forms of IPC through UNIX and socket Programming.

LIST OF EXPERIMENTS:

1. Understanding and using of commands like if config, net stat, ping, arp, telnet, ftp, finger, trace route, whois etc. Usage of elementary socket system calls (socket (), bind(), listen(), accept(), connect(), send(), recv(), sendto(), recvfrom()).

2. Implement the data link layer farming methods such as character stuffing and bit stuffing.

3. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.

4. Implement Dijkstra's algorithm to compute the Shortest path thru a graph.

5. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm.

6. Take an example subnet of hosts. Obtain broadcast tree for it.

7. Design TCP iterative Client and server application to reverse the given input sentence.

8. Design UDP Client and server application to reverse the given input sentence.

9. Implementation of get sock opt (), set sockopt () system calls.

10. Implementation of SMTP.

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B.TECH VI SEMESTER	**PCC**	0	0	3	1.5

20AM6L10   BDA LAB

Course Outcomes:

CO1: Developing different Data Models in Big Data.

CO2: Building HDFS.

CO3: Building various MapReduce Programs.

CO4: Programming using PIG and Hive.

CO5: Data Analytics with Spark.

LIST OF EXPERIMENTS

EXERCISE-1:
1. Implement the following Data structures in Java.
a) Linked Lists b) Stacks c) Queues d) Set e) Map

EXERCISE-2:
2. Perform setting up and Installing Hadoop in its three operating modes:
a) Standalone, b) Pseudo distributed, c) Fully distributed
3. Use web-based tools to monitor your Hadoop setup.

EXERCISE-3:
4. Implement the following file management tasks in Hadoop:
a) Adding files and directories
b) Retrieving files
c) Deleting files. Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

EXERCISE-4:
5. Run a basic Word Count Map Reduce program to understand MapReduce Paradigm.

EXERCISE-5:
6. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.
7. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

EXERCISE-6:
8. Install, Deploy & configure Apache Spark Cluster. Run Apache spark applications using Scala.
9. Data analytics using Apache Spark on Amazon food dataset, find all the pairs of items that are frequently reviewed together.

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a) Write a single Spark application that :

i. Transposes the original Amazon food dataset, obtaining a pair RDD of the type:<user_id> --> <list of product ids reviewed by user_id>.

ii. Count the frequencies of all the pairs of products reviewed together.

iii. Writes on the output folder all pairs of products that appear more than once and their frequencies. The pairs of products must be sorted frequency

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B.TECH VI SEMESTER	**SC**	**0**	**0**	**4**	**2**

20AM6S11 **SOFT SKILLS**
(Skill Oriented Course)

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

CO1: Make presentations on various technical and non-technical topics.

CO2: Learn various nuances of the interview process like building an effective resume, cracking JAM/GD/HR interviews.

CO3: Enhance understanding of soft skills and life skills

SYLLABUS

1. Life Skills
2. JAM
3. Presentation Skills
4. Resume Writing
5. Group Discussion
6. Interview Skills

Reference Books:

1. **Interact,** Orient Blackswan**.**
2. **Communication Skills,** Sanjay Kumar and Pushp Latha. OUP, 2011.

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B.TECH VI SEMESTER	MC	2	0	0	-

20AM6M12   ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE

Course Objectives:

- The course aims at imparting basic principles of thought process, reasoning and inferencing.

- Sustainability is at the core of Indian Traditional Knowledge Systems connecting society and nature.

- Holistic life style of Yogic-science and wisdom capsules in Sanskrit literature are also important in modern society with rapid technological advancements and societal disruptions.

- The course focuses on introduction to Indian Knowledge System, Indian perspective of modern scientific world-view and basic principles of Yoga and holistic health care system.

Course Outcomes: Upon successful completion of the course, the student will be able to

CO1: Understand the significance of Indian Traditional Knowledge.

CO2: Classify the Indian Tradition Knowledge

CO3: Compare Modern Science with Indian Traditional Knowledge system.

CO4: Analyze the role of Government in protecting the Traditional Knowledge.

CO5: Understand the impact of Philosophical tradition on Indian Knowledge System.

SYLLABUS

UNIT – I: Introduction to Traditional Knowledge:

Define Traditional Knowledge - Nature and Characteristics - Scope and Importance - kinds of Traditional Knowledge – The historical impact of social change on Traditional Knowledge Systems - Value of Traditional knowledge in Global Economy.

UNIT – II: Basic structure of Indian Knowledge System:

Astadash Vidya- 4 Ved - 4 Upaved (Ayurved, Dhanurved, Gandharva Ved & Sthapthya Adi), 6vedanga (Shisha, Kalppa, Nirukha,Vykaran, Jyothisha & Chand),4upanga (Dharmashastra, Meemamsa, purana & Tharka Shastra).

UNIT – III: Modern Science and Indian Knowledge System:

Indigenous Knowledge, Characteristics - Yoga and Holistic Health care - cases studies.

UNIT – IV: Protection of Traditional Knowledge:

The need for protecting traditional knowledge - Significance of Traditional knowledge Protection-Role of government to harness Traditional Knowledge.

UNIT – V: Impact of Traditions:

Philosophical Tradition (Sarvadarshan) Nyaya, Vyshepec, Sankhya, Yog, Meemamsa, Vedantha, Chavanka, Jain &Boudh - Indian Artistic Tradition - Chitrakala, Moorthikala, Vasthukala , Sthapthya, Sangeetha, Nruthya Yevam Sahithya

Text Books:

1. Traditional Knowledge System in India, by AmitJha, 2009.
2. Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.

Reference Books:

1. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, BharatiyaVidya
2. Swami Jitatmanand, Holistic Science and Vedant, BharatiyaVidyaBhavan.
3. Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata.
4. Pramod Chandra, India Arts, Howard Univ. Press, 1983.
5. Krishna Chaitanya, Arts of India, Abhinav Publications, 1987

Web Resources:

1. https://www.wipo.int/wipo_magazine/en/2017/01/article_0004.html
2. http://iks.iitgn.ac.in/wp-content/uploads/2016/01/Indian-Knowledge-Systems-Kapil-Kapoor.pdf
3. https://www.wipo.int/edocs/mdocs/tk/en/wipo_grtkf_ic_21/wipo_grtkf_ic_21_ref_facilitators_tex t.pdf

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B.TECH VII SEMESTER	**PEC**	3	0	0	3

20AM7T01   **CLOUD COMPUTING**
(Professional Elective-III)

Course Objectives:

- Explain the technology and principles involved in building a cloud environment
- To impletment Virtualization.
- Understand various types of cloud and its services.
- Contrast various programming models used in cloud computing.

Course Outcomes:

CO1:   Describe the principles of parallel and distributed computing and evaluation of cloud computing from existing technologies.

CO2:   Illustrate Virtualization for Data-Center Automation

CO3:   Explain and characterize different cloud deployment models and service models.

CO4:   Program data intensive parallel applications in cloud.

CO5:   Understand commercial cloud computing technologies such as AWS, AZURE and App Engine.

SYLLABUS

UNIT – I: Introduction:

Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Historical Developments, Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Amazon Web Services (AWS), Google App Engine, Microsoft Azure, Hadoop, Force.com and Salesforce.com, Microsoft Aneka.

UNIT – II: Virtualization:

Virtualization, Introduction, Characteristics of Virtualized, Environments Taxonomy of Virtualization Techniques, Execution Virtualization, Other Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples: Xen, VMware, Microsoft Hyper – V.

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UNIT – III: Cloud Computing Architecture:

Cloud Reference Model, Architecture, Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds, Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud, Open Challenges, Cloud Definition Cloud Interoperability and Standards Scalability and Fault Tolerance Security, Trust, and Privacy.

UNIT – IV: Data Intensive Computing: Map-Reduce Programming:

What is Data-Intensive Computing? Characteristics, Challenges, Historical Perspective. Technologies for Data Intensive Computing: Storage Systems, Programming Platforms.

Cloud Applications: Scientific Applications, Healthcare: ECG Analysis in the Cloud, Social Networking, Media Applications, Multiplayer Online Gaming.

UNIT – V: Cloud Platform in Industry and Cloud Applications:

Cloud Platforms in Industry: Amazon Web Services, Compute Services, Storage Services, Communication Services, Additional Services, Google App Engine, Architecture and Core Concepts, Application Life-Cycle, Cost Model, Observations, Microsoft Azure, Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance

Text Books:

1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi Mastering Cloud Computing McGraw Hill Education.

Reference Books:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014.

2. Buyya, Rajkumar, James Broberg, and Andrzej M. Goscinski, eds. Cloud computing: Principles and paradigms. Vol. 87. John Wiley & Sons, 2010.

3. Hwang, Kai, Jack Dongarra, and Geoffrey C. Fox. Distributed and cloud computing: from parallel processing to the internet of things. Morgan Kaufmann, 2013.

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B.TECH VII SEMESTER	**PCC**	**3**	**0**	**0**	**3**

20AM7T02   **NATURAL LANGUAGE PROCESSING**
(Professional Elective-III)

Pre-requisite: Data structures, finite automata and probability theory

Course Objective: Objective of the course is to impart

- Introduce to some of the problems and solutions of NLP and their relation to linguistics and statistics.

Course Outcomes:

CO1: Show sensitivity to linguistic phenomena and an ability to model them with formal grammars

CO2: Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems.

CO3: Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.

CO4: Able to design, implement, and analyze NLP algorithms.

CO5: Able to design different language modeling Techniques.

SYLLABUS

UNIT-I: **Finding the Structure of Words:**

Words and Their Components, Issues and Challenges, Morphological Models Finding the Structure of Documents: Introduction, Methods, Complexity of the Approaches, Performances of the Approaches.

UNIT-II: **Syntax Analysis:**

Parsing Natural Language, Treebanks: A Data-Driven Approach to Syntax, Representation of Syntactic Structure, Parsing Algorithms, Models for Ambiguity Resolution in Parsing, Multilingual Issues.

UNIT-III: **Semantic Parsing:**

Introduction, Semantic Interpretation, System Paradigms, Word Sense Systems, Software.

UNIT-IV:

Predicate-Argument Structure, Meaning Representation Systems, Software

UNIT-V: Discourse Processing:

Cohension, Reference Resolution, Discourse Cohension and Structure Language Modeling: Introduction, N-Gram Models, Language Model Evaluation, Parameter Estimation, Language Model Adaptation, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling.

Text Books:

1. "Multilingual natural Language Processing Applications: From Theory to Practice – Daniel M. Bikel and Imed Zitouni, Pearson Publication

2. Natural Language Processing and Information Retrieval: Tanvier Siddiqui, U.S. Tiwary.

Reference Books:

1. Speech and Natural Language Processing - Daniel Jurafsky & James H Martin, Pearson Publications.

B.TECH VII SEMESTER

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20AM7T03 **SOFTWARE PROJECT MANAGEMENT**
(Professional Elective-III)

Course Objectives: At the end of the course, the student shall be able to

- To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
- To compare and differentiate organization structures and project structures.
- To implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.

Course Outcomes: Upon the completion of the course students will be able to

CO1: Apply the process to be followed in the software development life-cycle models.

CO2: Apply the concepts of project management & planning.

CO3: Implement the project plans through managing people, communications and change.

CO4: Conduct activities necessary to successfully complete and close the Software projects.

CO5: Implement communication, modeling, and construction & deployment practices in software development.

SYLLABUS

UNIT-I: Conventional Software Management:

The waterfall model, conventional software Management performance.

Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT-II: The Old Way and The New:

The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life Cycle Phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

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Artifacts of The Process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT-III: Model Based Software Architectures:

A Management perspective and technical perspective.

Work Flows of the Process: Software process workflows, Iteration workflows.

UNIT-IV: Checkpoints of the Process:

Major mile stones, Minor Milestones, Periodic status assessments. Query Language.

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

UNIT-V: Project Control and Process Instrumentation:

The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Project Approach: Software Lifecycle models, Lifecycle phases Effort estimation: Estimation techniques, Function Point analysis, SLOC, COCOMO, Use case-based estimation.

Text Books:

1. Software Project Management, Walker Royce, Pearson Education, 2005.
2. Software Project Management, Bob Hughes, 4th edition, Mike Cotterell, TMH.
3. Software Project Management in practice, Pankaj Jalote, Pearson. (Units 1,2,3,4,5)

Reference Books:

1. Software Project Management, Joel Henry, Pearson Education.
2. Software Project Management in practice, Pankaj Jalote, Pearson Education, 2005.
3. Effective Software Project Management, Robert K. Wysocki, Wiley, 2006.

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B.TECH VII SEMESTER **PEC**	3	0	0	3

20AM7T04 **SOFTWARE TESTING METHODOLOGIES**
(Professional Elective-IV)

Course Objectives:

- To study fundamental concepts in software testing and discuss various software testing issues and solutions in software unit, integration, regression and system testing.
- To learn how to plan a test project, design test cases and data, conduct testing, manage software problems and defects, generate a test report
- To expose the advanced software testing concepts such as object-oriented software testing methods, web-based and component-based software testing
- To understand software test automation problems and solutions
- To learn how to write software test documents and communicate with engineers in Various forms.

Course Outcomes: At the end of the course, the students will be able to

CO1: Identify and understand various software testing problems, apply software testing knowledge and engineering methods and solve these problems by designing and selecting software test models, criteria, strategies, and methods.

CO2: Design and conduct a software test process for a software project Analyze the needs of software test automation

CO3: Use various communication methods and skills to communicate with their team mates to conduct their practice –oriented software testing projects.

CO4: Basic understanding and knowledge of contemporary issues in software testing, such as component -based, web based and object oriented software testing problems.

CO5: Write test cases for given software to test it before delivery to the customer and write test scripts for both desktop and web based applications.

SYLLABUS

UNIT – I: Software Testing:

Introduction, Evolution, Myths & Facts, Goals, psychology, definition, Model for testing, Effective Vs Exhaustive Software Testing.

Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, Software Testing Methodology.

Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, verifying code, Validation.

UNIT – II: Dynamic Testing – Black Box Testing Techniques:

Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause – Effect Graphing based testing, Error guessing.

White – Box Testing: need, Logic Coverage criteria, Basis Path testing, Graph matrices, Loop testing, data flow testing, mutation testing.

UNIT – III: Static Testing:

Inspections, Structured Walk throughs, Technical Reviews.

Validation Activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing.

Regression Testing: Progressives Vs regressive testing, Regression test ability, Objectives of regression testing, Regression testing types, Regression testing Techniques.

UNIT – IV: Efficient Test Suite Management:

Growing nature of test suite, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of aprioritized test suite Software.

Quality Management: Software Quality metrics, SQA models.

Debugging: Process, techniques, correcting bugs.

UNIT – V: Automation and Testing Tools:

Need for automation, categorization of testing tools, selection of Testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools such as Win Runner, Load Runner, Jmeter and JUnit . Test Automation using Selenium tool.

Testing Object Oriented Software: basics, Object oriented testing.

Testing Web based Systems: Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems.

Text Books:

1. Software Testing, Principles and Practices, Naresh Chauhan, Oxford
2. Software Testing, Yogesh Singh, CAMBRIDGE

Reference Books:

1. Foundations of Software testing, Aditya P Mathur, 2ed, Pearson
2. Software testing techniques –Baris Beizer, Dream tech, second edition.
3. Software Testing, Principles, techniques and Tools, M G Limaye, TMH
4. Effective Methods for Software testing, Willian E Perry, 3ed, Wiley

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20AM7T05   **INFORMATION SECURITY**
(Professional Elective-IV)

Course Objectives:

- Understand the concepts of classical encryption techniques and concepts of finite fields and number theory.
- Understand Working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms.
- Understand the Design issues and working principles of various authentication protocols, PKI standards.
- Concepts of cryptographic utilities and authentication mechanisms to design secure applications.

Course Outcomes:

CO1: Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication.

CO2: Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.

CO3: Apply different digital signature algorithms to achieve authentication and create secure applications

CO4: Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP

CO5: Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure applications

SYLLABUS

UNIT – I: Classical encryption Techniques:

The OSI Security Architecture, Security Attacks, Services & Mechanisms, Symmetric Cipher Model, Substitution Techniques: Caesar Cipher, Playfair Cipher, Hill Cipher, Polyablphabetic Ciphers, One-Time Pad, Transposition Techniques: Rail fence, Row Transposition cipher, Block Ciphers: Traditional Block Cipher Structure, Block Cipher Design Principles.

UNIT – II: Symmetric Key Cryptography:

Data Encryption Standard (DES), Advanced Encryption Standard (AES), Block Cipher Modes of Operations.

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Reminder Theorem.

UNIT – III: Public Key Cryptography:

Principles, Public Key Cryptography Algorithms, RSA Algorithm, Diffie Hellman Key Exchange, Elliptic Curve Cryptography.

Cryptographic Hash Functions: Application of Cryptographic Hash Funtions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security.

Digital Signatures: NIST Digital Signature Algorithm, Key Management and Distribution.

UNIT – IV: User Authentication:

Remote User Authentication Principles, Kerberos.

Electronic Mail Security: Pretty Good Privacy (PGP) And S/MIME.

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security payload.

UNIT – V: Introduction to firewall and types of firewalls:

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS).

Firewalls: Characteristics, Types of Firewalls, Placement of Firewalls, Firewall configuration.

Text Books:

1. Cryptography and Network Security – William Stallings, Pearson Education, 7th Edition. [Units 1,2,3,4,5].

2. Cryptography, Network Security and Cyber Laws – Bernard MeneZES, Cengage Learning, 2010 edition. [Units 1,2,3,4,5]

Reference Books:

1. Cryptography and Network Security – Behrouz A Forouzan, Debdeep Mukhopadhyaya, Mc-GrawHill, 3rd Edition, 2015.

2. Network Security Illustrated, Jason Albanese and Wes Sonnenreich, MGH Publishers, 2003.

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B.TECH VII SEMESTER	**PEC**	**3**	**0**	**0**	**3**

20AM7T06   **BUSINESS INTELLIGENCE**
(Professional Elective-IV)

Course Objectives:

- Introduce the concepts and components of Business Intelligence(BI)
- Evaluate the technologies that make up BI (data warehousing, OLAP)
- Identify the technological architecture that makes up BI systems.

Course Outcomes:

CO1: Understand concepts and components of Business Intelligence.

CO2: Explain the complete lifecycle of BI development

CO3: Illustrate technology and processes associated with Business Intelligence framework.

CO4: Demonstrate a business scenario, identify the metrics, indicators and make Recommendations to achieve the business goal.

CO5: Ability to design expert system using AI tools

SYLLABUS

UNIT – I: Business intelligence:

Effective and timely decisions, Data, information and knowledge, The role of mathematical models, Business intelligence architectures, Ethics and business intelligence.

Decision support systems: Definition of system, Representation of the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system.

UNIT – II:

Role of OLAP tools in the BI architecture, OLAP performance directly on operational databases, A peek into the OLAP operations on multidimensional data, Leveraging ERP data using analytics. Getting started with business intelligence: Using analytical information for decision support, Information sources before dawn of BI, Business intelligence (BI defined, Evolution of BI and role of DSS, EIS, MIS and digital dashboards, Need for BI at virtually all levels, BI for past, present and future, The BI value chain, Introduction to business analytics.

UNIT – III: BI Definitions and concepts:

BI Component framework, Need of BI, BI Users, Business Intelligence applications, BI Roles and responsibilities, Best practices in BI/DW, The complete BI professional, Popular BI tools.

Basis of data integration: Need for data warehouse, Definition of data warehouse, data mart, OSS, Raiph Kimball's approach vs. W.H.Inmon's approach, Goals of a datawarehouse, constituents of a datawarehouse, Extract, transform, load, data Integration, Data integration technologies, Data quality, Data profiling.

UNIT – IV: Business Intelligence Applications:

Marketing models: Relational marketing, Sales force management,

Logistic and production models: Supply chain optimization, Optimization models for logistics planning, Revenue management systems.

Data envelopment analysis: Efficiency measures, Efficient frontier, The CCR model, Identification of good operating practices.

UNIT – V: Knowledge Management:

Introduction to Knowledge Management, Organizational Learning and Transformation, Knowledge Management Activities, Approaches to Knowledge Management, Information Technology(IT) In Knowledge Management, Knowledge Management Systems Implementation, Roles of People in Knowledge Management

Artificial Intelligence and Expert Systems:

Concepts and Definitions of Artificial Intelligence, Artificial Intelligence Versus Natural Intelligence, Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, Development of Expert Systems.

Text Books:

1. Fundamental of Business Intelligence" Grossmann W,Rinderle-MaSpringer, 2015
2. "Fundamentals of Business Analytics" – By R N Prasad and SeemaAcharya, Publishers:WileyIndia

Reference Books:

1. Larissa T Moss and Shaku Atre–Business Intelligence Roadmap: The Complete Project Life cycle for Decision Support Applications, Addison Wesley Information Technology
2. David Loshin - Business Intelligence: The Savvy Manager's Guide, Publisher: Morgan Kaufmann.

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20AM7T07   SOFT COMPUTING
(Professional Elective-V)

Course Objectives:

- To learn the basic concepts of Soft Computing
- To become familiar with various techniques like neural networks, genetic algorithms and fuzzy systems.
- To apply soft computing techniques to solve problems.

Course Outcomes: Upon completion of this course, the students should be able to

CO1: Apply suitable soft computing techniques for various applications.

CO2: Integrate various soft computing techniques for complex problems

CO3: Learn Fuzzy Sets.

CO4: Understand the concepts of Genetic Algorithms.

CO5: Understand Hybrid Systems and Soft Computing Tools.

SYLLABUS

UNIT – I: Introduction To Soft Computing:

Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta-Perceptron Network-Adaline Network-Madaline Network.

UNIT – II: Artificial Neural Networks:

Back propagation Neural Networks - Kohonen Neural Network -Learning Vector Quantization -Hamming Neural Network - Hopfield Neural Network- Bi-directional Associative Memory -Adaptive Resonance Theory Neural Networks- Support Vector Machines - Spike Neuron Models.

UNIT – III: Fuzzy System:

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations -Membership Functions -Defuzzification - Fuzzy Arithmetic and Fuzzy Measures - Fuzzy Rule Base and Approximate Reasoning - Introduction to Fuzzy Decision Making.

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UNIT – IV: Genetic Algorithms

Basic Concepts- Working Principles -Encoding- Fitness Function - Reproduction - Inheritance Operators - Cross Over - Inversion and Deletion -Mutation Operator - Bit-wise Operators -Convergence of Genetic Algorithm.

UNIT – V: Hybrid Systems:

Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination - LR-Type Fuzzy Numbers - Fuzzy Neuron - Fuzzy BP Architecture - Learning in Fuzzy BP- Inference by Fuzzy BP - Fuzzy ArtMap: A Brief Introduction - Soft Computing Tools - GA in Fuzzy Logic Controller Design - Fuzzy Logic Controller.

Text Books:

1. N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.
2. S.N.Sivanandam ,S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt.Ltd., 2nd Edition, 2011.
3. S.Rajasekaran, G.A.VijayalakshmiPai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt.Ltd., 2017.

Reference Books:

1. Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, ―Neuro-Fuzzy and Soft Computing‖, Prentice-Hall of India, 2002.
2. KwangH.Lee, ―First course on Fuzzy Theory and Applications‖, Springer, 2005.
3. George J. Klir and Bo Yuan, ―Fuzzy Sets and Fuzzy Logic-Theory and Applications‖, Prentice Hall, 1996.

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20AM7T08   **ROBOTICS AND IT'S APPLICATIONS**
(Professional Elective-V)

Course Objectives:

- The students will be able to understand the basic concepts and fundamentals of robotics.
- They will also be able to use AI in the field of robotics.

Course Outcomes:

CO1: Demonstrate Robotics Fundamentals.

CO2: Understand the role of AI in Robotics

CO3: Classification of Robots

CO4: Describe working principle of various sensors and program different operations

CO5: Appreciate applications of robots in industry.

SYLLABUS

UNIT – I:

Introduction: Introduction to Robotics Fundamentals of Robotics, Robot Kinematics: Position Analysis, Dynamic Analysis and Forces, Robot Programming languages & systems: Introduction, the three levels of robot programming, requirements of a robot programming language, problems peculiar to robot programming languages

UNIT – II:

Need of AI in Robotics: History, state of the art, Need for AI in Robotics. Thinking and acting humanly, intelligent agents, structure of agents.

UNIT – III:

Game Playing: AI and game playing, plausible move generator, static evaluation move generator, game playing strategies, problems in game playing.

UNIT – IV:

Robotics fundamentals: Robot Classification, Robot Specification, notation, kinematic representations and transformations, dynamics techniques; trajectory planning and control.

UNIT – V:

Robotics and Its applications: DDD concept, Intelligent robots, Robot anatomy-Definition, law of robotics, History and Terminology of Robotics-Accuracy and repeatability of Robotics-Simple problems-Specifications of Robot-Speed of Robot, Robot joints and links-Robot classifications Architecture of robotic systems-Robot Drive systems-Hydraulic, Pneumatic and Electric system.

Reference Books:

1. Robotics, Vision and Control: Fundamental Algorithms in MATLAB, Peter Corke, Springer, 2011.
2. Robotics: Everything You Need to Know About Robotics from Beginner to Expert, Peter McKinnon, Createspace Independent Publishing Platform, 2016.
3. Introduction to AI Robotics, Second Edition, By Robin R. Murphy, MIT press, 2001.
4. Artificial Intelligence for Robotics: Build intelligent robots that perform human tasks using AI techniques, Francis X. Govers, Packt Publishers, 2018.

B.TECH VII SEMESTER

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20AM7T09 **INTERNET OF THINGS**
(Professional Elective-V)

Course Objectives:

- Understand the architecture of Internet of Things and connected world.
- Explore on use of various hardware, communication and sensing technologies to build IoT applications.
- Develop the real time IoT applications to make smart world.
- Understand challenges and future trends in IoT.

Course Outcomes:

CO1: Design and Deployment of IoT.

CO2: Design and comparing M2M with IoT

CO3: Understand Platform design and modeling of IoT

CO4: Apply IoT in different devices using Python

CO5: Implement IoT and cloud platforms.

SYLLABUS

UNIT – I: Introduction to Internet of Things (IoT):

Definition and characteristics of IoT, physical design of IoT, logical design of IoT, IoT Enabling Technologies, IoT levels and deployment, domains Specific IoTs.

UNIT – II: IoT and M2M:

Introduction, M2M, difference between IoT and M2M, software defined networking (SDN) and network function virtualization (NFV) for IoT, basics of IoT system management with NETCONF-YANG.

UNIT – III: IoT Platforms Design Methodology:

IoT Architecture: State of the art introduction, state of the art; Architecture reference model: Introduction, reference model and architecture, IoT reference model. Logical design using Python: Installing Python, Python data types and data Structures, control flow, functions, modules, packages, file handling. Raspberry PI with Python, other IoT devices.

B.Tech in Artificial Intelligence & Machine Learning

UNIT – IV: IoT Protocols:

Messaging Protocols- MQ Telemetry Transport (MQTT), Constrained Application Protocol (CoAP) Transport Protocols-Light Fidelity (Li-Fi), Bluetooth Low Energy (BLE)

IoT Protocols: Addressing and Identification: Internet Protocol Version 4 (IPV4), Internet Protocol Version 6(IPV6), Uniform Resource Identifier (URI).

UNIT – V: IoT Physical Servers And Cloud Offerings

Introduction to cloud storage models and communication APIs, WAMP –Auto Bahn for IoT, Xively cloud for IoT, case studies illustrating IoT design –home automation, smart cities, smart environment.

Text Books:

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things: A Hands-on-Approach", VPT, 1st Edition, 2014. (Units1,2,3,5)

2. Matt Richardson, Shawn Wallace, "Getting Started with Raspberry Pi", O'Reilly (SPD), 3rd Edition, 2014. (Unit 3)

3. Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram " Internet of Things" Wiley (Unit 4).

Reference Books:

1. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education

2. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", John Wiley and Sons2014.

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B.TECH VII SEMESTER	**HSMC**	**0**	**0**	**3**	**3**

20AM7L12 UNIVERSAL HUMAN VALUES UNDERSTANDING HARMONY

Course Objectives: The objective of the course is fourfold:

- To Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- To Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- To Strengthening of self-reflection.
- To Development of commitment and courage to act.

Course Outcomes: By the end of the course

CO1: Understand and analyze the essentials of human values and skills, self exploration, happiness and prosperity.

CO2: Evaluate coexistence of the "I" with the body

CO3: Identify and evaluate the role of harmony in family, society and universal order.

CO4: Understand and associate the holistic perception of harmony at all levels of existence

CO5: Develop appropriate technologies and management patterns to create harmony in professional and personal lives.

SYLLABUS

UNIT – I: Course Introduction-Need, Basic Guidelines, Content and Process for Value Education:

Purpose and motivation for the course, recapitulation from Universal Human Values-I Self-Exploration – what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration Continuous Happiness and Prosperity- A look at basic Human Aspirations 4. Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfill the above human aspirations: understanding and living in harmony at various levels. Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

B.Tech in Artificial Intelligence & Machine Learning

UNIT – II: Understanding Harmony in the Human Being - Harmony in Myself:

Understanding human being as a co-existence of the sentient 'I' and the material 'Body' Understanding the needs of Self ('I') and 'Body' - happiness and physical facility Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) Understanding the characteristics and activities of 'I' and harmony in 'I' Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Health. Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease.

UNIT – III: Understanding Harmony in the Family and Society-Harmony in Human Relationship:

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship. Understanding the meaning of Trust; Difference between intention and competence. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family. Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives.

UNIT – IV: Understanding Harmony in the Nature and Existence-Whole Existence as Coexistence:

Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature. Understanding Existence as Coexistence of mutually interacting units in all-pervasive space Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT – V: Implications of the above Holistic Understanding of Harmony on Professional Ethics:

Natural acceptance of human values. Definitiveness of Ethical Human Conduct Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations Sum up. Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions eg. To discuss the conduct as an engineer or scientist etc.

Text Books:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.

Reference Books:

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj - PanditSunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad

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B.TECH VII SEMESTER SC	0	0	4	2

20AM7S13 **DATA VISUALIZATION USING TABLEAU**
(Skill Oriented Course)

Course Objectives:

- The objective of this lab is usage of Tableau's library of resources to demonstrate best practices for data visualization and data storytelling.

Course Outcomes: At the end of this course, the student will be able to

CO1: Examine, navigate, and learn to use the various features of Tableau.

CO2: Apply basic functionalities of Tableau

CO3: Visualize the data using various charts.

CO4: Visualize the data using various custom charts and dash board

LIST OF EXPERIMENTS

1. Introduction to Tableau and download and install Tableau.
2. Connecting with different database. Tableau vs Excel, Live vs Extract
3. Data type, View data, column formatting, sort
4. Drill down and hierarchies, Grouping
5. Measure name and values, usage, Discrete vs continuous, parameters, combine, sets
6. Title and caption, exporting, granularity, worksheet interface, managing metadata
7. Cross database, data blending,
8. Filters and advanced filters
9. Size, color, label, tooltip, shapes, font, alignment, shading
10. Number functions, string functions, table calculations
11. Conditional formatting, rank, logical functions
12. Scatter chart, word map, line chart
13. Reference lines, bar charts, Tree map
14. Water fall, pie chart
15. Maps, dash board

Web links:

1. https://www.youtube.com/watch?v=ozGYSLrAc5o&list=PLWPirh4EWFpGXT Bu8ldLZGJCUeTMBpJFK&index=5
2. https://www.datacamp.com/community/tutorials/data-visualisation-tableau#introduction-to-tableau

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B.TECH V SEMESTER   **OEC** | **3** | **0** | **0** | **3** |

20CE5T04   ARCHITECTURE AND TOWN PLANNING
(OPEN ELECTIVE-I)

Course Objectives: The objective of this course is to

- Initiating the students to different architectures of the world.
- Salient features of Egyptian, Greek, Roman, Indian Vedic, Indus valley civilization.
- Architectural Design concepts, Principles of Planning and Composition.
- To understand town planning from ancient times to modern times.
- To impart the concepts of town planning standards.

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

CO1: Student should be able to distinguish architectural styles of eastern and Western world.

CO2: Student should understand the importance of Orders of Architecture.

CO3: Should be able to compose spaces of buildings using design concepts, planning principles.

CO4: Student should understand the town planning standards, landscaping features.

SYLLABUS

UNIT-I:

History of Architecture: Western Architecture: Egyptian, Greek, Roman Architectures- Orders. Indian Architecture: Vedic age, Indus valley civilization– Buddhist period: Stambas, Stupa, Toranas, Chaityas, Viharas – Hindu temples: Dravidian and Indo Aryan Styles-Temple of Aihole, Madurai, Bhuvaneshwar, Mount Abu. Indo Sarsanic (Islamic) Architecture: Mosque - Palace – Fort - Tomb.

UNIT-II:

Architectural Design: Principles of designing – Composition of Plan – relationship between plan and elevation- building elements, form, surface texture, mass, line, color, tone- Principles of Composition: Unity, contrast, proportion, scale, balance, circulation, rhythm, character, expression.

UNIT-III:

Principles of Planning: Principles of planning a residence- site selection, site orientation- aspect, prospect, grouping, circulation, privacy, furniture requirements,

Post-classic Architecture: Introduction of post-classic architecture contribution of eminent architects to modern period-Edward Lutyens, Le Corbusier, Frank Lloyd Wright, Walter Groping.

UNIT-IV:

Histroical Back Ground of Town Planning: Town planning in India – Town plans of mythological Manasa-Town plans of ancient towns: Harappa, Mohenjodaro, Pataliputra, Delhi, Acropolis (Greece), Jerusalem, Mecca, Rome, London.

UNIT-V:

Modern Town Planning: Zoning- Roads and road traffic- Housing- Slums, Parks, Play grounds- Public Utility Services- Surveys and maps for planning-neighbor hood Planning.

Standards of Town planning: Planning new towns, planning standards and specifications, national and regional planning, town planning and legislation planning regulations and limitations.

Text books:

1. 'The great ages of World Architecture' by G.K. Hiraskar.

2. 'Planning and Design of Buildings by Section of Architecture' by Y. S.Sane.

3. 'Professional Practice' by G.K.Krishnamurthy, S.V.Ravindra, PHI Learning, NewDelhi.

4. 'Indian Architecture – Vol. I & II' by Percy Brown, Taraporevala Publications, Bombay.

5. 'Fundamentals of Town Planning'by G.K. Haraskar.

Reference Books:

1. 'Drafting and Design for Architecture' by Hepler, Cengage

2. Learning 'Architect's Portable Handbook' by John Patten Guthrie – Mc Graw Hill International Publications.

3. 'Mordern Ideal Homes for India' by R. S. Deshpande.

4. 'Town and County Planning' by A.J. Brown and H.M. Sherrard.

5. 'Town Design' by Federik Glbbard, Architectural press, London.

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B.TECH V SEMESTER	**OEC**	**3**	**0**	**0**	**3**

20CE5T05   ELEMENTS OF CIVIL ENGINEERING
(OPEN ELECTIVE-I)

Course Objectives: The objective of this course is to

To introduce basics of Civil Engineering concepts in the fields of surveying, building materials, water resources, Water Supply, Sanitary, Electrical Works in Building and Highway engineering.

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

CO1: The student should   be   able to know the basics of civil engineering and concepts of surveying.

CO2: The student should be   able   to know various properties of building materials and various types of   building.

CO3: The student should be able to know the fundamentals of   Water Resources, Water Supply, Sanitary and Electrical Works in Building.

CO4: The student   should   be   able   to   know   the   fundamental concepts highway engineering.

SYLLABUS

UNIT-I:

Introduction. Introduction of Civil Engineering, Scope of Civil Engineering, Role of Civil Engineer in Society. Impact of infrastructural development on economy of country.

UNIT-II:

Surveying Introduction: Definition of Surveying, Fundamental principles of surveying, Classification of surveying.

Linear Measurement: Methods, Instruments used in chain surveying, Selection of stations, Chaining and Ranging.

Angular Measurement: Instruments used, Types of compass, Types of meridians and bearings, Measurement of bearings, computation of angles. Compass traversing local attraction.

Levelling: Objectives and applications-terminology-Instruments, component parts of dumpy level, Types of levelling, levelling staff

UNIT-III:

Building Materials and Construction Materials: Introduction to construction materials - Stones, Bricks, Lime, Cement, Timber, Sand, Aggregates, Mortar, Concrete and bitumen. Construction: Classification of buildings, Building components and their functions.

UNIT-IV:

Water Resources Hydrologic cycle, water use and its conservation, Introduction to dams, barrages and check dams. Water Supply, Sanitary and Electrical Works in Building Introduction, water supply system, water supply layout of a building, house drainage, traps, electrical works in building.

UNIT–V:

Transportation Engineering, classification of roads, Introduction of flexible and rigid pavements, Introduction to road traffic and traffic control mechanism.

Text Books:

1. Elements of Civil Engineering, Mimi Das Saikia, Bhargab Mohan Dasand Madan Mohan Das Publisher: PHI Learning Private Limited New Delhi.
2. Elements of Civil Engineering, Dr. R.K. Jain and Dr. P.P. Lodha, Publisher: McGraw Hill Education, India Pvt. Ltd.
3. Surveying Vol. I, Dr. B. C. Punmia, Ashokkumar Jain, Arun kumar Jain, 16th Edition Publisher: Laxmi Publication Delhi.

Reference Books:

1. Surveying Theory and Practice, James M Anderson and Edward, 7th Edition, M Mikhail Publisher: McGraw Hill Education, India Pvt. Ltd.

2. Surveying and Leveling, R. Subramanian Publisher, Oxford University.

3. Building drawing, M.G. Shah, C.M.Kale and S.Y. Patki Publisher: TataMcGraw Hill.

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B.TECH V SEMESTER **OEC**	**3**	**0**	**0**	**3**

20EE5T04   BASICS OF CONTROL SYSTEMS
(OPEN ELECTIVE-I)

Course Objectives:

- To Enable the student to understand the importance of Modelling of Control systems
- To understand the First order & second order systems
- To understand the transfer function analysis
- To understand the Stability of the systems
- To understand the States Space Analysis

Course Outcomes:

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

CO1: Understand the different Classification of control systems and modelling

CO2: Understand the functioning of Signals & time response analysis

CO3: Understand the concept of Root Locus & Construction of Root Loci

CO4: Understand the concept of Bode plot & Nyquist Plot

CO5: Understand the concept of States Space Analysis of LTI System

SYLLABUS

UNIT – I

Mathematical Modeling of Control Systems: Classification of control systems, Open Loop and closed loop control systems and their differences, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems

UNIT-II

Time Response Analysis: Standard test signals - Time response of first and second order systems - Time domain specifications - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT – III

Stability and Root locus Technique: The concept of stability – Routh's stability criterion –limitations of Routh's stability –Root locus concept - construction of root loci

UNIT–IV

Frequency Response Analysis: Introduction to Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots.

UNIT–V

State Space Analysis of LTI Systems: Concepts of state variables and state model, state space representation of transfer function, Diagonalization- Solving the time invariant state equations.

Text Books:
1. Control Systems principles and design, M.Gopal, Tata McGraw Hill education Pvt Ltd., 4th Edition.
2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India,2nd Edition.

Reference Books:
1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
2. Control Systems, Manik Dhanesh N, Cengage publications.
3. Control Systems Engineering, I.J.Nagarath and M.Gopal, Newage International

   Publications, 5th Edition.
4. Control Systems Engineering, S.Palani,TataMcGraw Hill Publications.

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20EE5T05   SPECIAL ELECTRICAL MACHINES
(OPEN ELECTIVE-I)

Course Objective:

- To explain theory of operation and control of switched reluctance motor.
- To explain the performance and control of stepper motors, and their applications.
- To describe the operation and characteristics of permanent magnet dc motor.
- To distinguish between brush dc motor and brush less dc motor.
- To explain the theory of travelling magnetic field and applications of linear motors.

Course Outcomes:

The student should be able to

CO1: Distinguish between brush dc motor and brush less dc motor.

CO2: Explain the performance and control of stepper motors, and their applications.

CO3: Explain theory of operation and control of switched reluctance motor.

CO4: Explain the theory of travelling magnetic field and applications of linear motors.

CO5: Understand the significance of electrical motors for traction drives.

SYLLABUS

Unit I: Stepper Motors: Classification and construction details of stepper motors – Hybrid and Variable Reluctance Motor (VRM) - Construction and principle of hybrid type synchronous stepper motor – Different configuration for switching the phase windings control circuits for stepper motors – Open loop and closed loop control of stepper motors – Applications of stepping motors.

Unit II: Switched Reluctance Motors: Construction – Comparison of conventional and switched reluctance motors –Torque producing principle and torque expression – Different converter configurations for SRM – Drive and power circuits for SRM – Position sensing of rotor – Applications of SRM.

Unit III : Brushless DC Motor: Construction – Principle of operation of BLDM – sensing and logic scheme, basic drive circuit, power converter circuit, transient analysis Theory of brushless DC motor as variable speed synchronous motor. Torque and EMF equations – Torque speed characteristics – Performance and efficiency.

UNIT-IV: **Linear motors:** Linear induction motor: Construction– principle of operation– applications. Linear synchronous motor: Construction – principle of operation– applications.

Unit V: Electric Motors for traction drives: AC motors– DC motors –Single sided linear induction motor for traction drives – Comparison of AC and DC traction.

Text Books:

1. Special electrical Machines, K. Venkata Ratnam, University press, 2009, New

2. "Linear Electric Motors: Theory, Design and Practical application" , Naser A and Boldea I, Prentice Hall Inc, New Jersey, 1987.

Reference Books:

1. Generalized Theory of Electrical Machines – PS Bhimbra, Khanna Publishers.

2. "Brushless Permanent Magnet and Reluctance Motor Drives" , Miller T.J.E. Clarendon Press, Oxford, 1989.

3. Electric Machines – Theory, operation, Applications and Control - Charles I. Hubert – Pearson Publications.

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B.TECH V SEMESTER **OEC**	3	0	0	3

20ME5T04   **DESIGN THINKING & PRODUCT INNOVATION (OPEN ELECTIVE-I)**

Pre-requisite: Managerial Economics and Financial Analysis,

Management Science.

Course Objective: At the end of the course, The student will able to

1. Design and develop the new product
2. Explain the basics of design thinking.
3. Describe the role of reverse engineering in product development.
4. Identify the needs of society and convert into demand.
5. Explain the product planning and product development process

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

CO1: To bring awareness on innovative design and new product development.

CO2: To explain the basics of design thinking.

CO3: To familiarize the role of reverse engineering in product development.

CO4: To train how to identify the needs of society and convert into demand.

CO5: To introduce product planning and product development process.

SYLLABUS

UNIT-I: **SCIENCE TO ENGINEERING:**

Job of engineers, engineering units and measurement, elements of engineering analysis, forces and motion, energy, kinematics and motion, conversion of linear motion to rotary and vice versa, motion transmission. Physics to Engineering: Application of Newton laws, Pascal's law, Bouncy, Bernoulli's theorem, Ohm's law, electrical induction in

engineering products.

UNIT-II: **HISTORICAL DEVELOPMENT:**

Invention wheel, early mechanics in design, mechanical advantages,

industrial revolution, steam and petrol for mobility. Innovations in Electrical and Electronics: Electrical energy generation, electrical bulb, electrical equipment, electronics and automation, computing for early days to present, innovations in communications.

UNIT-III: SYSTEMATIC APPROACH TO PRODUCT DEVELOPMENT:

Design Thinking, Innovation, Empathize Design Thinking as a systematic approach to Innovation, brainstorming, visual thinking, design challenges, innovation, art of Innovation, strategies for idea generation, creativity, teams for innovation. Solution finding methods: Conventional, intuitive, discursive, methods for combining solution, decision making for new design.

UNIT-IV: REVERSE ENGINEERING IN PRODUCT DEVELOPMENT:

Reversing engineering methods, identifying the bad features in a product, reduction in size and weight, usage of new materials, 3D printing, study of introducing electrical and electronic controls to the old products, importance of ergonomics in product development, environmental considerations in design, safety considerations in design.

UNIT-V:

Study of Product Development- Agriculture, development of machines for separation of corn seeds, peeling of groundnut shells, husk removing from paddy. Electrical: Design of burglar alarm, speedometer, water level indicator, smart gates, smart lights. Design of electrical vehicles, unmanned vehicles, design principles in drones.

Text Books:

1. Philip Kosky, Robert T. Balmer, William D. Keat, George Wise, "Exploring Engineering: An Introduction to Engineering and Design", 4th edition, Elsevier, 2016.

2. David Ralzman, "History of Modern Design", 2nd edition, Laurence King Publishing Ltd., 2010

3. An AVA Book, "Design Thinking", AVA Publishing, 2010.

Reference Books:

1. G. Pahl, W.Beitz, J. Feldhusen, KH Grote, "Engineering Design: A Systematic Approach", 3rd edition, Springer, 2007.

2. Tom Kelley, Jonathan Littman, "Ten Faces in Innovation", Currency Books, 2006.

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B.TECH V SEMESTER	**OEC**	3	0	0	3

20ME5T05   **NANOTECHNOLOGY**
(OPEN ELECTIVE-I)

Pre-requisite: Materials Science

Course Objective:

- To familiarize with principles of quantum mechanics on which nano materials behave
- To elucidate applications of nanotechnology

Course Outcomes:

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

CO1: Analyze the concepts and preparation methods of Nano materials

CO2: Understand the nano material properties and their behavior

CO3: Use various techniques for investigating nano material

CO4: Know the importance of Nano Technology for advanced materials processing

CO5: Know the importance of Nano structured Materials for Various Energies.

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SYLLABUS

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UNIT-I: Introduction to Nano technology:

Introduction: History and Scope, Can Small Things Make a Big Difference? Classification of Nanostructured Materials, Fascinating Nanostructures, Applications of Nanomaterials, Nature: The Best of Nanotechnologist, Challenges, and Future Prospects

UNIT-II: Unique Properties of Nanomaterials:

Microstructure and Defects in nanocrystalline Materials: Dislocations, Twins, stacking faults and voids, Grain Boundaries, triple, and disclinations, Effect of Nano-dimensions on Materials Behavior: Elastic properties, Melting Point, Diffusivity, Grain growth characteristics, enhanced solid solubility, Magnetic Properties: Soft magnetic Nanocrystalline alloy, Permanent magnetic Nanocrystalline materials, Giant Magnetic Resonance, Electrical Properties, Optical Properties, Thermal Properties, and Mechanical Properties.

UNIT-III: Synthesis Routes :

Bottom up approaches: Physical Vapor Deposition, Inert Gas Condensation, Laser Ablation, Chemical Vapor Deposition, Molecular Beam Epitaxy, Solgel method ,Self assembly, Top down approaches: Mechanical alloying, Nano-lithography, Consolidation of Nanopowders: Shock wave consolidation, Hot isostatic pressing and Cold isostatic pressing Spark plasma sintering.

UNIT-IV: Nanomaterials for Energy Conversion Systems:

Issues and Challenges of functional Nanostructured Materials for electrochemical Energy, Conversion Systems, Fuel Cells, Principles and nanomaterials design for Proton exchange membrane fuel cells (PEMFC); Direct methanol fuel cells (DMFC).

UNIT-V:

Issues and Challenges of functional Nanostructured Materials for electrochemical Energy Storage Systems, Primary and Secondary Batteries (Lithium ion Batteries), Cathode and anode materials, Nanostructured Carbon based materials, Nano-Oxides, Novel hybrid electrode materials, Current status and future trends.

Text books:

1. Electrochemical methods: Fundamentals and Applications, Allen J.Bard and Larry R. Faulkner, 2ndEdition John Wiley & Sons. Inc (2004)

2. D. Linden Ed., Handbook of Batteries, 2nd edition, McGraw-Hill, New York (1995)

3. G.A. Nazri and G. Pistoia, Lithium Batteries: Science and Technology, KulwerAcdemic Publishers, Dordrecht, Netherlands (2004).

4. J. Larmine and A. Dicks, Fuel Cell System Explained, John Wiley, New York (2000).

Reference Books:

1. Science and Technology of Lithium Batteries-Materials Aspects: An Overview, A. Manthiram, Kulwer Academic Publisher (2000).

2. M. S. Whittingham, A. J. Jacobson, Intercalation Chemistry, Academic Press, New York (1982).

3. M. Wakihara, O. Yamamoto, (Eds.) Lithium Ion Batteries: Fundamentals and Performance, Wiley –VCH ,Weinheim (1998).

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B. Tech V SEMESTER	**OEC**	**3**	**0**	**0**	**3**

20EC5T04   LINEAR SYSTEM ANALYSIS
(OPEN ELECTIVE –I)

Pre-requisite: Basic knowledge about vectors, differentiation and integration

COURSE OBJECTIVES:
The main objectives of this course are given below:

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

1 To understand basics of Signals and Systems required for all Engineering related courses.

2 To understand the behaviour of signal in time and frequency domain.

3 To understand the characteristics of LTI systems.

4 To understand concepts of Signals and Systems and its analysis using different transform techniques.

5 To understand sampling, convolution and correlation.

COURSE OUTCOMES:
At the end of this course the student will able to:

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

CO1: Differentiate various signal functions.

CO2: Represent any arbitrary signal in time and frequency domain.

CO3: Understand the characteristics of linear time invariant systems.

CO4: Analyse the signals with different transform technique.

CO5: Understand the concept of sampling.

SYLLABUS

UNIT-I: Signal Analysis

Analogy between Vectors and Signals, Orthogonal Signal Space, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function

UNIT-II: Fourier series & Fourier transforms

Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet's conditions, Trigonometric Fourier Series and Exponential Fourier Series.Deriving Fourier Transform from Fourier series,

Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform.

UNIT-III: Signal Transmission through Linear Systems

Linear System, Impulse response, Response of a Linear System, Linear Time Invariant(LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Pauley-Wiener criterion for physical realization, Relationship between Bandwidth and rise time.

UNIT-IV: Laplace Transforms & Z–Transforms

Laplace Transforms (L.T), Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal.

Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms

UNIT-V: Sampling theorem & Correlation

Graphical and analytical proof for Band Limited Signals, Natural and Flat top Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing, Introduction to Band Pass Sampling.

Cross Correlation and Auto Correlation of Functions, Properties of Correlation Functions, Energy Density Spectrum, Parseval's Theorem, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power Spectral Density Function, Relation between Convolution and Correlation.

Text Books:
1. Signals, Systems & Communications - B.P. Lathi, 2013, BSP.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawabi, 2nd Ed.

Reference Books:

1. Signals and Systems – Simon Haykin and Van Veen, Wiley 2 Ed.,
2. Signals and Systems – A. Rama Krishna Rao, 2008, TMH

B. TECH V SEMESTER

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20EC5T05 DIGITAL LOGIC DESIGN
(OPEN ELECTIVE –I)

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

1. To represent numbers and conversion between different representations.
2. To analyze logic processes and implement logical operations.
3. To develop the combinational logic circuits.
4. To understand concept of programmable logic devices like PROM, PLA, PAL.
5. To design and analyze the concepts of sequential circuits.

Course Outcomes:
At the end of this course the student will able to:

CO1: Understand different number systems and their conversions.

CO2: Analyze the logical operations and Boolean algebra

CO3: Develop combinational circuits and perform logical operations.

CO4: Understand different programmable logic devices.

CO5: Design the sequential logic functions.\

SYLLABUS

UNIT-I:

Number Systems: Binary- Octal- Decimal- Hexadecimal Number Systems- Conversion of Numbers from One Radix to Another Radix- r's Complement- (r-1)'s Complement- Subtraction of Unsigned Numbers- Signed Binary Numbers- Problems.

UNIT-II:

Logic Gates and Boolean Algebra: Basic Gates- Universal Gates- Ex-Or and Ex-Nor Gates- SOP- POS- Boolean Theorems- Dual of Logical Expressions- Minimizations of Logic Functions Using Boolean Theorems- K Map Method- Minimization of Boolean Functions.

UNIT-III: Signal Transmission through Linear Systems

Combinational Logic Circuits: Design of Half Adder- Full Adder- Half Subtractor- Full Subtractor- Ripple Adder and Subtractor- Design of Decoders- Encoders- Multiplexers- Demultiplexers- Magnitude Comparator.

UNIT-IV: Laplace Transforms & Z–Transforms

Introduction to Programmable Logic Devices (PLDs): PLA- PAL- PROM- Realization of Switching Functions Using PROM- Comparison of PLA, PAL and PROM.

UNIT-V: Sampling theorem & Correlation

Introduction to Sequential Logic Circuits: Basic Sequential Logic Circuits- Latch and Flip-Flop- RS- Latch Using NAND and NOR Gates- RS, JK, T and D Flip Flops- Conversion of Flip Flops- Flip Flops With Asynchronous Inputs (Preset and Clear)- Design of Registers- Universal Shift Register- Ring Counter- Johnson Counter.

TEXT BOOKS

1. Digital Design, M.Morris Mano, Michael D Ciletti, 4thEdition, PEA, 2003.

2. Fundamentals of Logic Design, Roth, 5thEdition, Cengage, 2004

REFERENCE BOOKS

1. Switching and Finite Automata Theory, Kohavi, 3rd Edition, Jha, Cambridge, 2005

2. Digital Logic Design, Leach, Malvino, Saha, TMH, 2000.

B. TECH V SEMESTER

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SOLID STATE DEVICES
20EC5T06 (OPEN ELECTIVE –I)

Course Objectives: Students undergoing this course, are expected to

1. Familiarize with the fundamentals of Semiconductor physics
2. Familiarize with various diodes and characteristics.
3. Familiarize with the transistors and their configurations.
4. Disseminate Amplifications with transistors
5. Understand the operation and working of Oscillators

Course Outcomes:

After undergoing the course, students will be able to

CO1: Understand importance of semiconductors.

CO2: Analyze Diode characteristics.

CO3: Differentiate various Transistor BJT configurations.

CO4: Design amplifiers at different applications using transistor.

CO5: Analyze different Feedback amplifiers & oscillators design

SYLLABUS.

Unit I: Basics Concepts of Semiconductor Physics, Charged Particles, Field Intensity, Potential, Energy, the eV unit of energy, Energy Band theory of Crystals, Insulators, Semiconductors and metals, Mobility and Conductivity, Electrons and Holes, Donor and Acceptor impurities, Charge Densities in a Semiconductor, Electrical properties of Ge and Si, Hall Effect, Diffusion and Drift Currents, Mass action Law, Fermi-Dirac distribution.

Unit II: Diodes: PN junction diode- Energy band diagram of PN junction Diode-V-I Characteristics –Current components in PN junction Diode- Diode equation-Diode resistance and capacitance, Characteristics of Zener Diode, Varactor Diode- SCR and UJT.

Unit III: Transistors Bipolar Junction Transistor: Transistor current components- Transistor equation- Transistor configurations- Characteristics of a transistor in CB, CC&CE configurations- Transistor as a Switch,Transistor as an amplifier. Field Effect Transistors (FET): Junction Field Effect Transistor construction & operation, characteristics of CS, CD & CG

Unit IV: Small Signal Transistor Amplifier models: Low Frequency Transistor Amplifier Models: Two port network, Transistor hybrid model, determination of h- parameters, generalized analysis of transistor amplifier model using h-parameters

Unit V: Feedback Amplifiers and Oscillators: Feedback principle and concept, types of feedback, classification of amplifiers, feedback topologies, Characteristics of negative feedback amplifiers Oscillators: Oscillator principle, condition for oscillations, types of oscillators, RC-phase shift and Wein bridge oscillators with BJT and their analysis. Generalized analysis of LC Oscillators, Hartley and Colpitt's oscillators with BJT and their analysis.

Text Books:

1) Millman, Halkias, ―Integrated Electronics- Analog and Digital Circuits and Systems, TMH.

2).Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, Mothiki S Prakash Rao McGrawHill,Second Edition.

Reference Books:

1) Electronic Devices and Circuits Theory – Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, Tenth Edition.

2) . Basic Electronic Circuits -V.K.Mehta, S-chand Publications,2008

B. TECH V SEMESTER	OEC	L	T	P	C
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INTRODUCTION TO ARTIFICIAL INTELLIGENCE
20CS5T07   (OPEN ELECTIVE –I)

Course Objectives:

- To gain a historical perspective of Artificial Intelligence and its foundations.
- To familiarize the basic principles of Artificial Intelligence towards problem solving Inference, Perception, Knowledge representation and Learning.
- To understand advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems.

Course Outcomes: At the end of the course, the students will be able to:

CO1: To Understand the history of Artificial Intelligence and its foundations.

CO2: Apply various Artificial Intelligence Techniques for problem solving.

CO3: Formalization of knowledge using the framework of predicate logic.

CO4: Ability to apply knowledge representation and reasoning to real world problems.

CO5: Derive conclusions from uncertain knowledge and quantify the uncertainty in the Conclusions obtained.

SYLLABUS

UNIT-1:

Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

UNIT-2: Problem Solving:

State-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction.

Problem Reduction and Game Playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

UNIT-3: Logic Concepts:

Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

UNIT-4: Knowledge representation:

Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames.

Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web.

UNIT-5: Expert system and applications:

Introduction phases in building expert systems, expert system versus traditional systems.

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-Shaffer theory, Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions.

TEXT BOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning (Units 1,2,3,4,5)

REFERENCES:

1. Artificial Intelligence- Deepak Khemani, TMH, 2013
2. Introduction to Artificial Intelligence, Patterson, PHI
3. Artificial intelligence, structures and Strategies for Complex problem solving, - George F Lugar, 5thed, PEA
4. Artificial intelligence, A modern Approach , 2nded, Stuart Russel, Peter Norvig, PEA

B. TECH V SEMESTER

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OPERATING SYSTEMS
20CS5T08   (OPEN ELECTIVE –I)

Course Objectives:

- Understand the importance of Operating System and its services.
- To impart the concepts of process, memory and file management techniques.
- To familiarize with the deadlock handling techniques.

Course Outcomes:

CO1: Understand the importance, functions and structures of operating systems.

CO2: Analyze and compare the performance of various CPU scheduling algorithms.

CO3: Develop software or hardware-based solutions for process synchronization.

CO4: Apply deadlock handling techniques to avoid deadlocks.

CO5: Compare various Memory Management Schemes and analyze various disk Scheduling Algorithms.

SYLLABUS

UNIT - I: Introduction: Defining operating system, operating system structures, operating systems operations, User and Operating-System Interface, Operating-system services, System calls: Types of system calls, operating system debugging, System Boot.

Study of Linux System: Components of LINUX, Inter process Communication

UNIT - II: Process Management: Process Concept, Process state, Process control block (PCB), Process scheduling, Scheduling queues, Schedulers, Operations on Processes, Process creation, Process Termination, Process, Inter process communication.

Multithreaded Programming: Multithreading models, Scheduling: Basic Concepts, Scheduling algorithms

UNIT – III: Synchronization: The critical section problem, Peterson's solution, Synchronization hardware, Semaphores, Classic problems of synchronization, Monitors.

File System Interface: File attributes, File operations, Access methods, Directory and Disk structures

UNIT - IV: Deadlocks: Deadlock characterization, Methods for handling deadlocks: deadlock- Prevention - Mutual Exclusion, Hold and wait, No preemption, Circular wait, Avoidance-Safe state, Resource allocation, Bankers's Algorithm, Safety Algorithm, Detection-Single instance of each resource type, several instances of a resource type, Detection algorithm usage, recovery from Dead lock.

UNIT - V:

Memory Management Strategies: Swapping, Contiguous memory allocation, Paging, Segmentation

Virtual-Memory Management: Demand paging, Page replacement Algorithms, Thrashing.

Mass-storage structure: Magnetic disk, Disk Scheduling

TEXT BOOKS:

1. Abraham Silberschatz, Peter B, Galvin, Greg Gagne, Operating System, John Wiley, 9thedition.(Unit-1,2,3,4,5)

2. Stallings, Operating Systems - Internal and Design Principles, Pearson education, 6th edition–2005.(Unit-5)

REFERENCES:

1. D. M. Dhamdhere, Operating systems- A Concept based Approach, TMH, 2nd edition.

2. Andrew S Tanenbaum, Modern Operating Systems, PHI, 4th edition.

3. Charles Crowley ,Operating Systems: A Design-Oriented Approach, Tata Mc Graw Hill Education,1996.

B. TECH V SEMESTER

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SOFTWARE ENGINEERING
20CS5T09   (OPEN ELECTIVE –I)

Course Objective:

- Gain knowledge about software process models.

- Familiarize the basic software engineering methods, practices and its applications.

- Facilitate students in software design.

Course Outcomes:

CO1: Understand the software life cycle models

CO2: Understand the scrum approach to agile project management**.**

CO3: Analyze the software requirements and generate SRS document

CO4: Understand some of the different models that may be used to design

CO5: Understand various software testing approaches and quality control to ensure good quality software

SYLLABUS

Unit-I:

Introduction to Software Engineering: Nature of software, Software engineering, The Software Processes, Software Myths.

Process Models: A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models, Specialised Process models, The Unified Process, Personal and Team Process Models.

Unit-II:

Requirements Engineering: Functional and Non-Functional Requirements, The Software Requirements Document, Requirements Specification, requirements Engineering, Requirements Elicitation and Analysis, Requirement Validation, Requirement Management.

Requirements Modelling: Requirement Analysis, Scenario-Based Modelling, Data Modelling Concepts, Class-Based Modelling

Unit-III:

Design Concepts: The Design Process, Design Concepts, The Design Models, Architectural Design: Software Architecture, Architectural Genres, Architectural Styles. User Interface Design: The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

Unit-IV:

Understanding of UML diagrams: Structural diagrams - class diagram, object diagram, component diagram, deployment diagram, Behavioural diagrams - Use-case diagram, activity diagram, sequence diagram, collaboration diagram, state chart diagram.

Unit-V:

Implementation: Structured coding Techniques, Coding Styles-Standards and Guidelines, Implementation Issues.

Software Testing Strategies: A Strategic approach to Software Testing, Strategic Issues and Test Strategies for Conventional Software, Validation Testing, System Testing, The Art of Debugging, White-Box Testing, Black Box Testing, Software Quality concepts.

TEXT BOOKS:

1. Roger S. Pressman (2010), Software Engineering, A Practitioner's Approach, 7th Edition, McGraw-Hill International Edition, India.

2. Ian Sommerville (2011), Software Engineering, 9th Edition, Pearson education, India.

3. Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Ph.D.Jim ConallenKelli A. Houston," Object-Oriented Analysis and Design with Applications", 3rd edition.

REFERENCES:

1. Pankaj Jalote (2010), Software Engineering, A Precise Approach, Wiley India.

2. Waman S. Jawadekar (2008), Software Engineering: A Primer, McGraw-Hill, India.

3. Hans Van Vilet (2008), Software Engineering Principles and Practice, 3rd Edition, John Wiley & Sons Ltd.

4. Rajib Mall (2005), Fundamental of Software Engineering, PHI.

5. Deepak Jain, Software Engineering, Principles and Practices, Oxford, University Press, India.

B. TECH V SEMESTER

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COMPUTER NETWORKS
20IT5T07   (OPEN ELECTIVE –I)

Course Objectives:

- Familiarize the student with the basic taxonomy and terminology of the computer networking area.

- Introduce the students to basic principles of networking using the goals like protocol layering and top down approach.

- Build an understanding of the basics of the internetworking and routing used in the computer networks.

- To provide guidelines in developing network applications

Course Outcomes:

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

CO1- Independently enumerate the layers of the OSI model and TCP/IP.

CO2- Identify the different types of network topologies and protocols.

CO3- Compare and contrast methods to identify Errors and correct them

CO4- Differentiate between various network routing algorithms.

CO5- Understand WWW and HTTP Architectures.

SYLLABUS

UNIT - I: Introduction:

OSI overview, TCP/IP and other networks models, Examples of Networks: Arpanet, Internet, Network Topologies Wide Area Networks(WAN), Local Area Networks(LAN), Metropolitan Area Networks(MAN).

UNIT - II: Physical Layer and overview of PL Switching:

Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, introduction to switching: Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks

UNIT – III: Data link layer:

Design issues, Framing: fixed size framing, variable size framing, flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, services provided to Network.

Elementary Data Link Layer protocols: Simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel.

Sliding window protocol: One bit, Go-back N, Selective Repetitive protocol, Stop and wait protocol.

UNIT - IV: Random Access:

ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, Controlled Access: Reservation, Polling, Token Passing, Channelization: Frequency Division Multiple Access(FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access(CDMA).

Network layer: Shortest Path, Distance Vector Routing Algorithm, Hierarchal routing algorithm.

UNIT - V: Application layer (WWW and HTTP):

WWWARCHITECTURE: Client (Browser), Server, Uniform Resource Locator, Resource Record, HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Request Message Format, HTTP Response Message Format

TEXT BOOKS:

1. Data Communications and Networks – Behrouz A. Forouzan. Third Edition TMH. (Units 1,2,4,5)
2. Computer Networks - Andrew S Tanenbaum, 4th Edition. Pearson Education(Units 1, 3, 4)

REFERENCES:

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education.
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson.

B. TECH V SEMESTER

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COMPUTER GRAPHICS
20IT5T08   (OPEN ELECTIVE –I)

Course Objectives:

- To develop, design and implement two and three dimensional graphical structures
- To enable students to acquire knowledge Multimedia compression and animations
- To learn Creation, Management and Transmission of Multimedia objects.

Course Outcomes:

After learning the course, the student will be able:

CO1: Illustrate the basics of computer graphics, different graphics systems and applications of computer graphics with various algorithms for line, circle and ellipse drawing objects for 2D transformations.

CO2: Apply projections and visible surface detection techniques for display of 3D scene on 2D screen.

CO3: Illustrate able to create the general software architecture of programs that use 3D object sets with computer graphics.

CO4: Know and be able to select among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).

CO5: Know and be able to discuss hardware system architecture for computer graphics. This Includes, but is not limited to: graphics pipeline, frame buffers, and graphic accelerators/co-processors.

SYLLABUS

UNIT - I: Introduction to Graphics:

Application area of Computer Graphics, overview of graphics systems, video-display devices, graphics monitors and work stations and input devices. 2D Primitives: Output primitives-Line, Circle and Ellipse drawing algorithms, Attributes of output primitives, Two dimensional Geometric transformations, Two dimensional viewing Line, Polygon, Curve and Text clipping algorithms.

UNIT - II: 3D Concepts:

Parallel and Perspective projections, Three dimensional object representation-Polygons, Curved lines, Splines, Quadric Surfaces, Visualization of data sets, 3D transformations, Viewing, Visible surface identification.

B. Tech in Artificial Intelligence & Machine Learning

UNIT – III: Graphics Programming:

Color Models- RGB, YIQ, CMY, HSV, Animations -General Computer Animation, Raster, Key frame. Graphics programming using OPENGL-Basic graphics primitives, Drawing three dimensional objects, Drawing three dimensional scenes

UNIT – IV: Rendering:

Introduction to shading models, Flat and Smooth shading, Adding texture to faces, Adding shadow of objects, Building a camera in a program, Creating shaded objects

UNIT - V: Overview of Ray Tracing:

Intersecting rays with other primitives, Adding Surface texture, Reflections and Transparency, Boolean operations on Objects.

TEXT BOOKS:

1. Donald Hearn, Pauline Baker, Computer Graphics– C Version, second edition, Pearson Education, 2004

REFERENCES:

1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007

B. TECH V SEMESTER

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OPERATIONS RESEARCH
20HS5T02 (OPEN ELECTIVE –I)

Course Objectives:

1) Identify and develop operational research models from the verbal description of the real system.

2) Understand the mathematical tools that are needed to solve optimization problems.

3) Use mathematical software to solve the proposed models.

4) Develop a report that describes the model and the solving technique, analyze the results and propose recommendations in language understandable to the decision-making processes in Management Engineering.

Course Outcomes:

CO1: Understand the methodology of Operations Research& concepts of linear programming

CO2: Formulate the solutions to transportation problems

CO3: Explain the solutions for various sequencing problems

CO4: Illustrate the solutions to different replacement policies

CO5: Apply game theory to solve real world problems

SYLLABUS

UNIT-I

Introduction to Operations Research: Basics definition, scope, objectives, phases, models and limitations of Operations Research. Linear Programming Problem – Formulation of LPP, Graphical solution of LPP. Simplex Method, Artificial variables, big-M method, two-phase method, degeneracy and unbound solutions.

UNIT-II

Transportation Problem. Formulation, Solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: MODI method.

UNIT-III

Assignment model. Formulation. Hungarian Method for optimal solution. Solving Unbalanced problem. Sequencing Models. Solution of Sequencing Problem – Processing n Jobs through 2 Machines – Processing n Jobs through 3 Machines – Processing 2 Jobs through m machines Processing n Jobs through m Machines.

UNIT-IV

Replacement Models. Replacement of Items that Deteriorate whose maintenance costs increase with time without change in the money value. Replacement of items that fail suddenly: individual replacement policy, group replacement policy.

UNIT-V

Game Theory. Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games.

Inventory models. Inventory costs. Models with deterministic demand – model (a) demand rate uniform and production rate infinite, model (b) demand rate non-uniform and production rate infinite, model (c) demand rate uniform and production rate finite.

TEXT BOOKS:

1) P. SankaraIyer,"Operations Research", Tata McGraw-Hill, 2008.

2) A.M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education, 2005**.**

REFERENCES:

1) J K Sharma. "Operations Research Theory & Applications, 3e", Macmillan India Ltd, 2007.

2) P. K. Gupta and D. S. Hira, "Operations Research", S. Chand & co., 2007.

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PRINCIPLES OF MANAGEMENT
20MB5T01   (OPEN ELECTIVE –I)

COURSE OBJECTIVE

This course ensures that the students understand

1 Management Concepts

2 Applications of Concepts in Practical aspects of business and Development of Managerial Skills.

3 Managers manage business organizations in the dynamic global environment and maintain competitive advantage.

4 Business decisions are made using various tools and techniques to remain competitive

5 Managers use problem-solving strategies, critical thinking skills in real-life situations and implement successful planning.

COURSE OUTCOME

After learning the contents of this course, the student would be able to know

CO1: What are the circumstances that lead to management evolution and how it will affect future managers.

CO2: Analyze and evaluate the influence of historical forces on the current practice of management

CO3: Develop the process of management's functions: Planning and Organizing.

CO4: Evaluate leadership styles to anticipate the consequences of each leadership style and directing.

CO5: Identify the areas to control and selecting the appropriate controlling methods/techniques.

SYLLABUS

UNIT I

Introduction to Management: Definition, Functions, Process, Scope and Significance of Management.

Nature of Management, Functions of Management, Managerial Roles, Levels Managerial Skills and Activities, Difference between Management and Administration, Significance of Values and Ethics in Management.

Challenges of Management

UNIT II

Evolution of Management Thought: Approaches to Management - Classical Approach- Scientific and Administrative Management; The Behavioral approach; The Quantitative approach; The Systems Approach; Contingency Approach, IT Approach.

UNIT III

Planning and Organizing: Nature, Scope, Objective and Significance of Planning, Elements and Steps of Planning, Decision Making Organizing Principles, Span of Control, Line and Staff Relationship, Authority, Delegation and Decentralization. Effective Organizing, Organizational Structures, Formal and Informal Organizations, Staffing.

UNIT IV

Directing: Effective Directing, Supervision, Motivation, Different Theories of Motivation-Maslow, Herzberg, McClelland, Vroom, Porter and Lawler, Job Satisfaction. Concept of Leadership- Theories and Styles. Communication Process, Channels and Barriers, Effective Communication.

UNIT V

Controlling and Coordinating: Elements of Managerial Control, Control Systems, Management Control Techniques, Effective Control Systems. Coordination Concept, Importance, Principles and Techniques of Coordination, Concept of Managerial Effectiveness.

TEXT BOOKS

1. Management Fundamentals, Robert N Lussier, 5e, Cengage Learning, 2013.

2. Fundamentals of Management, Stephen P. Robbins, Pearson Education, 2009.

3. Management-Tasks, Responsibilities & Practices, Drucker, F. Peter

4. Principles of Management, Terry and Franklin

REFERENCES

1. Essentials of Management, Koontz Weihrich, Tata McGraw Hill.

2. Management Essentials, Andrew DuBrin, 9e, Cengage Learning, 2012

NPTEL WEB COURSE:

nptel.ac.in/courses/122108038/

NPTEL VIDEO COURSE:

nptel.ac.in/courses/122108038/#

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B. TECH V SEMESTER **OEC**	**3**	**0**	**0**	**3**

TECHNOLOGY MANAGEMENT
20MB5T02 (OPEN ELECTIVE –I)

Course Objective

- The course aims at providing an overview of various issues connected with Management of Technology in organizations.

Course Outcomes

CO1: To understand the importance of technology and innovation management

CO2: To understand the technology absorption, incremental innovation, research and development, technovation and technology fusion that dominate the contemporary world industry.

CO3: To understand the nature, significance, dimensions requirements, concepts, issues, themes, policies and structure of the management of technology and technovation.

SYLLABUS

UNIT-I

Evolution of Technology-Effects of New Technology- Technology Innovation.-Invention-Innovation- Diffusion- Revolutionary and Evolutionary Innovation- Product and Process Innovation- Strategic Implications of Technology- Technology – Strategy Alliance -Convergent and Divergent Cycle- The Balanced Approach.

UNIT-II

Technology Assessment- Technology Choice- Technological Leadership and Followership- Technology Acquisition- Technological Forecasting- Exploratory, Intuitive, Extrapolation, Growth Curves, Technology Monitoring- Normative: Relevance Tree, Morphological Analysis, Mission Flow Diagram.

UNIT-III

Diffusion of Technology- Rate of Diffusion; Innovation Time and Innovation CostSpeed of Diffusion- Technology Indicators- Various Indicators- Organizational Implications of Technology- Relationship between Technical Structure and Organizational Infrastructure- Flexible Manufacturing Management System (FMMS).

UNIT-IV

Financial Aspects in Technology Management- Improving Traditional Cost - Management System- Barriers to the Evaluation of New Technology- Social Issues in Technology Management- Technological Change and Industrial Relations- Technology Assessment and Environmental Impact Analysis.

B. Tech in Artificial Intelligence & Machine Learning

UNIT-V

Human Aspects in Technology Management- Integration of People and Technology Organizational and Psychological Factors- Organizational Outcome- Technology Transfer-Technology Management Scenario in India.

Text Books

1. Sharif Nawaz: Management of Technology Transfer & Development, APCFT, Bangalore, 1983.

2. Rohtagi P K, Rohtagi K and Bowonder B: Technological Forecasting, Tata McGraw Hill,New Delhi.

References

1. Betz Fredrick: Managing Technology, Prentice Hall, New Jersey.

2. Gaynor: Handbook of Technology Management, McGraw Hill.

3. Tarek Khalil: Management of Technology, McGraw Hill International, 2000.

4. "Managing Technology and Innovation", Robert & Roland, 1st Edition, Routledge.

B. TECH V SEMESTER

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FOUNDATIONS OF DATA SCIENCE
20AD5T07   (OPEN ELECTIVE –I)

Course Objective: *This **course** explains vital data science concepts and teaches you how to accomplish the fundamental tasks that occupy data scientists. You'll explore data visualization, graph databases, the use of NoSQL, and the data science process. You'll use the Python language and common Python libraries as you experience firsthand the challenges of dealing with data at scale.*

Course Outcomes: At the end of the course, student will be able to
CO1: Describes benefits of data science, facets of data

CO2: Illustrates data science process and describes the need of machine learning

CO3: Describes the problems of handling large data

CO4: Introduces distributed data storage and processing frame works

CO5: Describes about graph databases and text analytics

SYLLABUS

UNIT-1: Data science in a big data world: Benefits and uses of data science and big data, Facets of data, The data science process, The big data eco system and data science, An introductory working example of Hadoop.

UNIT-2:

The data science process: Overview of the data science process, Step 1: Defining research goals and creating a project charter, Step 2: Retrieving data, Step 3: Cleansing, integrating, and transforming data, Step 4: Exploratory data analysis, Step 5: Build the models, Step 6: Presenting findings and building applications on top of them. Machine learning: What is machine learning and why should you care about it?, The modeling process, Types of machine learning, Semi-supervised learning.

UNIT-3:

 Handling large data on a single computer: The problems you face when handling large data, General techniques for handling large volumes of data, General programming tips for dealing with large data sets, Case study 1: Predicting malicious URLs, Case study 2: Building a recommender system inside a database.

UNIT-4: First steps in big data: Distributing data storage and processing with frameworks, Case study: Assessing risk when loaning money, Join the NoSQL movement: Introduction to NoSQL, ACID: the core principle of relational databases,

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B. Tech in Artificial Intelligence & Machine Learning

CAP Theorem: the problem with DBs on many nodes, The BASE principles of NoSQL databases, NoSQL database types, Case study: What disease is that?

UNIT-5: The rise of graph databases: Introducing connected data and graph databases , Introducing Neo4j: a graph database, Connected data example: a recipe recommendation engine, Text mining and text analytics: Text mining in the real world, Text mining techniques, Case study: Classifying Reddit posts.

Text Book:

Introducing Data Science by Davy Cielen, Arno D. B. Meysman, and Mohamed Ali

B. TECH V SEMESTER

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INTRODUCTION TO MACHINE LEARNING
20AM5T07   (OPEN ELECTIVE –I)

Pre-requisite: Probability and Statistics, Linear Algebra

Course Objective: *This **course*** explains basic concepts of Machine Learning and teaches you to use recent machine learning software for solving problems and understanding supervised and unsupervised learning methods

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

CO1: Identify the characteristics of machine learning.

CO2: Summarize the Model building and evaluation approaches.

CO3: Apply Bayesian learning and regression algorithms for real-world Problems.

CO4: Apply supervised learning algorithms to solve the real-world Problems.

CO5: Apply unsupervised learning algorithms for the real world data.

SYLLABUS

Unit-1: Introduction to Machine Learning and Preparing to Model:

Introduction to Machine Learning- Introduction, What is Human Learning? Types of Human Learning, What is Machine Learning? Types of Machine Learning, Problems Not To Be Solved Using Machine Learning, Applications of Machine Learning.

Preparing to Model- Introduction, Machine Learning Activities, Basic Types of Data in Machine Learning, Exploring Structure of Data, Data Quality and Remediation, Data Pre-Processing

Modeling & Evaluation, Basics of Feature Engineering:

Modeling & Evaluation - Introduction, Selecting a Model, Training a Model (for Supervised Learning), Model Representation and Interpretability, Evaluating Performance of a Model.

Basics of Feature Engineering - Introduction, Feature Transformation, Feature Subset Selection.

Unit-2: Bayesian Concept Learning and Regression:

Bayesian Concept Learning - Introduction, Why Bayesian Methods are Important? Bayes' Theorem, Bayes' Theorem and Concept Learning, Bayesian Belief Network.

Regression: Introduction, Regression Algorithms - Simple linear regression, Multiple linear regression, Polynomial Regression Model, Logistic Regression, Maximum Likelihood Estimation.

Unit-3: Supervised Learning: Classification, Ensemble Learning: Classification-Introduction, Example of Supervised Learning, Classification Model, Classification

Learning Steps, Common Classification Algorithms - k-Nearest Neighbour (KNN), Decision tree, Random forest model, Support vector machines.

Ensemble Learning- Boosting, Bagging

Unit-4: Basics of Neural Network

Introduction, Understanding the Biological Neuron, Exploring the Artificial Neuron Types of Activation Functions, Early Implementations of ANN, Architectures of Neural Network, Learning Process in ANN, Backpropagation, Deep Learning

Unit-5: Unsupervised Learning:

Introduction, Unsupervised vs Supervised Learning, Application of Unsupervised Learning.

Principle Component Analysis: Introduction, Probabilistic PCA- Maximum Likelihood PCA, EM Algorithm for PCA, Bayesian PCA, Factor Analysis; Kernel PCA

Clustering: Clustering as a Machine Learning task, Different types of clustering techniques, Partitioning methods, Hierarchical clustering, Density-based methods: DBSCAN.

Finding Pattern using Association Rule - Definition of common terms, Association rule, Apriori algorithm.

Text Books:

1. Subramanian Chandramouli, Saikat Dutt, Amit Kumar Das, "Machine Learning", Pearson Education India ,1st edition.
2. Christopher M. Bishop, "Pattern Recognition and Machine Learning". New York :Springer, 2006.

Reference Books:

1. Tom M. Mitchell, "Machine Learning', MGH, 1997.
2. Shai Shalev-Shwartz, ShaiBen David, "Understanding Machine Learning: From Theory to Algorithms", Cambridge.
3. Peter Harington, "Machine Learning in Action" , Cengage, 1st edition, 2012.

B.TECH VI SEMESTER

OEC

L	T	P	C
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20CE6T08   REMOTE SENSING AND GIS
(OPEN ELECTIVE-II)

Course Objectives: The objective of this course is to

- Introduce the basic principles of Remote Sensing and GIS techniques.
- Learn various types of sensors and platforms
- learn concepts of visual and digital image analyses
- Understand the principles of spatial analysis
- Appreciate application of RS and GIS to Civil engineering

Course Outcomes:

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

CO1: Be familiar with ground, air and satellite based sensor platforms.

CO2: Interpret the aerial photographs and satellite imageries

CO3: Create and input spatial data for GIS application

CO4: Apply RS and GIS concepts in water resources engineering

SYLLABUS

UNIT–I:

Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems. Sensors and platforms: Introduction, types of sensors, airborne remote sensing, space borne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT.

UNIT–II:

Image analysis: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT–III:

Geographic Information System: Introduction, key components, application areas of GIS, map projections. Data entry and preparation: spatial data input, raster data models, vector data Models.

UNIT – IV:

Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing.

UNIT–V:

RS and GIS applications: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications. Application to Hydrology and Water Resources: Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management.

Text Books:

1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press
2. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi
3. Schowenger, R. A (2006) 'Remote Sensing' Elsevier publishers.
4. 'Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013.
5. 'Fundamentals of Geographic Information Systems' by Demers, M.N, Wiley India Pvt. Ltd, 2013.

Reference Books:

1. 'Remote Sensing and its Applications' by Narayan LRA, Universities Press, 2012.
2. 'Concepts and Techniques of Geographical Information System' by Chor Pang Lo and A KW Yeung, Prentice Hall (India), 2006
3. 'Introduction to Geographic Information Systems' by Kand Tsung Chang, McGraw Hill Higher Education, 2009.
4. 'Basics of Remote sensing & GIS' by Kumar S, Laxmi Publications, New Delhi, 2005.
5. 'Principals of Geographical Information Systems' by Burrough P A and R.A. McDonnell, Oxford University Press, 1998.

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B.TECH VI SEMESTER **OEC**	**3**	**0**	**0**	**3**

20CE6T09   ENVIRONMENTAL IMPACT ASSESSMENT
(OPEN ELECTIVE-II)

Course Objectives: The objective of this course is to

- impart knowledge on different concepts of Environmental Impact Assessment
- know procedures of risk assessment
- learn the EIA methodologies and the criterion for selection of EIA methods
- pre-requisites for ISO 14001 certification
- know the procedures for environmental clearances and audit
- appreciate the importance of stakeholder participation in EIA

Course Outcomes:

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

CO1: Prepare EMP, EIS, and EIA report

CO2: Identify the risks and impacts of a project

CO3: Selection of an appropriate EIA methodology

CO4: Evaluation the EIA report

CO5: Estimate the cost benefit ratio of a project

CO6: Know the role of stakeholder and public hearing in the preparation of EIA

SYLLABUS

UNIT–I:

Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map- Classification of environmental parameters – role of stakeholders in the EIA preparation – stages in EIA.

UNIT–II:

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis - EIS and EMP.

UNIT-III:

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives- application of remote sensing and GIS for EIA.

UNIT-IV:

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with

reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Generalized approach for assessment of Air pollution Impact.

UNIT–V:

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation.

Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment-advantages of Environmental Risk Assessment. Case studies and preparation of Environmental Impact assessment statement for various Industries.

Text Books:

1. Environmental Impact Assessment, Canter Larry W., McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, Y. Anjaneyulu, B. S. Publication, Sultan Bazar, Hyderabad.

Reference Books:

1. Environmental Science and Engineering, J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers
2. Environmental Science and Engineering, Suresh K. Dhaneja, S. K. , Katania & Sons Publication., New Delhi.
3. Environmental Pollution and Control, H. S. Bhatia, Galgotia Publication (P) Ltd, Delhi

B.TECH VI SEMESTER	**OEC**	**L**	**T**	**P**	**C**
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20EE6T08 **RENEWABLE ENERGY SOURCES**
(OPEN ELECTIVE-II)

Course Objective:

- To give sufficient knowledge about the promising new and renewable sources of energy
- Explain the concept of various forms of renewable energy
- Learn the present energy scenario
- Analyse the environmental aspects of renewable energy resources.

Course Outcomes:

CO1: Know the need of various renewable energy systems

CO2: understand the concepts of bio-energy,

CO3: Acquire the knowledge of OTEC, tidal,

CO4: Acquire the knowledge of geothermal and Alternative energy sources

SYLLABUS

UNIT-I

Introduction: Introduction to energy sources, reserves and estimates, global energy scenario, renewable energy -environment implications, global warming and climate change, limitations of conventional energy sources, classification of non-conventional energy sources - solar energy, wind energy, bio-energy, Ocean Thermal Energy Conversion (OTEC), tidal, geothermal and hydro.

UNIT-II

Bio-energy: Biomass and its sources, energy plantation, production of fuel wood, bio-conversion processes, bio-gas, bio-diesel and ethanol production and utilization, thermo-chemical processes, biomass gasification, process, types of reactors, utilization of producer gas for thermal and electricity generation.

UNIT-III

Ocean thermal energy conversion, tidal, geothermal: Tidal energy, wave energy, data, technology options; open and closed *Ocean thermal energy conversion* cycles, geothermal energy sources, power plant and environmental issues.

UNIT-IV

Fuel Cells: Hydrogen generation-storage, transport and utilization, applications, power generation. Fuel cells-Technologies, types, economics and power generation.

UNIT-V

Solar Energy Storage and Applications:

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications- solar heating/cooling technique, solar distillation and drying, photovoltaic energy conversion.

Text Books:

1. Non-Conventional Energy Sources by G.D. Rai, Khanna Publishers, 2006
2. Renewable Energy Resources – Twidell&Wier, CRC Press(Taylor & Francis), 2012
3. *Y. W. B. Charles, B.H. Essel, —Biomass Conversion and Technology‖*, John Wiley, Latest Edition

Reference Books:

1. Renewable energy resources by G. N. Tiwari, M. K. Ghosal, Alpha Science International, 2005.
2. Renewable Energy Technologies by R. Ramesh, K. Uday Kumar, M. Anandakrishnan, Narosa Publishing House, 1997
3. Non-Conventional Energy Systems by K Mittal, A. H. Wheeler Publishing Company Limited, 01-Jan-1999.
4. Renewable energy sources and emerging technologies by D.P.Kothari,K.C.Singhal, P.H.I.
5. Godfrey Boyle, —Renewable Energy- Power for a Sustainable Future‖, Oxford University Press, U.K.,
6. Twidell, J.W. & Weir, A., —Renewable Energy Sources‖, E.F.N Spon Ltd., UK.

B.TECH VI SEMESTER	**OEC**	**L**	**T**	**P**	**C**
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20EE6T09 **ENERGY AUDIT, CONSERVATION AND MANAGEMENT**
(OPEN ELECTIVE-II)

Course Objective:

- To understand energy efficiency, scope, conservation and technologies.

- To design energy efficient lighting systems.

- To estimate/calculate power factor of systems and propose suitable compensation techniques.

- To understand energy conservation in HVAC systems.

- To calculate life cycle costing analysis and return on investment on energy efficient technologies.

Course Outcomes:
At the end of the course student will be able to

- Explain energy efficiency, conservation and various technologies.

- Design energy efficient lighting systems.

- Calculate power factor of systems and propose suitable compensation techniques.

- Explain energy conservation in HVAC systems.

- Calculate life cycle costing analysis and return on investment on energy efficient technologies.

SYLLABUS

UNIT-I

Basic Principles of Energy Audit and management: Energy audit – Definitions – Concept – Types of audit – Energy index – Cost index – Piecharts – Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions –Language – Questionnaire – Check list for top management.

UNIT-II

Lighting: Modification of existing systems – Replacement of existing systems – Priorities**:** Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level –Illumination of inclined surface to beam – Luminance or brightness – Types of lamps –Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures.

UNIT-III

Power Factor and energy instruments: Power factor – Methods of improvement – Location of capacitors – Power factor with nonlinear loads – Effect of harmonics on Power factor – Numerical problems. Energy

Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters– Tong testers – Power analyzer.

UNIT-IV

Space Heating and Ventilation: Ventilation – Air–Conditioning (HVAC) and Water Heating**:** Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning –Insulation–Cooling load – Electric water heating systems – Energy conservation methods.

UNIT-V

Economic Aspects and Financial Analysis: Understanding energy cost - Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts) – Economics of energy efficient motors and systems.

Computation of Economic Aspects

Need of investment, appraisal and criteria - Calculation of simple payback period–Return on investment – Net present value – Internal rate of return – numerical examples – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment –Numerical examples.

Text Books:
1. Hand Book of Energy Audit by Sonal Desai- Tata McGraw hill

2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd– 2nd edition, 1995

Reference Books:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevierpublications. 2012

2. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.

3. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.

4. Energy management hand book by W.C.Turner, John wiley and sons.

5. Energy management and conservation –k v

B.TECH VI SEMESTER	OEC	**L**	**T**	**P**	**C**
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20ME6T07 **INDUSTRIAL ROBOTICS (OPEN ELECTIVE-II)**

Pre-requisite: Kinematics and Mathematics

Course Objective:

1. The student will be exposed to the concepts of automation and fundamentals of robotics
2. The students will be exposed to the concepts of transformations and robot kinematics,
3. The students will understand the functioning of sensors and actuators
4. The students will be exposed to robot programming languages and Programming.
5. The student will be exposed to the applications of robotics in manufacturing.

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

CO1 Understand various applications of robotics and classification of coordinate system and control systems.

CO2 Build the concepts of components of industrial robotics.

CO3 Apply kinematic analysis with D-H notation, forward and inverse kinematics and Solve dynamic analysis with Lagrange – Euler and Newton – Euler formulations.

CO4 Model trajectory planning for a manipulator by avoiding obstacles.

CO5 Understand different types of actuators and applications of robots in manufacturing.

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SYLLABUS

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UNIT-I:

Introduction: Automation and Robotics – An over view of Robotics – present and future applications. Components of the Industrial Robotics: common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, Design of end effectors, Precision of Movement: Resolution, Accuracy and Repeatability, Speed of Response and Load Carrying Capacity.

UNIT-II: MOTION ANALYSIS AND CONTROL:

Motion Analysis: Basic Rotation Matrices, Composite Rotation Matrices. Homogeneous transformations as applicable to rotation and translation – problems. Manipulator Kinematics-H notation-H method of Assignment of frames-H Transformation Matrix, joint coordinates and world coordinates, Forward and inverse kinematics – problems.

UNIT-III:

Differential transformation of manipulators, Jacobians – problems. Dynamics: Lagrange – Euler and Newton – Euler formations – Problems. Trajectory planning and avoidance of obstacles, path planning, Slew motion, joint interpolated motion straight line motion.

UNIT-IV:

Robot actuators and Feedback components: Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors, comparison of Actuators, Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors, Tactile and Range sensors, Force and Torque sensors – End Effectors and Tools.

UNIT-V:

Robot Application in Manufacturing: Material Transfer – Material handling, loading and unloading- Processing – spot and continuous arc welding & spray painting – Assembly and Inspection. Robotic Programming Methods – Languages: Lead Through Programming, Textual Robotic Languages such as APT, MCL.

Text Book(s)

1. Industrial Robotics / Groover M P /Pearson Edu.

2. Introduction to Robotic Mechanics and Control by JJ Craig, Pearson, 3rd edition.

References

1. Robotics / Fu K S/ McGraw Hill.
2. Robotic Engineering / Richard D. Klafter, Prentice Hall
3. Robot Analysis and Intelligence / Asada and Slotine / Wiley Inter-Science.
4. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley

5. Introduction to Robotics by SK Saha, The McGrah Hill Company, 6th, 2012

6. Robotics and Control / Mittal R K &Nagrath I J / TMH

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B.TECH VI SEMESTER	**OEC**	3	0	0	3

20ME6T08 **3D PRINTING**
(OPEN ELECTIVE-II)

Pre-requisite: Manufacturing Process

Course Objective:

The course aims at the importance of Additive Manufacturing, Classifications, models, specifications of various Additive Manufacturing Techniques. To learn the different tools, soft-wares required and the applications of Additive Manufacturing

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

CO1: Understand the working principle and process parameters of AM processes

CO2: Explore the applications of AM processes in various fields

CO3: Apply the suitable process and material for fabricating a given product

CO4: Use the suitable post process based on product application

CO5: Design and develop a product for AM Process

SYLLABUS

UNIT-I:

Additive Manufacturing Process: Basic Principles of the Additive Manufacturing Process, Generation of Layer Information, Physical Principles for Layer Generation. Elements for Generating the Physical Layer, Classification of Additive Manufacturing Processes, Evaluation of the Theoretical Potentials of Rapid Prototyping Processes.

UNIT-II:

Machines for Rapid Prototyping: Overview of Polymerization: Stereolithography (SL), Sintering/Selective Sintering: Melting in the Powder Bed, Layer Laminate Manufacturing (LLM) and Three-Dimensional Printing (3DP).

UNIT-III:

Rapid Prototyping: Classification and Definition, Strategic Aspects for the Use of Prototypes, Applications of Rapid Prototyping in Industrial Product Development. Rapid Tooling: Classification and Definition of Terms, Properties of Additive Manufactured Tools, Indirect Rapid

UNIT-IV:

Tooling Processes: Molding Processes and Follow-up Processes, Indirect Methods for the Manufacture of Tools for Plastic Components, Indirect Methods for the Manufacture of Metal Components

UNIT-V:

Direct Rapid Tooling Processes: Prototype Tooling: Tools Based on Plastic Rapid Prototyping Models and Methods, Metal Tools Based on Multilevel AM Processes, Direct Tooling: Tools Based on Metal Rapid Prototype Processes.

Text Books:

1. Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, Ian Gibson, David W Rosen, Brent Stucker, Springer, 2015, 2nd Edition.

2. 3D Printing and Additive Manufacturing: Principles & Applications, Chua Chee Kai, Leong Kah Fai, World Scientific, 2015, 4th Edition.

References:

1. Rapid Prototyping: Laser-based and Other Technologies, Patri K. Venuvinod and Weiyin Ma, Springer, 2004.

2. Rapid Manufacturing: The Technologies and Applications of Rapid Prototyping and Rapid Tooling, D.T. Pham, S.S. Dimov, Springer 2001.

3. Rapid Prototyping: Principles and Applications in Manufacturing, Rafiq Noorani, John Wiley & Sons, 2006.

B.TECH VI SEMESTER

OEC	L	T	P	C
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20EC6T07   **ELECTRONIC CIRCUITS AND NETWORKS**
(OPEN ELECTIVE-II)

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

1. To understand the Differentiator and Integrator circuits
2. To understand the concept of wave shaping circuits, Switching Characteristics of diode and transistor.
3. To Introduce to Time-base Generators and Principles of Synchronization and Frequency division.
4. To Understand Sampling Gates and to Design NAND and NOR gates using various logic families.
5. To understand and Design gates using various logic families.

Course Outcomes:
At the end of this course the student will able to:

CO1: Understand the basic concepts of Optoelectronic Devices

CO2: Design linear wave shaping circuits.

CO3: Design Non- linear wave shaping circuits.

CO4: Design Different Time Base Generators

CO5: understand the concepts of one port networks

SYLLABUS

UNIT-I: **Optoelectronic Devices**

Introduction, Photo sensors, Photoconductors, Photodiodes, Phototransistors, Light-Emitting Diodes, Liquid Crystal Displays, Cathode Ray Tube Displays, Emerging Display Technologies, Opto couplers.

UNIT-II: **LINEAR WAVE SHAPING**

High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT-III: **NON-LINEAR WAVE SHAPING**

Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of

voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT-IV: VOLTAGE TIME BASE GENERATORS

General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator.

UNIT-V: Synthesis of one port networks

Synthesis of one port networks

Synthesis of reactive one-ports by Foster's and Cauer methods (forms I and II) - Synthesis of LC, RC and RL driving-point functions.

Text Books:

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGraw-Hill, 1991.

2. K. S. Suresh Kumar, ─Electric Circuit Analysis‖, Pearson Publications, 2013.

Reference Books:

1. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005.

2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002

B.TECH VI SEMESTER		**OEC**	**L**	**T**	**P**	**C**
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20EC6T08 **PRINCIPLES OF COMMUNICATIONS (OPEN ELECTIVE – II)**

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

1 Familiarize with the fundamentals of analog communication systems

2 Familiarize with various techniques for analog modulation and demodulation of signals

3 Familiarize with the fundamentals of digital communication systems

4 Familiarize with various techniques for digital modulation and demodulation of signals

5 Distinguish the figure of merits of various analog modulation methods

Course Outcomes:

At the end of this course the student will able to:

CO1:   Differentiate various Analog modulation schemes

CO2:   Analyze demodulation schemes and their spectral characteristics

CO3:   Analyze demodulation schemes and their spectral characteristics

CO4:   Analyze demodulation schemes and their spectral characteristics

CO5:   Analyze noise characteristics of various analog modulation methods

SYLLABUS

UNIT-I: Introduction: Overview of Communication system, Communication channels, Need for modulation, Baseband and Pass band signals, Amplitude Modulation: Double sideband with Carrier (DSB-C), Double side band without Carrier DSB-SC, Single Side Band Modulation SSB, Modulators and Demodulators, Vestigial Side Band (VSB), Quadrature Amplitude Modulator, Radio Transmitter and Receiver

UNIT-II: Angle Modulation, Frequency and Phase modulation, frequency deviation, Bandwidth, FM Modulators and Demodulators, Narrow band and wide band FM, FM Broadcasting.

UNIT-III: Pulse digital Transmission of Analog Signals: Sampling Theorem and its applications, Pulse Amplitude Modulation (PAM), Pulse Width Modulation, Pulse Position Modulation, Generation and Demodulation, Frequency Division Multiplexing, Time Division Multiplexing

UNIT-IV: Digital Representation of Analog Signals, Pulse Code Modulation (PCM), Differential Pulse Code Modulation, Delta Modulation. Adaptive Delta Modulation, Sources of Noises, Frequency domain representation of Noise, Super position of Noises, Mathematical Representation of Noise.

UNIT-V: Noise in Amplitude Modulation: Analysis, Signal to Noise Ratio, Figure of Merit. Noise in Frequency Modulation: Pre-emphasis, De-Emphasis and SNR Improvement, Phase Locked Loops.

Text Book:

1. Herbert Taub and Donald L. Schilling, ―Principles of Communication

Systems., Tata McGrawHill.

2. Rishabh Anand, Communication Systems, Khanna Publishers

Reference Books:

1. B.P.Lathi,―Modern Digital and Analog communication Systems, 3rd Edition, Oxford University Press.

2. Simon Haykin, ―Communication Systems, 4th Edition, Wiley India

B. TECH VI SEMESTER

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OEC	**3**	**0**	**0**	**3**

20EC6T09   **MICROCONTROLLERS & ITS APPLICATIONS**
(OPEN ELECTIVE-II)

Course Objectives:

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

1   To understand the basics of 8051 Microcontroller and its functionalities

2   To understand the 8051 family instruction set

3   To develop machine language programming in microprocessors.

4   Todesign and develop microcontroller based interfacing for real time applications using low level language like ALP.

5   To understand the basics of ARM architectures and its functionalities.

Course Outcomes:

At the end of this course the student will able to:

CO1:   To be able to understand the overview of 8051 Micro controller in general.

CO2:   To be able to understand the instruction set of 8051 microcontroller

CO3:   To be able to understand the Assembly Language Programming in microcontrollers.

CO4:   To be able to understand the microcontroller is interfacing with I/O devices, memory, and serial communication using ALP.

CO5:   To be able to understand the overview of ARM Architecture in general.

SYLLABUS

UNIT-I: Introduction to 8051 Microcontrollers

Overview of 8051 microcontrollers, Architecture, I/O ports, Memory organization, Addressing modes, SFRs, Counters and timers, Synchronous serial-cum, Asynchronous serial communication, Interrupts and priorities.

UNIT-II: 8051 FAMILY MICROCONTROLLERS INSTRUCTION SET

Basic assembly language programming, Data transfer instructions, Data and bit- manipulation instructions, Arithmetic instructions, Instructions for logical operations on the test among the registers, Program flow control instructions, Interrupt control flow.

UNIT-III: 8051 REAL TIME CONTROL

Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the serial communication Interrupts, programming Timers and Counters, serial port and its programming,

UNIT-IV: I/O and Memory Interface and Serial Communication and Bus Interface

I/O and Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051

Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer, USART, External Communication Interfaces-RS232,USB

UNIT-V: ARM Architecture:

ARM processor fundamentals, ARM Architecture –Register, exceptions and interrupts, interrupt vector table, ARM instruction set- Data processing, Branch, load and store instructions; Software instructions, Program status register instructions loading constants

TEXTBOOKS:

1. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System

   Design, 2/e, Pearson Education, 2005.

2. Kenneth. J. Ayala, The 8051 Microcontroller, 3/e, Cengage Learning, 2004.

REFERENCE:

1. Mazidi and Mazidi, The 8051 Microcontroller and Embedded Systems, 2/e, Pearson Education, 2007

2. ARM system Developers guide, Andrew N Sloss, Dominic Symes, Chris Wright, Elsevier,2012

B. TECH VI SEMESTER

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INTRODUCTION TO MACHINE LEARNING
20CS6T07   (OPEN ELECTIVE –II)

Course Objective:

This course will enable students to,

- To introduce the basic concepts and techniques of Machine Learning.

- To develop the skills in using recent machine learning software for solving practical problems.

- To be familiar with a set of well-known supervised, semi-supervised and unsupervised learning algorithms

Course Outcomes:

After studying this course, the students will be able to

CO1: Choose the learning techniques and investigate concept learning

CO2: Identify the characteristics of decision tree and solve problems associated with

CO3: Apply effectively neural networks for appropriate applications

CO4: Apply Bayesian techniques and derive effectively learning rules

CO5: Evaluate hypothesis and investigate instant based learning and reinforced learning

SYLLABUS:

UNIT-I:

Introduction: Well-posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning.

Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.

UNIT-II:

Decision Tree Learning: Decision tree representation, Appropriate problems for decision treelearning, Basic decision tree learning algorithm, hypothesis space search in decision treelearning, Inductive bias in decision tree learning, Issues in decision tree learning.

UNIT-III:

Artificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptions, Back propagation algorithm.

Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, Naive Bayes classifier, Bayesian belief networks.

UNIT-IV:

Learning Sets of Rules: Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

UNIT-V:

Instance Based Learning: Introduction, k-nearest neighbour learning, locally weighted regression, radial basis function, cased-based reasoning,

Reinforcement Learning: Introduction, Learning Task, Q Learning

TEXT BOOKS:

1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.

REFERENCES:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning,2nd edition, springer series in statistics.

2. EthemAlpaydın, Introduction to machine learning, second edition, MIT press.

B. TECH VI SEMESTER

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INFORMATION SECURITY
20CS6T08   (OPEN ELECTIVE –II)

Course Objectives:

- Understand the concepts of classical encryption techniques and concepts of finite fields and number theory
- Understand Working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms
- Understand the Design issues and working principles of various authentication protocols, PKI standards
- Concepts of cryptographic utilities and authentication mechanisms to design secure applications.

Course Outcomes:

CO1: Compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication

CO2: Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.

CO3: Apply different digital signature algorithms to achieve authentication and create secure applications

CO4: Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP

CO5: Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure applications

SYLLABUS

UNIT - I: Classical Encryption Techniques:

The OSI Security Architecture, Security Attacks, Services & Mechanisms, Symmetric Cipher Model, Substitution Techniques: Caesar Cipher, Playfair Cipher, Hill Cipher, Polyalphabetic Ciphers, One-Time Pad, Transposition Techniques: Rail fence, Row Transposition cipher, Block Ciphers: Traditional Block Cipher Structure, Block Cipher Design Principles.

UNIT - II:

Symmetric Key Cryptography: Data Encryption Standard (DES), Advanced Encryption Standard (AES), Block Cipher Modes of Operations.

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder Theorem

UNIT – III:

Public Key Cryptography: Principles, Public Key Cryptography Algorithms, RSA Algorithm, Diffie Hellman Key Exchange, Elliptic Curve Cryptography.

Cryptographic Hash Functions: Application of Cryptographic Hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security.

Digital Signatures: NIST Digital Signature Algorithm, Key Management and Distribution

UNIT - IV:

User Authentication: Remote User Authentication Principles, Kerberos.

Electronic Mail Security: Pretty Good Privacy (PGP) And S/MIME.

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload.

UNIT - V:

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS)

Firewalls: Characteristics, Types of Firewalls, Placement of Firewalls, Firewall Configuration

TEXT BOOKS:

1. Cryptography and Network Security- William Stallings, Pearson Education, 7th Edition. [Units 1,2,3,4,5]
2. Cryptography, Network Security and Cyber Laws – Bernard Menezes, Cengage Learning, 2010 edition. [Units 1,2,3,4,5]

REFERENCES:

1. Cryptography and Network Security- Behrouz A Forouzan, Debdeep Mukhopadhyaya, Mc-GrawHill, 3rd Edition, 2015.
2. Network Security Illustrated, Jason Albanese and Wes Sonnenreich, MGH Publishers, 2003.

B. TECH VI SEMESTER

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AGILE TECHNOLOGIES
20CS6T09 (OPEN ELECTIVE –II)

COURSE OBJECTIVES:

1. To have an understanding of the Agile Manifesto and Principles

2. To Apply Agile based techniques in each of the development phases.

COURSE OUTCOMES:

CO1: Understand the Agile Manifesto and Principles.

CO2: Apply agile software development practices to create high-quality software.

CO3: Acquire Knowledge on software design, set of software technologies and APIs.

CO4: Examine and demonstrate knowledge of Agile development

CO5: Demonstrate the Agile Approach to estimate project variables, control and Risk Management

SYLLABUS

UNIT-I

Agile Software Development: Genesis of Agile, Introduction and Background, Traditional Model Vs Agile Model, Values of Agile, Agile Manifesto and Principles, Stakeholders, Challenges.

UNIT-II

Lean Approach: Waste Management, Kaizen and Kanban, Add process and products add Value, Roles related to life cycle, Differences between Agile and Traditional Plans, Differences at different life cycle phases, Key techniques, Principles, Understand as a means of assessing the initial status of the project, How agile helps to build quality.

UNIT-III

Agile Scrum Framework: Introduction to Scrum, Project phases, Agile estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, **Agile Requirements:** User story definition, Characteristics and contents of user stories, Acceptance tests and verifying stories, Product Velocity, Burn down chart, Sprint planning and retrospective, Daily Scrum, Scrum roles- Product Owner, Scrum Master, Scrum Team, Scrum Case Study, Tools for Agile Project Management.

UNIT-IV

Agile Software Design and Development: Agile Design practices, Role of design principles including Single Responsibility principle, Open Closed Principle, Liskov Substitution principle, Interface Segregation principles, Dependency Inversion principle in Agile Design, Refactoring- Need and significance, Refactoring techniques, Continuous Integration, Automated Build tools, Version Control.

UNIT-V

Agile Testing and Review: Agile Testing Techniques, Test Driven Development, User Acceptance Test, Agile Metrics and Measurements, The Agile Approach to estimate project variables, Agile control- The 7 control parameters, Agile Approach to Risk, Agile approach to Configuration Management, Atern Principles and Philosophy, Best practices to manage Scrum.

TEXT BOOKS:

1. Robort C. Martin, Agile Software Development- Principles, Patterns and Practices, Prentice Hall, 2013(Units 1, 3, 5)

2. Ken Schawber, Mike Beedle, Agile Software Development with Scrum, Pearson(Units 3,4)

3. Mike Cohn, Succeeding with Agile: Software Development Using Scrum, Addison Wesley Series.(Units 3, 4)

REFERENCES:

1. David J. Anderson and Eli Schragenheim, Agile Management for Software Engineering: Applying the Theory of Constraints for Business Results, Prentice Hall, 2003.

2. Hazza and Dubinsky, ―Agile Software Engineering, Series: Undergraduate Topics in Computer Science, Springer,.

3. Craig Larman, ―Agile and Iterative Development: A Managers Guide, Addison-Wesley.

4. Kevin C. Desouza, ―Agile Information Systems: Conceptualization, Construction, and management, Butterworth-Heinemann.

B. TECH VI SEMESTER

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FUNDAMENTALS OF MACHINE LEARNING

20IT6T07 **(OPEN ELECTIVE –II)**

Course Objective:

This course will enable students to,

- To introduce the basic concepts and techniques of Machine Learning.
- To develop the skills in using recent machine learning software for solving practical problems.
- To be familiar with a set of well-known supervised, semi-supervised and unsupervised learning algorithms

Course Outcomes:

After studying this course, the students will be able to

CO1: Choose the learning techniques and investigate concept learning

CO2: Identify the characteristics of decision tree and solve problems associated with

CO3: Apply effectively neural networks for appropriate applications

CO4: Apply Bayesian techniques and derive effectively learning rules

CO5: Evaluate hypothesis and investigate instant based learning and reinforced learning

SYLLABUS:

UNIT-I:

Introduction: Well-posed learning problems, Designing a Learning system, Perspective and Issues in Machine Learning.

Concept Learning: Concept learning task, Concept learning as search, Find-S algorithm, Version space, Candidate Elimination algorithm, Inductive Bias.

UNIT-II:

Decision Tree Learning: Decision tree representation, Appropriate problems for decision treelearning, Basic decision tree learning algorithm, hypothesis space search in decision treelearning, Inductive bias in decision tree learning, Issues in decision tree learning.

UNIT-III:

Artificial Neural Networks: Introduction, Neural Network representation, Appropriate problems, Perceptions, Back propagation algorithm.

Bayesian Learning: Introduction, Bayes theorem, Bayes theorem and concept learning, Naive Bayes classifier, Bayesian belief networks.

UNIT-IV:

Learning Sets of Rules: Introduction, sequential covering algorithms, learning rule sets: summary, learning First-Order rules, learning sets of First-Order rules: FOIL, Induction as inverted deduction, inverting resolution.

UNIT-V:

Instance Based Learning: Introduction, k-nearest neighbour learning, locally weighted regression, radial basis function, cased-based reasoning,

Reinforcement Learning: Introduction, Learning Task, Q Learning

TEXT BOOKS:

2. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.

REFERENCES:

3. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning,2nd edition, springer series in statistics.
4. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.

B. TECH VI SEMESTER

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20IT6T08 — **DATABASE MANAGEMENT SYSTEMS (OPEN ELECTIVE –II)**

Course Objectives:

- Understand the basic database concepts, applications, schema and various models.
- Familiarize with entity relation model for a data base and write queries using SQL.
- Emphasize the importance of normalization, transaction management and concurrency control in databases

Course Outcomes:

CO1: Understand the concept of database, database models and familiarize with Entity Relationship models

CO2: Demonstrate the use of constraints, relational algebra operations.

CO3: Apply SQL queries to interact with database and understand the basics of NOSQL.

CO4: Apply normalization in database design to eliminate anomalies.

CO5: Understand the basic concepts of transaction processing and concurrency control.

SYLLABUS

UNIT-I: Database System Applications:

A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS.

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model.

UNIT-II: Introduction to the Relational Model:

Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical data base design, introduction to views, destroying/altering tables and views. Relational Algebra, Tuple relational Calculus, Domain relational calculus.

UNIT-III: SQL:

QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active data bases.

NOSQL: Definition of NOSQL, History of NOSQL and Different NOSQL products, Applications, features of NoSQL, Difference between SQL and NoSQL.

UNIT-IV: Schema Refinement (Normalization):

Introduction to Schema Refinement, Functional Dependencies Reasoning about FDs, Normal Forms, Properties of decomposition, Normalization, Schema refinement in database design, Other kinds of dependencies.

UNIT-V: Transaction Management and Concurrency Control:

Properties of transactions, Transactions and Schedules, Concurrent execution of transactions, Lock-based concurrency control, deadlocks, Performance of locking.

Concurrency control: 2PL, Serializability, recoverability, Introduction to lock management, dealing with deadlocks.

TEXT BOOKS:

1. Raghu rama Krishnan, Johannes Gehrke, "Data base Management Systems", 3rd Edition, TATA McGraw Hill.
2. "Professional NOSQL" by Shashan k Tiwari, 2011, WROX Press.

REFERENCE:

1. Peter Rob & Carlos Coronel, "Data base Systems design, Implementation, and Management", 7th Edition, Pearson Education, 2000.
2. Silberschatz, Korth, "Data base System Concepts", 6th Edition, McGraw Hill, 2010.
3. ElmasriNavathe, "Fundamentals of Database Systems", 5th Edition, Pearson Education, 2007.
4. C.J.Date, "Introduction to Database Systems", 7th Edition, Pearson Education, 2002

B. TECH VI SEMESTER

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20HS6T02 **QUANTITATIVE APTITUDE AND REASONING (OPEN ELECTIVE –II)**

SYLLABUS

Unit-I: Divisibility and remainder rules of numbers, Unit digit , square root, cube root and simplification of numbers, HCF and LCM of numbers, Averages and Percentages, Alphabetical and miscellaneous series, Coding and decoding and Blood Relations

Unit-II: Profit & loss, Simple interest and Compound interest, Direction, Order and Ranking, Sitting arrangement and Puzzle

Unit-III: Ratio & proportions, Partnership, Alligation and mixtures and Ages.

Data sufficiency, Inequalities and Decision making.

Unit-IV: Time and work, Pipes & cisterns and Time and distance.

Syllogism, Statement and course of action and Statement and Assumption.

Unit-V: Boats and streams, Areas, Volume and surface areas.

Statement and argument, Cause and effect and Drawing inference.

Text Books:

1. "Objective Arithmetic" by R.S. Agarwal, S. Chand Publications.

2. Verbal and non-verbal Reasoning, R.S. Agarwal, S. Chand Publications

Reference Books:

1. Quantitative Aptitude by Dinesh Khattar, Pearson Education.

2. Quantitative Aptitude by Abhjit Guha.

3. Fast Track objective Arithmetic, Rajesh Verma, Arihant publications.

B. TECH VI SEMESTER

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20MB6T01   **ORGANIZATIONAL BEHAVIOUR**
(OPEN ELECTIVE –II)

Course Objectives

1. To understand the fundamentals of Organizational Behaviour.
2. For the understanding and balancing of Values and Emotions at work place.
3. To improve the student's Personality and Attitude.
4. To understand and improve the skill of perception and Group Behaviour.
5. Understanding and managing organizational culture, leadership and conflict.

Course Outcomes

Learning Organizational Behavior enables engineers:

CO1: To understand the psychology of workers and other members in the organization.

CO2: To be equipped with the right knowledge and skills regarding organizational processes, group behavior, organizational structure and culture.

CO3: To build up strategies for development at their work place.

CO4: To motivate and control employees.

CO5: To resolve organizational conflict effectively.

<div align="center">SYLLABUS</div>

UNIT I

Fundamentals of OB: Definition, Scope and Importance of OB, Relationship between OB and the individual, Evolution of OB, Models of OB (Autocratic, Custodial, Supportive, Collegial & SOBC), Limitations of OB.

Unit II

Values, Attitudes and Emotions: Introduction, Values, Attitudes, Definition and Concept of Emotions, Emotional Intelligence - Fundamentals of Emotional Intelligence, The Emotional Competence Framework, Benefits of Emotional Intelligence, difference between EQ and IQ. Stress at workplace: Work Stressors – Prevention and Management of stress – Balancing work and Life, Workplace spirituality.

Unit III

Personality & Attitude: Definition Personality, importance of personality in Performance, The Myers-Briggs Type Indicator and The Big Five personality model, Johari Window, Transaction Analysis. Attitude – Definition, Importance of attitude in an organization, Right Attitude, Components of attitude, Relationship between behavior and attitude.

Unit IV

Perception: Factors influencing perception, Selective perception, Attribution theory, Perceptual process, Social perception (stereotyping and halo effect). Motivation:

Definition & Concept of Motive & Motivation. Group and Team Dynamics: Meaning Group Dynamics, Types of Groups, Group Development, Team Effectiveness & Team Building.

Unit V

Organizational Culture: Types of Culture, Creating and Maintaining Organization Culture, Managing Cultural Diversity. Organizational Change: Types of Organizational change, Forces that acts as stimulants to change, overcome the Resistance to Change, Developing a Learning Organization. Leadership: Introduction, Managers V/s Leaders. Overview of Leadership- Traits and Types. Conflict Management: Sources of Conflict, Types of Conflict, Conflict Management Approaches.

Text Books

1. Pareek Udai: "Understanding Organizational Behavior", Oxford University Press, New Delhi, 2007.

1. K.Aswathappa: "Organizational Behavior-Text, Cases and Games", Himalaya Publishing House, New Delhi,2008.

2. Steven L McShane, Mary Ann Von Glinow, Radha R Sharma: "Organizational Behavior", Tata McGraw Hill Education, New Delhi, 2008.

References

1. Jerald Greenberg and Robert A Baron: "Behavior in Organizations", PHI Learning Pvt Ltd, New Delhi, 2009.

2. Robbins, Stephen P. Organizational behavior, 14/E. Pearson Education India, 2001.

B. TECH VI SEMESTER

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20MB6T02 **PROJECT MANAGEMENT (OPEN ELECTIVE –II)**

Course Objectives

The objective of this course is to enable the students to gain basic knowledge about the concept of project, project management, project life-cycle, project appraisal; to acquaint the students about various issues of project management.

SYLLABUS

Unit -I

Basics of Project Management –Concept– Project environment – Types of Projects – Project life cycle – Project proposals – Monitoring project progress – Project appraisal and Project selection – Causes of delay in Project commissioning– Remedies to avoid overruns. Identification of Investment opportunities – Sources of new project ideas, preliminary screening of projects – Components for project feasibility studies.

Unit- II

Market feasibility -Market survey – Categories of Market survey – steps involved in conducting market survey– Demand forecasting techniques, sales projections.

Unit- III

Technical and Legal feasibility: Production technology, materials and inputs, plant capacity, site selection, plant layout, Managerial Feasibility Project organization and responsibilities. Legalities – Basic legal provisions. Development of Programme Evaluation & Review Technique (PERT) –Construction of PERT (Project duration and valuation, slack and critical activities, critical path interpretation) – Critical Path Method (CPM)

Unit- IV

Financial feasibility – Capital Expenditure – Criteria and Investment strategies – Capital Investment Appraisal Techniques (Non DCF and DCF) – Risk analysis – Cost and financial feasibility – Cost of project and means of financing — Estimation of cash flows – Estimation of Capital costs and operating costs; Revenue estimation – Income – Determinants – Forecasting income –Operational feasibility - Breakeven point – Economics of working.

Unit -V

Project Implementation and Review: Forms of project organization – project planning – project control – human aspects of project management – prerequisites for successful project implementation – project review – performance evaluation – abandonment analysis.

Text Books

1. Prasanna Chandra, ―Projects, Planning, Analysis, Selection, Financing, Implementation and Review, Tata McGraw Hill Company Pvt. Ltd., New Delhi 1998.

2. Gido: Effective Project Management, 2e, Thomson, 2007.

References

1. Singh M.K, ―Project Evaluation and Management‖.

2. Vasanth Desai, Project Management, 4th edition, Himalaya Publications 2018.

3. Clifford F. Gray, Erik W. Larson, ―Project Management, the Managerial Emphasis, McGraw Hill, 2000.

Text Books

1. Prasanna Chandra, ―Projects, Planning, Analysis, Selection, Financing, Implementation and Review, Tata McGraw Hill Company Pvt. Ltd., New Delhi 1998.

B. TECH VI SEMESTER

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20AM6T07   **BIG DATA ANALYTICS (OPEN ELECTIVE –II)**

Pre-requisite: Data Base Management System

Course objectives:

In this course student will learn about

1. To understand the need of Big Data, challenges and different analytical architectures

2. Installation and understanding of Hadoop Architecture and its ecosystems

3. Processing of Big Data with Advanced architectures like Spark.

4. Describe graphs and streaming data in Spark.

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

CO1: Discuss the challenges and their solutions in Big Data

CO2: Understand and work on Hadoop Framework and eco systems.

CO3: Explain and Analyze the Big Data using Map-reduce programming in Both Hadoop and Spark framework.

CO4: Demonstrate spark programming with different programming languages.

CO5: Demonstrate the graph algorithms and live streaming data in Spark.

<div align="center">SYLLABUS</div>

Unit-I:

Introduction to big data: Data, Types of digital data, Evolution and Definition of big data, Challenges of big data, Characteristics and Need of big data.

Introduction to Hadoop: Introducing Hadoop, need of Hadoop, limitations of RDBMS, RDBMS versus Hadoop, Distributed Computing Challenges, History of Hadoop, Hadoop Overview, Hadoop Distributors.

HDFS (Hadoop Distributed File System): HDFS Daemons, Anatomy of file read, Anatomy of file write, working with HDFS commands.

Unit-II:

Introduction to MAPREDUCE Programming: Processing Data with Hadoop, Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator), Mapper, Reducer, Combiner, Partitioner, Searching, Sorting , Compression, Hadoop EcoSystem.

Unit-III:

Introduction to Pig: Key Features of pig, The Anatomy of Pig, Pig on Hadoop , Pig Philosophy, Pig Latin Overview, Data Types in Pig, Running Pig, Execution Modes of Pig, Relational Operators.

Introduction to HIVE: HIVE features, HIVE architecture, HIVE datatypes, HIVE File Formats, HIVE Query Language.

Unit-IV:

NoSQL: Introduction to NOSQL, Types of NoSQL Databases, and Advantages of NoSQL databases, CAP Theorem, BASE, SQL versus NoSql.

NoSQL databases: Introduction to MongoDB, Data types in MongoDB, MongoDB query language.

Unit-V:

Spark: Introduction to data analytics with Spark, Spark Stack, Programming with RDDS, Working with key/value pairs, Spark SQL, Schema RDDs,

Sparking Streaming: High level architecture of Spark Streaming, DStreams, Transformations on DStreams, Different Types of Transformations on DStreams.

Text Books:

[1].SeemaAcharya, SubhashiniChellappan, Big Data and Analytics, Wiley Publishers

[2].Holden Karau, Andy Konwinski, Patrick Wendell, MateiZaharia, "Learning Spark: Lightning-Fast Big Data Analysis", O'Reilly Media, Inc.

Reference Books:

[1]. TomWhite, Hadoop,"TheDefinitiveGuide",3rdEdition,O'ReillyPublications, 2012.

[2].David Loshin, "BigDataAnalytics: From Strategic Planning to Enterprise IntegrationwithTools,Techniques,NoSQL,andGraph",MorganKaufmannPublishers, 2013

[3].Hadoopin PracticebyAlexHolmes, MANNING

[4].Hadoop in Action byChuckLam, MANNING

[5] Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch , "Understanding Big Data Analytics for Enterprise ClassHadoopandStreamingData", 1st Edition, TMH,2012.

[6] HienLuu, Beginning Apache Spark 2

E-resources and Other digital materials:

[1].Big Data Use cases for Beginners | Real Life Case Studies | Success Stories https://www.youtube.com/watch?v=HHR0-iJp2sM

[2]. Alexey Grishchenko, Hadoopvs MPP, https://0x0fff.com/hadoop-vs-mpp/

[3]. Random notes on bigdata- SlideShare: Available

www.slideshare.net/yiranpang/random-notes-on-big-data-26439474

B. TECH VI SEMESTER

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20AD6T07 **VISUAL ANALYTICS (OPEN ELECTIVE –II)**

Pre-requisite: There is no prerequisite to learn this course.

Course Objective: *This **course*** explains apply the fundamentals of Tableau tool, Use all the basic functionality to visualize their data, Connect to various data sources, Build a variety of basic charts, Combine insights into a useable dashboard, Share and publish visualizations.

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

CO1: Examine, navigate, and learn to use the various features of Tableau

CO2: Create and design visualizations and dashboards for your intended audience

CO3: apply predicative analytics to improve business decision making

CO4: Assess the quality of the data and perform exploratory analysis

CO5: Combine the data to and follow the best practices to present your story

SYLLABUS

UNIT-1:

Introduction: Tableau Application Suite, Installing and Activating Tableau Desktop, Data Preparation, Finding the Dataset, Understanding the Data, The Tableau Workspace, Saving, Opening, and Sharing Your Workbooks, Setting Up a Data Connector, Adding a Table to a Data Model, Data Extracts and Live Connections, Data Protection and Data Governance, Data Types, Data Collection with IFTTT and Google Sheets, Website Analysis with Google Analytics, Performance Optimization.

UNIT-2:

Data Visualizations and Aggregate Functions: Chart Types, Scatter Plots, Bar Charts, Legends, Filters, and Hierarchies, Line Charts, Straight Lines, Step Charts, Continuous Date Fields, Highlight Tables, Heat maps, Bullet Charts, Aggregate Functions, Calculated Fields, Aggregations in Calculated Fields, Text Operators, Splits, Date Fields, and Formats, Working with NULL Values, Parameters

UNIT-3:

Table Calculations and Maps: Different Types of Calculations, Quick Table Calculations, Customized Table Calculations, Bump Charts, Dual Axis Charts, Keywords and Syntax, Cohort Analysis, Regional Averages, Different Types of Maps, Map Layers, Maps with Pie Charts: Creating a Pie Chart Map, Dual Axis Map Embedding the Chart in Tooltips, Mapbox Maps, Mapbox in Tableau, Using the Background Map, Spatial Data.

UNIT-4:

Advanced Analytics and Interactive Dashboards: Overview of the Tableau Analytics Pane, Constant, Average, and Reference Lines, Trend Lines, Forecasts, Model Description, Cluster Analysis, Clustering in Tableau, Python, R, and MATLAB Integration, Connecting Tableau with TabPy, Security, The Dashboard Pane, Placing Charts on the Dashboard, Dashboard Actions, Filter Actions, Adding Web Content via URL Actions, Design Tips for Creating a Dashboard

UNIT-5:

Data Preparation with Tableau: Connecting to Data, Wildcard Unions, Inspecting the Data, Removing Unneeded Fields, Data Cleaning and Formatting, Cleaning Steps and Built-in Cleaning Features, Unions, Joins, Splits Grouping, Running the Flow and Outputting the Data, Saving Flows.

Text Book:

Alexander Loth, "**Visual Analytics with Tableau**", ISBN: 978-1-119-56020-3, Wiley 2019

Reference Books:

1. "**Visual Thinking for Design"** by Colin Ware

2. "**Storytelling With Data: A Data Visualization Guide for Business Professionals"** by Cole Nussbaumer Knaflic

3. "**Visualize This: The Flowing Data Guide to Design, Visualization, and Statistics"** by Nathan Yau

B.TECH VII SEMESTER

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20CE7T13   CONSTRUCTION TECHNOLOGY AND MANAGEMENT
(OPEN ELECTIVE-III)

Course Objectives:

- To introduce to the student the concept of project management including network drawing and monitoring
- To introduce various equipments like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery, related to constriction.
- to introduce the importance of safety in construction projects

Course Outcomes:

CO1: appreciate the importance of construction planning

CO2: understand the functioning of various earth moving equipment

CO3: the methods of production of aggregate products and concreting and usage of machinery required for the works.

CO4: apply the gained knowledge to project management and construction techniques

SYLLABUS

UNIT-I:

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts– critical Path Method – Applications

UNIT-II:

Project Evaluation and Review Technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources

UNIT-III:

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types

UNIT–IV:

Hoisting and earthwork equipment – hoists – cranes – tractors - bulldozers –graders – scrapers– draglines - clamshell buckets

UNIT –V:

Concreting equipment – crushers – jaw crushers – gyratory crushers – impact crushers– selection of crushing equipment - screening of aggregate – concrete mixers – mixingand placing of concrete – consolidating and finishing Construction methods – earthwork – piling – placing of concrete – form work – fabrication anderection – quality

control and safety engineering

Text Books:

1. Construction Planning Equipment and Methods, Peurifoy and Schexnayder, Shapira, Tata Mcgrawhill

2. Construction Project Management Theory and Practice, Kumar Neeraj Jha (2011), Pearson.

3. Construction Technology, Subir K. Sarkar and Subhajit Saraswati, Oxford University press.

4. Project Planning and Control with PERT and CPM, B. C. Punamia and K K Khandelwal, Laxmi Publications Pvt Ltd. Hyderabad.

Reference Books:

1. Construction Project Management - An Integrated Approach, Peter Fewings, Taylor and Francis

2. Construction Management Emerging Trends and Technologies, Trefor Williams , Cengage learning.

3. Hand Book of Construction Management, P. K. Joy, Trinity Press Chennai, New Delhi.

B.TECH VII SEMESTER

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20CE7T14   GREEN BUILDINGS
(OPEN ELECTIVE-III)

Course Objectives:

- To introduce the different concepts of green building techniques and how they may be synthesized to best fit a construction.
- To Know the importance of Green buildings
- To know and implement energy conservation and renewable resources
- To understand the knowledge of ECBC, LEED, GRIHA etc.

Course Outcomes:

CO1: Able to describe the importance and necessity of green building.

CO2: Able to suggest materials and technologies to improve energy efficiency of building.

CO3: Able to assess a building on the norms available for green building.

SYLLABUS

UNIT-I:

Introduction of Green Buildings, Salient features of green buildings, Advantages of Green Buildings- Sustainable site selection and planning of buildings to improve comfort, day lighting, ventilation, planning for drainage.

UNIT-II:

ENERGY EFFICIENT BUILDINGS Passive cooling and day lighting – Active solar and photovoltaic, building energy analysis methods, Lighting system design, Lighting economics and aesthetics, Impacts of lighting efficiency, Technological options for energy management.

UNIT-III:

ENERGY CONSERVATION Need for energy conservation, various forms of energy used in buildings, embodied energy of materials, energy used in transportation and construction processes- water conservation systems in buildings, waste to energy management in residential complexes or gated communities.

UNIT-IV:

RENEWABLE ENERGY RESOURCES Wind and Solar Energy Harvesting, potential of solar energy in India and world, construction and operation of various solar, wind and hydro power appliances, success case studies of fully solar, wind and hydro power energies.

UNIT-V:

ENERGY REQUIREMENT AND GREEN BUILDING RATING SYSTEMS Energy

B. Tech in Artificial Intelligence & Machine Learning

Conservation Building Code (ECBC) requirement for green buildings, Requirement for green rating systems - Leadership in Energy and Environment Design (LEED), Green Rating systems for Integrated Habitat Assessment (GRIHA), Building automation and building management systems.

Text Books:

1. 'Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers', 2009
2. 'Alternative building materials and technologies' by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
3. 'Green Building Handbook' by Tomwoolley and Samkimings, 2009

Reference Books:

1. 'Complete Guide to Green Buildings' by Trish riley.
2. 'Non-Conventional Energy Resources' by G. D. Rai, Khanna Publishers.
3. 'Standard for the design for High Performance Green Buildings' by Kent Peterson, 2009
4. Ganesan T P, "Energy Conservation in Buildings", ISTE Professional Center, Chennai, 1999.

B.TECH VII SEMESTER

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20EE7T13   CONCEPT OF POWER SYSTEM ENGINEERING
(OPEN ELECTIVE-III)

Course Objective: To develop problem solving skills and understanding of Power System concepts through the application of techniques and principles of electrical Power Generation methods.

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

CO1:   Various electrical Power System Components, Supply systems

CO2:   Thermal Power Station working procedure, each module path directions

CO3:   Hydro Power Station working procedure, classifications

CO4:   Nuclear Power Station working procedure, Chain Reaction

CO5:   Solar power generation & Wind Power Generation, Applications

SYLLABUS

UNIT-I: **Power System Components**

Single line Diagram of Power system, Different kinds of supply system, conventional and Non-conventional energy sources, Applications.

UNIT-II: Thermal Power Stations

Choice of site Selection, general layout of a thermal power plant showing paths of coal, steam, water, air, ash and flue gasses, ash handling system, Brief description of components: Boilers, Super, heaters, Economizers, electrostatic precipitators

UNIT-III: Hydro & Nuclear Power Stations

Choice of site, arrangement of hydroelectric installations, Hydrology. Mass curve, flow duration curve, classification of Hydro Power Plants, Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components

UNIT-IV: Solar power generation & Wind Power Generation

Solar radiation spectrum. Radiation measurement. Applications of solar thermal systems Solar Photovoltaic (SPV) systems, Introduction to wind energy, basic principles of wind energy conversion.

UNIT-V: Transmission & Distribution

Transmission structure, classifications, types of conductors, primary & secondary distribution, Substation Equipments , layout.

Text Books:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, S.Bhatnagarand, A Chakrabarti, DhanpatRai& Co. Pvt. Ltd.

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2. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa New age International (P) Limited, Publishers

3. Non-Conventional Energy Resources/ Khan B.H/ Tata McGraw Hill, New Delhi, 2006

B.TECH VII SEMESTER

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20EE7T14 INSTRUMENTATION
(OPEN ELECTIVE-III)

Course Objectives:

1. To study the basics of measuring system.
2. To study various Electrical transducers and to measure the various types of Non–electrical quantities
3. To study various types of digital voltmeters
4. To study the working principles of various types of oscilloscopes and their applications.
5. To study various types of signal analyzers

Course Outcomes:

CO1: Able to study the basics of measuring system.

CO2: Acquire proper knowledge to use various types of Transducers and able to monitor and measure various parameters such as strain, Fow, temperature and pressure

CO3: Acquire proper knowledge and working principle of various types of digital voltmeters.

CO4: Able to measure various parameters like phase and frequency of a signal with the help of CRO.

CO5: Acquire proper knowledge and able to handle various types of signal analyzers.

SYLLABUS

UNIT-I

Basics of Measuring System: Measuring Systems, Performance Characteristics – Static characteristics – Dynamic Characteristics – Errors in Measurement – Gross Errors – Systematic Errors and Random Errors, Statistical analysis of random errors.

UNIT-II

Transducer Basics and Applications: Definition of transducers – Classification of transducers – Advantages of Electrical transducers –Characteristics and choice of transducers – Principle operation of resistor, inductor, LVDT and capacitor transducers. Measurement of Temperature, Pressure, Strain and Flow.

UNIT-III

Digital Voltmeters: Digital voltmeters – Successive approximation, ramp, dual–Slope integration continuous balance type – Microprocessor based ramp type DVM, digital frequency meter – Digital phase angle meter.

B. Tech in Artificial Intelligence & Machine Learning

UNIT-IV

Oscilloscope: Cathode ray oscilloscope – Time base generator – Horizontal and vertical amplifiers – Measurement of phase and frequency – Lissajous patterns – Sampling oscilloscope, data logger, Transient recorder.

UNIT-V

Signal Analyzers: Wave Analyzers – Frequency selective analyzers – Heterodyne – Application of Wave analyzers – Harmonic Analyzers – Total Harmonic distortion – Spectrum analyzers – Basic spectrum analyzers – Spectral displays – Vector impedance meter – Q meter – Peak reading and RMS voltmeters

Text Books:

1. Electronic Instrumentation–by H.S.Kalsi Tata MCGraw–Hill Edition, 1995.
2. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpatrai & Co

Reference Books:

1. Measurement and Instrumentation theory and application, Alan S.Morris and Reza Langari, Elsevier
2. Measurements Systems, Applications and Design – by D O Doeblin
3. Principles of Measurement and Instrumentation – by A.S Morris, Pearson/Prentice Hall ofIndia
4. Modern Electronic Instrumentation and Measurement techniques – by A.D HelfrickandW.D.Cooper, Pearson/Prentice Hall of India.
5. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India.

B.TECH VII SEMESTER	**OEC**	**L**	**T**	**P**	**C**
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20ME7T10 GREEN ENGINEERING SYSTEMS
(OPEN ELECTIVE -III)

Pre-requisite: Thermodynamics, Environmental Sciences

Course Objective: The course aims to highlight the significance of alternative sources of energy, green energy systems and processes and provides the theory and working principles of probable sources of renewable and green energy systems that are environmental friendly.

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

CO1: Evaluate the impact of technology on environment

CO2: Compare biological ecology to industrial ecology

CO3: Design eco-friendly product

CO4: Create sustainable products, facilities, processes and infrastructure

CO5: Asses the life cycle of a product to evaluate its impact on energy and materials use. Determine the effects of air and water quality

SYLLABUS

UNIT-I:

INTRODUCTION: SOLAR RADIATION: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems. Photo voltaic energy conversion – types of PV cells, I-V characteristics.

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

UNIT-II:

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney.

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

UNIT-III:

BIO-MASS: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, bio fuels, I.C. engine operation and economic aspects.

GEOTHERMAL ENERGY: Resources, types of wells, methods of harnessing the energy, potential in India.

OCEAN ENERGY: OTEC, Principles of utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-IV: ENERGY EFFICIENT SYSTEMS:

(A) ELECTRICAL SYSTEMS: Energy efficient motors, energy efficient lighting and control, selection of luminaire, variable voltage variable frequency drives (adjustable speed drives), controls for HVAC (heating, ventilation and air conditioning), demand site management.

(B) MECHANICAL SYSTEMS: Fuel cells- principle, thermodynamic aspects, selection of fuels & working of various types of fuel cells, Environmental friendly and Energy efficient compressors and pumps.

UNIT-V: ENERGY EFFICIENT PROCESSES:

Environmental impact of the current manufacturing practices and systems, benefits of green manufacturing systems, selection of recyclable and environment friendly materials in manufacturing, design and implementation of efficient and sustainable green production systems with examples like environmental friendly machining, vegetable based cutting fluids, alternate casting and joining techniques, zero waste manufacturing.

Text Books:

1. Solar Energy – Principles of Thermal Collection and Storage/Sukhatme S.P. and J.K.Nayak/ TMH

2. Non-Conventional Energy Resources/ Khan B.H/ Tata McGraw Hill, New Delhi, 2006

3. Green Manufacturing Processes and Systems, Edited / J. Paulo Davim/Springer 2013

References:

1. Alternative Building Materials and Technologies / K.S Jagadeesh, B.V Venkata Rama Reddy and K.S Nanjunda Rao/New age international

2. Principles of Solar Engineering / D.YogiGoswami, Frank Krieth& John F Kreider / Taylor & Francis

3. Non-Conventional Energy / Ashok V Desai /New Age International (P) Ltd

4. Renewable Energy Technologies /Ramesh & Kumar /Narosa

5. Non conventional Energy Source/ G.D Roy/Standard Publishers

6. Renewable Energy Resources-2nd Edition/ J.Twidell and T. Weir/ BSP Books Pvt.Ltd

7. Fuel Cell Technology –Hand Book / Gregor Hoogers / BSP Books Pvt. Ltd.

B.TECH VII SEMESTER

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20ME7T11 **HYBRID ELECTRIC VEHICLES**
(OPEN ELECTIVE -III)

Pre-requisite: Internal-Combustion engines.

Course Objective:

The main objective of this course is to provide the knowledge on architecture of Hybrid Electric Vehicles, Fuel cells and their sub-systems. The focus is as well on explaining the requirements of hybrid electric vehicles and Fuel-cells for automobile applications. At the same time, various design considerations in fuel cell vehicles and electric vehicles will be explained.

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

CO1: Compare and contrast the working of Conventional and Electric Vehicles.

CO2: Comprehend the use of Series and Hybrid Electric vehicle drive trains

CO3: Apply the fundamentals of to develop the propulsion and storage systems for Hybrid Electric Vehicles.

CO4: Perform a case study on Hybrid Electric vehicle drive trains for different parameters

CO5: Describe the working principle of various types of fuel-cells.

SYLLABUS

UNIT-I:

ELECTRIC VEHICLES: Introduction, Electric Vehicle Principle- Components of Electric Vehicle Constituents of a conventional vehicle-Drive cycles and Drive Terrain, Operating principle of Fuel Cell, Differences between conventional battery and Electric battery, Transmission differences between conventional and Electric Vehicles, Differences between conventional lighting system and Electric vehicle lighting system.

UNIT-II:

HYBRID ELECTRIC VEHICLES: Introduction, A Brief history of Hybrid Electric vehicles (HEVs),Basics of Hybrid Electric Vehicles (HEVs), Architecture of HEVs-Series HEVs, Parallel HEVs, Series-Parallel HEVs.

HYBRID ELECTRIC VEHICLE DRIVE TRAINS: Parallel Hybrid Drive trains with Torque coupling, Parallel Hybrid Drive trains with both Speed coupling, Parallel Hybrid Drive trains with both speed Torque coupling.

UNIT-III:

ELECTRIC PROPULSION SYSTEMS: DC Motors- Operating principle and control of DC motors, Induction Motor Drives: Operating principle and Control Mechanisms, Brushless Motor Drives-Principle and Construction, Switched Reluctance Motor (SRM) Drives- Basic structure, Drive Convertor, Modes of Operation.

ENERGY STORAGE SYSTEMS: Electrochemical Batteries, Lead-Acid Batteries, Nickel Based Batteries, Lithium Based Batteries, Ultra Capacitors- Basic Principles and Performance, Ultrahigh-speed flywheels- Basic Principle and Power Capacity, Fly Wheel technologies.

UNIT-IV:

DESIGN OF SERIES HYBRID ELECTRIC VEHICLE DRIVES: Design of Series Hybrid Electric Vehicle Drive- Control Strategies, Sizing of Major Components and Case Study for designing for various parameters.

DESIGN OF PARALLEL HYBRID ELECTRIC VEHICLE DRIVES: Design of Parallel Hybrid Electric Vehicle Drive- Control Strategies of Drive Train and Design of Drive Train Parameters.

UNIT-V:

FUEL CELL ELECTRIC VEHICLES: Operating principles of fuel cells, Fuel and oxidant consumption, Fuel cell system characteristics, Fuel cell technologies- Proton Exchange membrane fuel cells, Alkaline Fuel cells, Phosphoric acid fuel cells, Molten carbonate fuel cells, Solid oxide fuel cells, Fuel supply- Hydrogen storage-Hydrogen production, Ammonia as hydrogen carrier, Non-Hydrogen fuel cells, Fuel Cell Hybrid Vehicle Drive Train.

Text Books:

1) MehrdadEhsani, YiminGao, Ali Emadi, 2nd edition, Modern Electric, Hybrid Electric and Fuel cell vehicles, CRC Press, Taylor and Francis Group, 2010.

2) Chris Mi, M.AbulMasrur and David WenzhongGao, 1st Edition, Hybrid Electric Vehicles, John Wiley & Sons, Ltd, 2011.

B. TECH VII SEMESTER

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20EC7T10 **DATA COMMUNICATIONS (OPEN ELECTIVE-III)**

COURSE OBJECTIVES:
The main objectives of this course are given below:

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

1 To focus on information sharing and networks.

2 To Introduce flow of data, categories of network, different topologies.

3 To focus on different coding schemes.

4 To brief the students regarding protocols and standards.

5 To give clear idea of signals, transmission media, errors in data communications and their correction, networks classes and devices, etc.

COURSE OUTCOMES:
At the end of this course the student will able to:

CO1: Know basic knowledge of data Communication

CO2: Know basic knowledge of Analog & Digital Signals

CO3: Understand the basic knowledge of Analog Transmission

CO4: know Different types of transmission media

CO5: Focus on DTE-DCE Interface

SYLLABUS

UNIT-I:

Introduction to data communication and networking: Reason to study data communication, Data Communication, Networks, Protocols and Standards, Standards Organizations. Line Configuration, Topology, Transmission Modes, Categories of Networks Internet works. Study of OSI and TCP/IP protocol suit: The Model, Functions of the layers, TCP/IP Protocol Suites

UNIT-II:

Study of Signals: Analog and Digital, Periodic and Aperiodic Signals, Analog Signals, Time and Frequency Domains, Composite Signals, Digital Signals. Study of Digital transmission: Digital to Digital Conversion, Analog to Digital Conversion.

UNIT-III:

Study of Analog transmission: Digital to Analog Conversion, Analog to Analog Conversion. Study of Multiplexing: Many to one/one to Many, Frequency division Multiplexing, Wage division Multiplexing, Time division Multiplexing, Multiplexing applications.

B. Tech in Artificial Intelligence & Machine Learning

UNIT-IV:

Types of transmission media: Guided Media, Unguided Media, Transmission Impairments, Performance Wavelength, Shannon Capacity, Media Comparison, PSTN, Switching. Error Detection and Correction: Types of Errors, Detection, Parity Check, Vertical Redundancy Check, Longitudinal Redundancy Check, Cyclic Redundancy Check, Checksum, Error Correction.

UNIT-V:

Study of DTE-DCE in brief: Digital data transmission, DTE-DCE Interface, Modems, 56K Modems, Cable Modems. Introduction to networks and devices: Network classes, Repeaters, Hub, Bridges, Switches, Routers, Gateways Routers, Routing Algorithms, Distance Vector Routing, Link State Routing.

Text Books:

1. Data communication & Networking by Bahrouz Forouzan.

2. Computer Networks by Andrew S. Tanenbaum

Reference Books:

1. Data and Computer Communications by William Stallings

2. Kleinrock, Leonard. Queueing Systems, Vol 1: Theory. New York, NY: Wiley J., 1975. ISBN: 0471491101.

B. Tech VII Semester	**OEC**	**L**	**T**	**P**	**C**
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20EC7T11 | **MECHATRONICS**
(OPEN ELECTIVE III)

Course Objective: The main objective of this course is
- To introduce the integrative nature of Mechatronics.
- To describe the basic programming, different components and devices of mechatronics systems**.**

Course Outcomes:
At the end of this course the student will able to:

CO1: Basic concepts of mechatronics

CO2: To design mechatronics system with the help of Microprocessor

CO3: To design PLC and other electrical and Electronics Circuits

CO4: To understand the concept of solid state Devices

CO5: To know Dynamic models & controllers

SYLLABUS

UNIT-I:

Introduction to Mechatronics – Systems – Concepts of Mechatronics approach – Need for Mechatronics – Emerging areas of Mechatronics – Classification of Mechatronics. Sensors and Transducers: Static and dynamic Characteristics of Sensor, Potentiometers – LVDT – Capacitance sensors – Strain gauges – Eddy current sensor – Hall effect sensor – Temperature sensors – Light sensors.

UNIT-II:

Introduction – Architecture of 8085 – Pin Configuration – Addressing Modes –Instruction set, Timing diagram of 8085 – Concepts of 8051 microcontrollers – Block diagram

UNIT-III:

Introduction – Basic structure – Input and output processing – Programming – Mnemonics – Timers, counters and internal relays – Data handling – Selection of PLC, Basic programming in PLC.

UNIT-IV:

Solid state electronic devices - PN junction diode, BJT, FET, DIAC, TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering.

UNIT-V:

Dynamic models and analogies, System response. Process Controllers – Digital Controllers, Programmable Logic Controllers, Design of mechatronics systems & future trend

TEXT BOOKS:

1. Bolton, ―Mechatronics‖, Printice Hall, 2000

2. Ramesh S Gaonkar, ―Microprocessor Architecture, Programming, and Applications with the 8085‖, 5th Edition, Prentice Hall, 2008.

REFERENCE BOOKS:

1. Mechatronics System Design / Devdas shetty/Richard/Thomson.

2. Mechatronics/M.D.Singh/J.G.Joshi/PHI.

B. TECH VII SEMESTER

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BIOMEDICAL INSTRUMENTATION.
20EC7T12 (OPEN ELECTIVE III)

Course Objectives:
1. To introduce student to basic biomedical engineering technology
2. To understand the anatomy & physiology of major systems of the body in designing equipment for medical treatments.
3. To impart knowledge about the principle and working of different types of bio-medical electronic equipment/devices.

Course- Outcomes:
After going through this course the student will able

CO1.To understand Physiological System of the Body and Bioelectric Potentials.

CO2.To understand Electrodes, Transducer and Sensors used in Biomedical field.

CO3 To understand the problem and identify the necessity of equipment for diagnosis and therapy.

CO4 To understand the importance of electronics engineering in medical field.

CO5 To understand the importance of telemetry in patient care

SYLLABUS

UNIT-1: INTRODUCTION TO BIOMEDICAL INSTRUMENTATION

Age of Biomedical Engineering, Development of Biomedical Instrumentation, Man Instrumentation System, Components of the Man-Instrument System, Physiological System of the Body, Problems Encountered in Measuring a Living System, Sources of Bioelectric Potentials, Muscle, Bioelectric Potentials, Sources of Bioelectric Potentials, Resting and Action Potentials, Propagation of Action Potential, Bioelectric Potentials-ECG, EEG and EMG, Envoked Responses.

UNIT-II: ELECTRODES AND TRANSDUCERS: Introduction, Electrode Theory, Biopotential Electrodes, Examples of Electrodes, Basic Transducer Principles, Biochemical Transducers, The Transducer and Transduction Principles, Active Transducers, Passive Transducers, Transducers for Biomedical Applications, Pulse Sensors, Respiration Sensor, Transducers with Digital Output**.**

UNIT-III: CARDIOVASCULAR SYSTEM AND MEASUREMENTS: The Heart and Cardiovascular System, Electro Cardiography, Blood Pressure Measurement, Measurement of Blood Flow and Cardiac Output, Measurement of Heart Sound, Plethysmography.

MEASUREMENTS IN THE RESPIRATORY SYSTEM: The Physiology of The Respiratory System, Tests and Instrumentation for The Mechanics of Breathing, Respiratory Therapy Equipment.

UNIT-IV: PATIENT CARE AND MONITORING: Elements of Intensive-Care Monitoring, Patient Monitoring Displays, Diagnosis, Calibration and Repair ability of Patient-Monitoring Equipment, Other Instrumentation for Monitoring Patients, Organization of the Hospital for Patient-Care Monitoring, Pacemakers, Defibrillators, Radio Frequency Applications of Therapeutic use.

THERAPEUTIC AND PROSTHETIC DEVICES: Audiometers and Hearing Aids, Laparoscope, Shock Hazards and Prevention, Physiological Effects and Electrical Current, Shock Hazards from Electrical Equipment, Methods of Accident Prevention,

UNIT-V: DIAGNOSTIC TECHNIQUES AND BIO-TELEMETRY: Principles of Ultrasonic Measurement, Ultrasonic Imaging, Ultrasonic Applications of Therapeutic Uses, Ultrasonic Diagnosis, X-Ray and Radio-Isotope Instrumentations, CAT Scan, Emission Computerized Tomography, MRI, Introduction to Biotelemetry, Physiological Parameters Adaptable to Biotelemetry, The Components of Biotelemetry System, Implantable Units, Telemetry for ECG Measurements during Exercise, Telemetry for Emergency Patient Monitoring**.**

Text Books:

1. Bio-Medical Instrumentation‖, Cromwell , Wiebell, Pfeiffer
2. Hand Book of Bio-Medical Instrumentation‖, Instrumentation‖, Kandahar. McGraw-Hill

References

1. Introduction to Bio-Medical Equipment Technology‖, 4th Edition, Joseph J. Carr, John M. Brown, Pearson Publications.
2. "Bio-Medical Electronics and Instrumentation", Onkar N. Pandey, Rakesh Kumar, Katson Books.

B. TECH VII SEMESTER

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ARTIFICIAL NEURAL NETWORKS.
20CS7T10   **(OPEN ELECTIVE III)**

Course Objectives:

- To deal with the historical developments of artificial intelligence leading to artificial neural networks (ANN).
- To introduce the basic concepts and models of ANN for solving real world problems.

Course Outcomes:

At the end of this course the student will be able to:

CO1- Understand biological neuron & artificial neuron and basic building blocks of ANN.

CO2- Understand different single layer/multiple layer Perceptron learning algorithms.

CO3- Understand and analyze Adaline and Madeline Networks and their applications

CO4- Learning algorithms based on basic gradient descent, backpropagation and their modifications.

CO5- Understand self-organization learning, ART, Radial basis Functions.

SYLLABUS

UNIT - I: Introduction to Artificial Neural Networks:

Introduction, Artificial Neural Networks, Historical Development of Neural Networks, Biological Neural Networks, Comparison Between them and the Computer, Comparison Between Artificial and Biological Neural Network Basic Building Blocks of Artificial Neural Networks, Artificial Neural Network (ANN) terminologies.

UNIT - II: Fundamental Models of Artificial Neural Networks:

Introduction, McCulloch - Pitts Neuron Model, Learning Rules, Hebbian Learning Rule Perceptron Learning Rule, Delta Learning Rule (Widrow-Hoff Rule or Least Mean Square (LMS)Rule,Competitive Learning Rule, Out Star Learning, Boltzmann Based Learning, Hebb Net.

Perceptron Networks: Introduction, Single Layer Perceptron, Brief Introduction to Multilayer Perceptron Networks

UNIT – III: Adaline and Madaline Networks:

Introduction, Adaline, Madaline. Associative Memory Networks: Introduction, Algorithms for Pattern Association, Hetero Associative Memory Neural Networks, Auto Associative Memory Network, Bi- directional Associative Memory.

UNIT - IV: Feedback Networks:

Introduction, Discrete Hopfiled Net, Continuous Hopfiled Net, Relation between BAM and Hopfiled Nets.

Feed Forward Networks: Introduction, Back Propagation Network (BPN), Radial Basis Function Network (RBFN).

UNIT - V: Self Organizing Feature Map:

Introduction, Methods Used for Determining the Winner, Kohonen Self Organizing Feature Maps, Learning Vector Quantization (LVQ),Max Net, Maxican Hat, Hamming Net

Adaptive Resonance Theory: Introduction, ART Fundamentals, ART 1, ART2.

TEXT BOOKS:

1. Sivanandam, S Sumathi, S N Deepa; "Introduction to Neural Networks", 2nd ed.,TATA McGraw HILL : 2005.

REFERENCES:

1. "Simon Haykin, "Neural networks A comprehensive foundations", 2nd ed., Pearson Education, 2004.

2. B Yegnanarayana, "Artificial neural networks", 1st ed., Prentice Hall of India P Ltd, 2005.

3. Li Min Fu, "Neural networks in Computer intelligence", 1st ed., TMH, 2003

B. TECH VII SEMESTER

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CYBER SECURITY
20CS7T11   (OPEN ELECTIVE III)

Course Objective:

- Understand the importance of Cyber Security principles, Security architecture, risk management, attacks, incidents, and emerging IT and IS technologies.
- Students will gain insight into the importance of Cyber Security and the integral role of Cyber Security professionals.

Course Outcomes:

CO1: Understand and classify various forms of Cybercrimes

CO2: Interpret the reasons for Cyber offence

CO3: Detect and analyze vulnerabilities in Mobile and Wireless devices

CO4: Analyze tools used to perform cyber crimes

CO5: Understand cyber security Laws

SYLLABUS:

UNIT-I: Introduction, Cybercrime:

Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? , Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes

UNIT-II: Cyber offenses:

How Criminals Plan Them –Introduction, How Criminals Plan the Attacks, Social Engineering, Cyber stalking, Cyber cafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector Cloud Computing.

UNIT-III: Cybercrime Mobile and Wireless Devices:

Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile.

UNIT-IV: Tools and Methods Used in Cybercrime:

Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attacks on Wireless Networks.

UNIT-V: Cybercrimes and Cyber security:

The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Consequences of Not Addressing the Weakness in Information Technology Act, Digital Signatures and the Indian IT Act, Information Security Planning and Governance, Information Security Policy Standards, Practices, The information Security Blueprint, Security education, Training and awareness program

TEXT BOOKS:

1. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole, SunitBelapure, Wiley.

2. Principles of Information Security, MichealE.Whitman and Herbert J.Mattord, Cengage Learning.

REFERENCES:

1. Information Security, Mark Rhodes, Ousley, MGH.

B. TECH VII SEMESTER

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SOFTWARE TESTING METHODOLOGIES
20CS7T12   (OPEN ELECTIVE III)

Course Objectives:

- To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
- To Understand different levels of Testing
- Apply Black Box and White Box Testing Techniques
- To learn how to plan a test project, design test cases and data, conduct testing operations, and generate a test report.
- To understand software test automation problems and solutions.

Course Outcomes:

CO1: Have an ability to apply software testing knowledge and engineering methods.

CO2: Ability to identify the needs of software test automation, and define a test tool to support test automation.

CO3: Understand and identify various software testing problems, and solve these problems by designing and selecting software test models, criteria, strategies, and methods.

CO4: Use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects.

CO5: Apply techniques and skills to use modern software testing tools to support software testing projects.

SYLLABUS

UNIT-I: Software Testing:

Introduction, Evolution, Dichotomies, Goals & Typical Objectives of Testing, Model for testing, Software Testing Principles, **Software Testing Terminology and Methodology:** Software Testing Terminology, Errors, Defects, Failures, Root Causes and Effects, Software Testing Life Cycle, Software Testing Methodology.

UNIT-II: Verification and Validation:

Verification & Validation Activities, Categories of Test Techniques: Dynamic Testing,

Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing,

White-Box Testing: Need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing

UNIT-III: Static Testing:

Inspections, Structured Walkthroughs, Technical reviews, Benefits of Static Testing, Static Vs Dynamic Testing.

Levels of Testing: Unit testing, Integration Testing,. Function testing, System testing and Acceptance testing.

Regression testing: Progressive Vs Regressive testing, Objectives of regression testing, Regression testing techniques

UNIT-IV: Test Management:

Test Organization, Test Planning, Test Design and Test case specifications, Structure of a Testing Group, Reasons for the growth of a Test suite, Test suite Minimization, Test suite prioritization, Types of test case prioritization, prioritization techniques, Measuring the effectiveness of a prioritized test suite. Software Quality Management: Software Quality metrics, SQA models

Debugging: Debugging process, Debugging Techniques, Correcting Bugs, Debuggers

UNIT-V: Automation and Testing Tools:

Need for automation, Testing Tool Considerations, Test Tool Classification, Benefits and Risks of Test automation, Special Considerations for Test execution and Test Management Tools, Principles for tool selection, Testing tools- success factors, Guidelines for automated testing, overview of some commercial testing tools.

Object oriented testing Testing Web based Systems: Challenges in testing for web based software, quality aspects, web **engineering**, testing of web based systems, Testing mobile systems.

TEXT BOOKS:

1. Software testing techniques - Baris Beizer, International Thomson computer press, second edition. (Unit 1)
2. Software Testing, Principles and Practices, Naresh Chauhan, Oxford Publishers(Unit 2,3,4,5)

REFERENCES:

 Effective Methods for Software testing, Willian E Perry, 3ed, Wiley

1. Software Testing, Principles, techniques and Tools, M G Limaye, TMH
2. Foundations of Software testing, Aditya P Mathur, 2ed, Pearson

B. TECH VII SEMESTER

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INTERNET OF THINGS
20IT7T10   (OPEN ELECTIVE III)

Course Objectives:

- Understand the architecture of Internet of Things and connected world.
- Explore on use of various hardware, communication and sensing technologies to build IoT applications
- Develop the real time IoT applications to make smart world.
- Understand challenges and future trends in IoT.

Course Outcomes:

CO1: Design and Deployment of IoT.

CO2: Design and comparing M2M with IoT.

CO3: Understand Platform design and modeling of IoT

CO4: Apply IoT in different devices using Python

CO5: Implement IoT and cloud platforms.

SYLLABUS

UNIT-I: Introduction to Internet of Things (IoT):

Definition and characteristics of IoT, physical design of IoT, logical design of IoT, IoT Enabling Technologies, IoT levels and deployment, domains Specific IoTs.

UNIT-II: IoT and M2M :

Introduction, M2M, difference between IoT and M2M, software defined networking (SDN) and network function virtualization (NFV) for IoT, basics of IoT system management with NETCONF-YANG.

UNIT-III: IoT Platforms Design Methodology:

IoT Architecture: State of the art introduction, state of the art; Architecture reference model: Introduction, reference model and architecture, IoT reference model. Logical design using Python: Installing Python, Python data types and data Structures, control flow, functions, modules, packages, file handling. Raspberry PI with Python, other IoT devices.

UNIT-IV: IoT Protocols:

Messaging Protocols- MQ Telemetry Transport (MQTT), Constrained Application Protocol (CoAP) Transport Protocols-Light Fidelity (Li-Fi), Bluetooth Low Energy (BLE) IoT Protocols: Addressing and Identification: Internet Protocol Version 4 (IPV4), Internet Protocol Version 6(IPV6), Uniform Resource Identifier (URI)

UNIT-V: IoT Physical Servers And Cloud Offerings: Introduction to cloud storage models and communication APIs, WAMP –Auto Bahn for IoT, Xively cloud for IoT, case studies illustrating IoT design –home automation, smart cities, smart environment.

TEXT BOOKS:

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things: A Hands-on-Approach", VPT, 1st Edition, 2014. (Units1,2,3,5)

2. Matt Richardson, Shawn Wallace, "Getting Started with Raspberry Pi", O'Reilly (SPD), 3rd Edition, 2014. (Unit 3)

3. Shriram K Vasudevan, Abhishek S Nagarajan, RMD Sundaram " Internet of Things" Wiley (Unit 4).

REFERENCE BOOKS:

1. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill Higher Education

2. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", John Wiley and Sons2014.

B. TECH VII SEMESTER

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COMPUTER VISION
20IT7T11   (OPEN ELECTIVE III)

Course Objectives:

- To review image processing techniques for computer vision.
- To understand shape and region analysis.
- To understand Hough Transform and its applications to detect lines, circles, ellipses.
- To understand motion analysis.
- To study some applications of computer vision algorithms

Course Outcomes:

CO1: Implement fundamental image processing techniques required for computer vision.

CO2: Perform shape analysis.

CO3: Apply Hough Transform for line, circle, and ellipse detections.

CO4: Apply 3D vision techniques.

CO5: Develop applications using computer vision techniques

SYLLABUS

UNIT - I:

IMAGE PROCESSING FOUNDATIONS

Review of image processing techniques – classical filtering operations – thresholding techniques – edge detection techniques – corner and interest point detection – mathematical morphology –texture.

UNIT - II: SHAPES AND REGIONS

Binary shape analysis – connectedness – object labeling and counting – size filtering – distance functions – skeletons and thinning – deformable shape analysis – boundary tracking procedures – active contours – shape models and shape recognition – centroidal profiles – handling occlusion – boundary length measures – boundary descriptors – chain codes – Fourier descriptors – region descriptors – moments.

UNIT – III: HOUGH TRANSFORM

Line detection – Hough Transform (HT) for line detection – foot-of-normal method – line localization – line fitting – RANSAC for straight line detection – HT based circular object detection – accurate center location – speed problem – ellipse detection – Case study: Human Iris location – hole detection – generalized Hough Transform (GHT) – spatial matched filtering – GHT for ellipse detection – object location – GHT for feature collation.

UNIT - IV: 3D VISION AND MOTION

Methods for 3D vision – projection schemes – shape from shading – photometric stereo – shape from texture – shape from focus – active range finding – surface representations – point-based representation – volumetric representations – 3D object recognition – 3D reconstruction – introduction to motion – triangulation – bundle adjustment – translational alignment – parametric motion – spline-based motion – optical flow – layered motion

.UNIT - V: APPLICATIONS

Application: Photo album – Face detection – Face recognition – Eigen faces – Active appearance and 3D shape models of faces Application: Surveillance – foreground-background separation – particle filters – Chamfer matching, tracking, and occlusion – combining views from multiple cameras – human gait analysis Application: In-vehicle vision system: locating roadway – road markings – identifying road signs – locating pedestrians.

TEXT BOOKS:

1.D. L. Baggio et al., ―Mastering OpenCV with Practical Computer Vision Projects‖, Packt Publishing, 2012.

2. E. R. Davies, ―Computer & Machine Vision‖, Fourth Edition, Academic Press, 2012.

REFERENCES:

1. Jan Erik Solem, ―Programming Computer Vision with Python: Tools and algorithms for analyzing images‖, O'Reilly Media, 2012.

2. Mark Nixon and Alberto S. Aquado, ―Feature Extraction & Image Processing for Computer Vision‖, Third Edition, Academic Press, 2012.

3. R. Szeliski, ―Computer Vision: Algorithms and Applications‖, Springer 2011.

4. Simon J. D. Prince, ―Computer Vision: Models, Learning, and Inference‖, Cambridge University Press, 2012.

B. TECH VII SEMESTER

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FUZZY SETS
20HS7T01   (OPEN ELECTIVE III)

COURSE OBJECTIVES:

1) Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.
2) Explain different types operations performed on fuzzy sets.
3) Provide the knowledge of Arithmetic operations on fuzzy numbers.
4) Emphasis on different kinds of crisp and fuzzy relations
5) Enable students to know the validity of arguments by fuzzy logic.

COURSE OUTCOMES:

CO1: Understand basic knowledge of fuzzy sets and fuzzy logic.

CO2: Apply various kinds of operations on fuzzy sets.

CO3: Understand the concepts of fuzzy arithmetic to solve fuzzy equations.

CO4: Illustrate the properties of fuzzy sets to design modeling software system.

CO5: Apply fuzzy logic to solve the problems in neural networks.

SYLLABUS

UNIT-I

Fuzzy Sets(all theorems without proofs): Introduction, Crisp sets, Fuzzy sets: Basic types and basic concepts, additional properties of α-cuts, representations of Fuzzy sets, extension principle for Fuzzy sets.

UNIT-II

Operations on Fuzzy Sets(all theorems without proofs): Types of operations, Fuzzy complements, Fuzzy intersections: t-norms, Fuzzy unions: t-conorms, Combinations of operations, Aggregation operations.

UNIT-III

Fuzzy Arithmetic(all theorems without proofs): Fuzzy numbers, Linguistic variables, Arithmetic operations on intervals, Arithmetic operations on Fuzzy numbers, Lattice of Fuzzy numbers, Fuzzy equations.

UNIT-IV

Fuzzy Relations(all theorems without proofs): Crisp versus Fuzzy relations, Projection and cylindrical extensions, Binary Fuzzy relations, Binary relations on a single set, Fuzzy equivalence relations, Fuzzy compatibility relations, Fuzzy ordering relations, Fuzzy morphisms.

UNIT-V

Fuzzy Logic(all theorems without proofs): Classical logic: an over view, multivalued logics, Fuzzy propositions, Fuzzy quantifiers, Linguistic hedges, Inference from conditional Fuzzy propositions, Inference from conditional and qualified propositions, Inference from quantified propositions.

TEXT BOOKS:

1. George J. Klir& Bo Yuan, Fuzzy Sets & Fuzzy Logic, Pearson Education, PHI, 1995.
2. H. J. Zimmermann, Fuzzy Set Theory and its Applications, 4th edition, Springer.

REFERENCES:

1. Timothy J. Ross, Fuzzy Logic with Engineering Applications, 3rd edition, Wiley, 2010.
2. John Yen & Reza Langari, Fuzzy Logic, Pearson.

B. TECH VII SEMESTER

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DIGITAL MEDIA MANAGEMENT

20MB7T01   (OPEN ELECTIVE III)

Course Objective

Digital marketing channels that can helps the students to understand the increased business visibility and brand awareness. Moreover, having a professional presence on social media helps them to reach a broader target audience to secure more leads and convert them into loyal customers.

SYLLABUS

Unit – I

Understanding Digital Marketing: Concept, Components of Digital Marketing, Need and Scope of Digital Marketing, Benefits of Digital Marketing, Digital Marketing Platforms and Strategies, Comparison of Marketing and Digital Marketing, Digital Marketing Trends.

Unit – II

Channels of Digital Marketing: Digital Marketing, Website Marketing, Search Engine Marketing, Online Advertising, Email Marketing, Blog Marketing, Social Media Marketing, Audio, Video and Interactive Marketing, Online Public Relations, Mobile Marketing, Migrating from Traditional Channels to Digital Channels. Marketing in the Digital Era Segmentation – Importance of Audience Segmentation, How different segments use Digital Media –

Organizational Characteristics, Purchasing Characteristics, Using Digital Media to Reach, Acquisition and Retention of new customers, Digital Media for Customer Loyalty.

Unit – III

Digital Marketing Plan: Need of a Digital Marketing Plan, Elements of a Digital Marketing Plan – Marketing Plan, Writing the Marketing Plan and Implementing the Plan, Executive Summary, Mission, Situational Analysis, Opportunities and Issues, Goals and Objectives, Marketing Strategy, Action Plan, Budget.

Unit – IV

Search Engine Marketing and Online Advertising: Importance of SEM, understanding Web Search – keywords, HTML tags, Inbound Links, Online Advertising vs. Traditional Advertising, Payment Methods of Online Advertising – CPM (Cost-per-Thousand) and CPC (Cost per-click), Display Ads - choosing a Display Ad Format, Landing Page and its importance.

Unit – V

Social Media Marketing: Understanding Social Media, Social Networking with Facebook, LinkedIn, Blogging as a social medium, Microblogging with Twitter, Social Sharing with YouTube, Social Media for Customer Reach, Acquisition and Retention. Measurement of Digital Media: Analyzing Digital Media Performance, Analyzing Website Performance, Analyzing Advertising Performance.

TEXT BOOKS

1 Richard Gay, Alan Charles worth and Rita Essen, Online Marketing, Oxford University Press, 2016.

REFERENCES

1. Dave Chaffey, Fiona Ellis-Chadwick, Richard Mayer, Kevin Johnston. Internet Marketing Strategy, Implementation and Practice,3rd Ed .Prentice Hall.

2. Rob Stokes e-Marketing: The essential guide to marketing in a digital world. 5th Ed. Quirk e-Marketing (Pty) Ltd.

B. TECH VII SEMESTER

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20MB7T02

ENTREPRENEURSHIP DEVELOPMENT
(OPEN ELECTIVE III)

SYLLABUS

UNIT –I

Entrepreneurship- definition. growth of small scale industries in developing countries and their positions vis-a-vis large industries; role of small scale industries in the national economy; characteristics and types of small scale industries; demand based and resources based ancillaries and sub-control types. Government policy for small scale industry; stages in starting a small scale industry.

UNIT -II

Project identification- assessment of viability, formulation, evaluation, financing, field-study and collection of information, preparation of project report, demand analysis, material balance and output methods, benefit cost analysis, discounted cash flow, internal rate of return and net present value methods.

UNIT -III

Accountancy- Preparation of balance sheets and assessment of economic viability, decision making, expected costs, planning and production control, quality control, marketing, industrial relations, sales and purchases, advertisement, wages and incentive, inventory control, preparation of financial reports, accounts and stores studies.

UNIT -IV

Project Planning and control: The financial functions, cost of capital approach in project planning and control. Economic evaluation, risk analysis, capital expenditures, policies and practices in public enterprises. profit planning and programming, planning cash flow, capital expenditure and operations. control of financial flows, control and communication.

UNIT -V

Laws concerning entrepreneur viz, partnership laws, business ownership, sales and income taxes and workman compensation act. Role of various national and state agencies which render assistance to small scale industries.

Text / Reference Books:

1. Forbat, John, "Entrepreneurship" New Age International.

2. Havinal, Veerbhadrappa, "Management and Entrepreneurship" New Age International

3. Joseph, L. Massod, "Essential of Management", Prentice Hall of India.

B. TECH VII SEMESTER

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20AD7T10

DATA ANALYSIS AND VISUALIZATION WITH PYTHON
(OPEN ELECTIVE III)

Pre-requisite:

Course Objective: *This course* explains vital data science concepts and teaches you how to accomplish the fundamental tasks that occupy data scientists. You'll explore data visualization, graph databases, the use of NoSQL, and the data science process. You'll use the Python language and common Python libraries as you experience firsthand the challenges of dealing with data at scale.

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

CO1: Describes benefits of data science, facets of data

CO2: Illustrates data science process and describes the need of machine learning

CO3: Describes the problems of handling large data

CO4: Introduces distributed data storage and processing frame works

CO5: Describes about graph databases and text analytics

SYLLABUS

Unit-1:

Preliminaries: What Kinds of Data?, Why Python for Data Analysis?, Python as Glue, Solving the "Two-Language" Problem, Why Not Python?, Essential Python Libraries, Installation and Setup.

Python Language Basics, IPython, and Jupyter Notebooks: The Python Interpreter, IPython Basics, Python Language Basics.

NumPy Basics: Arrays and Vectorized Computation:

The NumPy ndarray: A Multidimensional Array Object, Universal Functions: Fast Element-Wise Array Functions, Array-Oriented Programming with Arrays, File Input and Output with Arrays, Linear Algebra, Pseudorandom Number Generation.

Unit-2:

Introduction to pandas Data Structures: Series, DataFrame, Index Objects

Essential Functionality: Reindexing, Dropping Entries from an Axis, Indexing, Selection, and Filtering, Integer Indexes, Arithmetic and Data Alignment, Function Application and Mapping, Sorting and Ranking, Axis Indexes with Duplicate Labels, Summarizing and Computing Descriptive Statistics: Correlation and Covariance, Unique Values, Value Counts, and Membership.

Unit-3:

Data Loading, Storage, and File Formats Reading and Writing Data in Text Format: Reading Text Files in Pieces, Writing Data to Text Format, Working with Delimited Formats, JSON Data, XML and HTML: Web Scraping

Binary Data Formats: Using HDF5 Format, Reading Microsoft Excel Files

Data Cleaning and Preparation:

Handling Missing Data: Filtering Out Missing Data, Filling In Missing Data

Data Transformation: Removing Duplicates, Transforming Data Using a Function or Mapping, Replacing Values, Renaming Axis Indexes, Discretization and Binning, Detecting and Filtering Outliers, Permutation and Random Sampling, Computing Indicator/Dummy Variables

Unit-4:

Data Wrangling: Join, Combine, and Reshape:

Hierarchical Indexing: Reordering and Sorting Levels, Summary Statistics by Level, Indexing with a DataFrame's columns.

Combining and Merging Datasets: Database-Style DataFrame Joins, Merging on Index, Concatenating Along an Axis, Combining Data with Overlap.

Reshaping and Pivoting: Reshaping with Hierarchical Indexing, Pivoting "Long" to "Wide" Format, Pivoting "Wide" to "Long" Format.

Unit-5:

Plotting and Visualization

A Brief matplotlib API Primer: Figures and Subplots, Colors, Markers, and Line , Styles, Ticks, Labels, and Legends, Annotations and Drawing on a Subplot, Saving Plots to File, matplotlib Configuration.

Plotting with pandas and seaborn: Line Plots, Bar Plots, Histograms and Density Plots, Scatter or Point Plots, Facet Grids and Categorical Data, Other Python Visualization Tools.

Text Book:

"Python for Data Analysis" Data Wrangling With Pandas, Numpy, And Ipython Second Edition by Wes McKinney, Oreilly Publications.

B. TECH VII SEMESTER	**OEC**	**L**	**T**	**P**	**C**
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NoSQL DATABASES
20AM7T10 **(OPEN ELECTIVE III)**

Pre-requisite: Linear Algebra, Calculus, Python Programming

Course Objective: *This **course** explains define, compare and use the four types of NoSQL Databases, demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases, explain the detailed architecture, define objects, load data, query data and performance tune Document oriented NoSQL databases, ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data

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

CO1: Identify the type of NoSQL database to implement based on business requirements

CO2: Apply NoSQL data modeling from application specific queries

CO3: Understand NoSQL Storage Architecture

CO4: Use Atomic Aggregates and denormalization as data modeling techniques to optimize query processing

CO5: Apply indexing and ordering of data sets

SYLLABUS

Unit-1:

Introduction to NoSQL: Definition And Introduction, Sorted Ordered Column-Oriented

Stores, Key/Value Stores, Document Databases, Graph Databases, Examining Two Simple Examples, Location Preferences Store, Car Make And Model Database, Working With Language Bindings.

Unit-2:

Interacting with NoSQL: If NoSql Then What, Language Bindings For NoSQL Data Stores, Performing Crud Operations, Creating Records, Accessing Data, Updating And Deleting Data

Unit-3:

NoSQL Storage Architecture: Working With Column-Oriented Databases, Hbase

Distributed Storage Architecture, Document Store Internals, Understanding Key/Value

Stores In Memcached And Redis, Eventually Consistent Non-Relational Databases.

Unit-4:

NoSQL Stores: Similarities between Sql and Mongodb Query Features, Accessing Data

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B. Tech in Artificial Intelligence & Machine Learning

From Column-Oriented Databases like Hbase, Querying Redis Data Stores, Changing Document Databases, Schema Evolution in Column-Oriented Databases, Hbase Data Import And Export, Data Evolution In Key/Value Stores.

Unit-5:

Indexing and Ordering Data Sets: Essential Concepts behind a Database Index, Indexing And Ordering In Mongodb, Creating and Using Indexes In Mongodb, Indexing And Ordering In Couchdb, Indexing In Apache Cassandra.

Reference Books:

1) Pramod Sadalage and Martin Fowler, NoSQL Distilled, Addison-Wesley Professional,2012.

2) Dan McCreary and Ann Kelly, Making Sense of NoSQL, Manning Publications,2013.

3) Shashank Tiwari, Professional NoSQL, Wrox Press, Wiley, 2011, ISBN:978-0-470-94224-6

4) Gaurav Vaish, Getting Started with NoSQL, Packt Publishing, 2013.

B.TECH VII SEMESTER

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20CE7T15   WASTE WATER TREATMENT
(OPEN ELECTIVE-IV)

Course Objectives: To study about waste water treatment

Course Outcomes: Able to provide waste management techniques

SYLLABUS

UNIT–I:

Quality requirements of boiler and cooling waters – Quality requirements of process water for Textiles – Food processing and Brewery Industries – Boiler and Cooling water treatment methods.

UNIT–II:

Basic Theories of Industrial Waste water Management – Volume reduction – Strength reduction – Neutralization – Equalization and proportioning. Joint treatment of industrial wastes and domestic sewage – consequent problems, Industrial waste water discharges into streams. Lakes and oceans- consequent problems.

UNIT–III:

Recirculation of Industrial Wastes – Use of Municipal Waste Water in Industries, Manufacturing Process and design origin of liquid waste from Textiles, Paper and Pulp industries, Thermal Power Plants and Tanneries, Special Characteristics, Effects and treatment methods. Manufacturing Process and design origin of liquid waste from Fertilizers, Distillers, and Dairy, Special Characteristics, Effects and treatment methods.

UNIT-IV:

Manufacturing Process and design origin of liquid waste from Sugar Mills, Steel Plants, Oil Refineries, and Pharmaceutical Plants, Special Characteristics, Effects and treatment methods.

UNIT–V:

Common Effluent Treatment Plants – Advantages and Suitability, Limitations, Effluent Disposal Methods.

Text Books:

1. Waste Water Treatment by M.N. Rao and Dutta, Oxford & IBH, New Delhi.

Reference Books:

1. Liquid waste of Industry by Newmerow.

2. Water and Waste Water technology by Mark J. Hammer and Mark J. Hammer (Jr).

B.TECH VII SEMESTER

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20CE7T16 REPAIR AND REHABILITATION OF CONCRETE STRUCTURES
(OPEN ELECTIVE-IV)

Course Objectives:

- Familiarize Students with deterioration of concrete in structures
- Equip student with concepts of NDT and evaluation
- To evaluate the performance of the materials for repair
- To strategize different repair and rehabilitation of structures.

Course Outcomes:

CO1: Explain deterioration of concrete in structures

CO2: Carryout analysis using NDT and evaluate structures

CO3: Students must gain knowledge on quality of concrete

CO4: Examine how the Concrete repair industry equipped with variety of repair Material sand techniques .

SYLLABUS

UNIT–I:

Maintenance and Repair Strategies Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

UNIT-II:

Causes of Damage To Structures Causes of Distress in Structures - Extrinsic and Intrinsic causes for damage of structures; Effect of Chemical and Marine Environment on structures.

UNIT-III:

Semi Destructive Tests for Damage Assessment Core Test, LOK test, CAPO test, Penetration Tests Non-Destructive Tests for Damage Assessment Rebound Hammer Test, Ultrasonic Pulse Velocity test, Resistivity Test, Carbonation Test, Corrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data.

UNIT-IV:

Materials for Repair: Criteria for durable concrete repair, selection of repair materials, Special concretes and mortars, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fiber reinforced concrete, FRP sheets.

UNIT-V:

Techniques for Repair: Crack repair techniques – Crack Stitching, Mortar and dry pack, vacuum concrete, Shotcreting, Epoxy injection, Mortar repair for cracks Methods of Strengthening: Repairs to overcome low member strength – Jacketing, blanketing

Text Books:

1. 'Maintenance & Repair of Civil Structures' by B.L. Gupta & Amit Gupta.
2. 'Rehabilitation of Concrete Structures' by B. Vidivelli, Standard Publishers.
3. 'Concrete Bridge Practice Construction, Maintenance & Rehabilitation' by V. K. Raina

Reference Books:

1. 'Concrete Structures- protection   Repair and Rehabilitation' by R. Doodge Woodson, BH Publishers
2. Shetty M.S., "Concrete Technology – Theory   and   Practice", S. Chand   and Company, 2008.
3. Dov Kominetzky. M. S., "Design   and   Construction Failures", Galgotia Publications Pvt.Ltd., 2001
4. Ravishankar.K., Krishnamoorthy. T. S, "Structural   Health   Monitoring, Repair   and Rehabilitation of Concrete Structures", Allied Publishers, 2004.
5. CPWD and Indian Buildings Congress, Hand book on Seismic Retrofit of Buildings, Narosa   Publishers, 2008,
6. Gambhir. M. L., "Concrete Technology", McGraw Hill, 2013

B.TECH VII SEMESTER

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20EE7T15   POWER QUALITY
(OPEN ELECTIVE-IV)

Course Objective:

- To introduce the power quality problem
- To educate on production of voltages sags, over voltages and harmonics and methods of control.
- To study overvoltage problems
- To study the sources and effect of harmonics in power system
- To impart knowledge on various methods of power quality monitoring.

Course Outcome:

At the end of this course the student should be able to

CO1: Differentiate between different types of power quality problems.

CO2: Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.

CO3: Analyze power quality terms and power quality standards.

CO4: Explain the principle of voltage regulation and power factor improvement methods.

CO5: Explain the power quality monitoring concepts and the usage of measuring instruments.

SYLLABUS

Unit-I

Introduction to Power Quality: Terms and definitions of transients, Long Duration Voltage Variations: Under Voltage and Sustained Interruptions; Short Duration Voltage Variations: interruption, Sag, Swell; Voltage Imbalance; Notching DC offset; waveform distortion; voltage fluctuation; power frequency variations.

Unit-II

Voltage Sag: Sources of voltage sag: motor starting, arc furnace, fault clearing etc; estimating voltage sag performance and principle of its protection; solutions at end user level- Isolation Transformer, Voltage Regulator, Static UPS, Rotary UPS, and Active Series Compensator.

Unit-III

Electrical Transients: Sources of Transient Over voltages- Atmospheric and switching transients-motor starting transients, pf correction-capacitor switching

transients, ups switching transients, neutral voltage swing etc; devices for over voltage protection.

Unit-IV

Harmonics: Causes of harmonics; current and voltage harmonics, measurement of harmonics, THD; effects of harmonics on – Transformers, AC Motors, Capacitor Banks, Cables, and Protection Devices, Energy Metering, Communication Lines etc. harmonic mitigation techniques.

Unit-V

Monitoring and Instrumentation: Power quality monitoring and considerations – Historical perspective of PQ measuring instruments – PQ measurement equipment – Assessment of PQ measuring data – Application of intelligent systems – PQ monitoring standards.

Text Books:

1. Roger C Dugan, McGrahan, Santoso & Beaty, "Electrical Power System Quality" McGraw Hill

2. Arinthom Ghosh & Gerard Ledwich, "Power Quality Enhancement Using Custom Power Devices" Kluwer   Academic Publishers

3. Sankaran, " Power Quality" CRC Press.

Reference Books:

1. Power Quality Primer, Kennedy B W, First Edition, McGraw–Hill, 2000.

2. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M HJ, First Edition, IEEE Press; 2000.

3. Power System Harmonics, Arrillaga J and Watson N R, Second Edition, John Wiley & Sons, 2003.

4. Electric Power Quality control Techniques, W. E. Kazibwe and M. H. Sendaula, Van Nostrad Reinhold, New York.

5. Harmonics and Power Systems –Franciso C.DE LA Rosa–CRC Press (Taylor & Francis) Power Quality in Power systems and Electrical Machines–EwaldF.fuchs, Mohammad A.S. Masoum–Elsevier.

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20EE7T16 ELECTRIC VEHICLES
(OPEN ELECTIVE-IV)

Course Objective:

- To study the different drive train configurations of electric vehicles
- To propose the various propulsion and energy storage systems for EHVs
- To know the sizing of propulsion motors and other systems involved in EH vehicles
- To carry out different design case studies of EHv and BEVs

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

CO1: Assess the performance, societal and environmental impact of EHVs having known their past history

CO2: Implement various drive train topologies and control strategies in Electric and Hybrid vehicles

CO3: Recommend, Design/Size and Control different electric propulsion units and other components of EHVs and BEVs

CO4: Appropriately select the energy storage system and strategize its management in EHVs

CO5: Define Ancillary Service Management and explain different ancillary services.

SYLLABUS

UNIT-I INTRODUCTION TO ELECTRIC VEHICLES:

History of electric vehicles (EV) and hybrid electric vehicle (EHV), need and importance of EV and HEV, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies, Power/energy supplies requirements for EV/HEV applications, vehicle power source characterization, and transmission characteristics.

UNIT-II HYBRID ELECTRIC DRIVE-TRAINS: Basic architecture and concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.

Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive-train topologies, power flow control in electric drive-train topologies, fuel efficiency analysis

UNIT-III ELECTRIC PROPULSION UNIT:

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Induction Motor drives, Permanent Magnet Motor drives, and Switch Reluctance Motor drives, drive system efficiency.

UNIT-IV BATTERY ENERGY STORAGE SYSTEMS:

Battery Basics - Lead-Acid Battery -Cell Discharge Operation - Cell Charge Operation-Construction-Battery Parameters - Battery Capacity-Discharge Rate - State of Charge- State of Discharge- Depth of Discharge-Technical Characteristics - Practical Capacity -Battery Energy -Constant Current Discharge -Specific Energy - Battery Power -Specific Power -Batteries for EV applications.

UNIT-V MODELLING OF EV/HEV:

Modelling and analysis of EV/HEV drive train sizing of motor, and design of traction power electronics, various vehicle subsystems.

TEXT BOOKS:

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2010.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press,2009.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

REFERENCES:

1. Jefferson, C.M., Barnard and R.H., Hybrid Vehicle Propulsion, WIT Press, Boston, 2002
2. Jack Erjavec and Jeff Arias, "Hybrid, Electric and Fuel Cell Vehicles", Cengage Learning, 2012
3. SerefSoylu "Electric Vehicles - The Benefits and Barriers", InTech Publishers, Croatia, 2011
4. Jack Erjavec and Jeff Arias, "Alternative Fuel Technology – Electric, Hybrid and Fuel Cell Vehicles", Cengage Learning Pvt. Ltd., New Delhi, 2007
5. Seth Leitman, "Build Your Own Electric Vehicle" McGraw hill, New York, USA, 2013

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B.TECH VII SEMESTER | **OEC** | 3 | 0 | 0 | 3 |

20ME7T12   **MICRO-ELECTRO- MECHANICAL SYSTEMS**
(OPEN ELECTIVE -IV)

Pre-requisite: Calculus and Differential Eq., Fundamentals of Physics (Mechanics, Optics, Electricity and magnetism), Fundamentals of Inorganic Chemistry.

Course Objective: The main objective of this course is to introduce the integrative nature of Micro Electro Mechanical systems. To describe the different components and devices of Micro Electro Mechanical systems.

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

CO1: Explain MEMS and Principles of sensing and actuation

CO2: Explain Thermal Sensors and Actuators & Magnetic Sensors and Actuators

CO3: Explain Micro-Opto-Electro Mechanical Systems

CO4: Explain Radio Frequency (RF) MEMS & Micro Fluidic Systems

CO5: Explain Chemical And Bio Medical Micro Systems

SYLLABUS

UNIT-I:

INTRODUCTION: Definition of MEMS, MEMS history and development, micro machining, lithography principles & methods, structural and sacrificial materials, thin film deposition, impurity doping, etching, surface micro machining, wafer bonding, LIGA.

MECHANICAL SENSORS AND ACTUATORS: Principles of sensing and actuation: beam and cantilever, capacitive, piezo electric, strain, pressure, flow, pressure measurement by micro phone, MEMS gyroscopes, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

UNIT-II:

THERMAL SENSORS AND ACTUATORS: Thermal energy basics and heat transfer processes, thermisters, thermo devices, thermo couple, micro machined thermo couple probe, peltier effect heat pumps, thermal flow sensors, micro hot plate gas sensors, MEMS thermo vessels, pyro electricity, shape memory alloys (SMA), U-shaped horizontal and vertical electro thermal actuator, thermally activated MEMS relay, micro spring thermal actuator, data storage cantilever.

MAGNETIC SENSORS AND ACTUATORS: Magnetic materials for MEMS and properties, magnetic sensing and detection, magneto resistive sensor, more on hall effect, magneto diodes, magneto transistor, MEMS magnetic sensor, pressure sensor utilizing MOKE, magnetic MEMS actuators, by directional micro actuator, feedback circuit integrated magnetic actuator, large force reluctance actuator, magnetic probe based storage device.

UNIT-III: MICRO-OPTO-ELECTRO MECHANICAL SYSTEMS:

Principle of MOEMS technology, properties of light, light modulators, beam splitter, micro lens, micro mirrors, digital micro mirror device (DMD), light detectors, grating light valve (GLV), optical switch, wave guide and tuning, shear stress measurement.

UNIT-IV:

RADIO FREQUENCY (RF) MEMS: RF – based communication systems, RF MEMS, MEMS inductors, varactors, tuner/filter, resonator, clarification of tuner, filter, resonator, MEMS switches, phase shifter.

MICRO FLUIDIC SYSTEMS: Applications, considerations on micro scale fluid, fluid actuation methods, dielectrophoresis (DEP), electro wetting, electro thermal flow, thermo capillary effect, electro osmosis flow, opto electro wetting (OEW), tuning using micro fluidics, typical micro fluidic channel, microfluid dispenser, micro needle, molecular gate, micro pumps.

UNIT-V: CHEMICAL AND BIO MEDICAL MICRO SYSTEMS:

Sensing mechanism & principle, membrane transducer materials, chem.-lab-on-a-chip (CLOC) chemoresistors, chemocapacitors, chemotransistors, electronic nose (Enose), mass sensitive chemosensors, fluroscence detection, calorimetric spectroscopy.

Text Books:

1. MEMS, NitaigourPremchandMahalik, TMH Publishing co.

References:

1. Foundation of MEMS, Chang Liu, Prentice Hall Ltd.

2. Bio-MEMS (Micro systems), Gerald Urban, Springer.

3. MEMS and Micro Systems: Design and Manufacture, Tai-Ran Hsu, TMH Publishers.

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20ME7T13   **SOLAR ENERGY SYSTEMS**
(OPEN ELECTIVE -IV)

Pre-requisite: Thermodynamics, Environmental Sciences

Course Objective: To impart knowledge on non-conventional sources of energy and techniques used in exploiting solar, wind, tidal and geothermal sources of energy and bio-fuels.

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

CO1: Significance of renewable energy and describe the principles of solar radiation. Analyze various solar collectors.

CO2: Know the various storage methods and application of solar energy.

CO3: Understand the concept of converting wind energy into electrical energy using both horizontal and vertical axis wind machines.

CO4: Know biomass disasters, functional operation of geothermal systems. Generalize the operation of ocean, tidal and wave energy systems.

CO5: understand the operating principle of direct energy conversion systems .and to recognize the need and ability to engage in lifelong learning for further developments in this field.

SYLLABUS

UNIT-I: FUNDAMENTALS OF SOLAR RADIATION:

Energy conservation principle, Energy scenario (world and India), Solar angles, Solar time, Solar radiation: Outside earth's atmosphere, Earth surface, measurements of solar radiation: Pyrometer, Sunshine recorder, Pyro heliometer.

UNIT-II: ENERGY STORAGE SYSTEMS:

Energy –Environment-Economy Necessity of energy storage, Specifications of energy storage devices, energy storage Methods-Mechanical Energy Storage-Thermal Energy Storage-Sensible Heat Storage-Solid media storage.

UNIT-III: SOLAR COLLECTORS:

Classifications, comparison of concentrating and non-concentrating types – Liquid flat plate collectors, Evacuated tube collectors. Modified flat plate collectors: Compound parabolic concentrator(CPC), Cylindrical parabolic Concentrator, Fixed mirror solar concentrator, Paraboloid Dish Collector.

UNIT-IV: SOLAR THERMAL DEVICES:

Solar water heater, Solar space heating and cooling systems, Solar industrial heating systems, Solar refrigeration and air conditioning systems, Solar Desalination – Solar cooker: domestic, community – Solar pond – Solar drying.

UNIT-V: SOLAR PHOTOVOLTAIC SYSTEMS:

Solar cell fundamentals, Energy band model of semiconductors, Working Principle of photovoltaic cell, solar cell classification, solar cell technologies, solar PV systems-classification. Solar cell –module-array Construction.

Text Books:

1. Goswami D.Y., Kreider, J. F. and Francis., "Principles of Solar Engineering', Taylor and Francis, 2000.

2. Chetan Singh Solanki, "Solar Photovoltatics – Fundamentals, Technologies

and Applications", PHI Learning Private limited, 2011.

3. Sukhatme S.P., Nayak.J.P, 'Solar Energy – Principle of Thermal Storage and collection", Tata McGraw Hill, 2008.

4. Solar Energy International, "Photovoltaic – Design and Installation Manual" – New Society Publishers, 2006.

5. Roger Messenger and Jerry Vnetre, "Photovoltaic Systems Engineering", CRC Press, 2010.

Reference Books:

1. B.H.Khan "Non – conventional Energy Resources" Tata McGraw Hill education Pvt. Ltd.

2. G.D. Rai, "Non-Conventional Energy Sources", Dhanpat Rai and Sons .

B. TECH VII SEMESTER

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INTRODUCTION TO EMBEDDED SYSTEMS
20EC7T13   (OPEN ELECTIVE –IV)

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

1 The basic concepts of an embedded system are introduced.

2 The various elements of embedded hardware and their design principles are explained

3 Internals of Real-Time operating system and the fundamentals of RTOS based embedded firmware design is discussed

4 Embedded system implementation and testing tools are introduced and discussed.
   Technology capabilities and limitations of the hardware, software components

5 Design Methodologies

Course Outcomes:

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

CO1: Understand the basic concepts of an embedded system and able to know an embedded system design Approach to perform a specific function.

CO2: The various embedded firmware design approaches on embedded environment.

CO3: Identify the unique characteristics of real-time systems

CO4: Design, implement and test an embedded system.

CO5: Define the unique design problems and challenges of real-time systems

SYLLABUS

UNIT-I: Introduction to Embedded systems

 What is an embedded system Vs. General Computing system, history, classification, major application areas, and purpose of embedded systems, Core of embedded system, Characteristics and Quality Attributes of Embedded systems

UNIT-II: Embedded Hardware Design

Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real-time clock, Application specific and Domain specific embedded systems-Examples

UNIT-III:

Embedded Firmware design approaches, Embedded Firmware Development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA,Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

UNIT-IV:

Factors to be considered in selecting a controller, 8051 Architecture, RTOS and Scheduling Operating basics, types, RTOS, Tasks, Process and Threads, Multiprocessing and Multitasking, Types of multitasking, Non preemptive Scheduling, Preemptive Scheduling.

UNIT-V: Design and Development

Embedded system development Environment – IDE, Simulators, Emulators, Debuggers, Embedded Product Development life cycle (EDLC), Trends in embedded Industry

Text books:

1. Introduction to embedded systems Shibu. K.V, TMH, 2009.

2. Embedded Systems, Rajkamal, TMH, 2009.

References:

1. Ayala &Gadre: The 8051 Microcontroller & Embedded Systems using Assembly and C,   CENGAGE

2. Embedded Systems: A Contemporary Design Tool Paperback by James K. Peckol

B. Tech VII Semester

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INTERNET OF THINGS
20EC7T14   (OPEN ELECTIVE –IV)

COURSE OBJECTIVES:
The main objectives of this course are given below:

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

1	To introduce the terminology, technology and its applications
2	To introduce the concept of M2M (machine to machine) with necessary protocols
3	To introduce the Python Scripting Language which is used in many IoT devices
4	To introduce the Raspberry PI platform, that is widely used in IoT applications
5	To introduce the implementation of web-based services on IoT devices

COURSE OUTCOMES:

At the end of this course the student will able to:

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

CO1:	Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved.
CO2:	Understand IoT sensors and technological challenges faced by IoT devices, with a focus on Bwireless, energy, power, and sensing modules
CO3:	Market forecast for IoT devices with a focus on sensors
CO4:	Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi

SYLLABUS

UNIT-I: Introduction to Internet of Things

Definition and Characteristics of IoT, Sensors, Actuators,

Physical Design of IoT – IoT Protocols, IoT communication models, IoT Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Agriculture and Industry.

UNIT-II: IoT and M2M

Software defined networks, network function virtualization, difference between SDN and NFV for IoT, Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER

UNIT-III: IoT Physical Devices and Endpoints

Introduction to Arduino and Raspberry Pi- Installation,

Interfaces (serial, SPI, I2C), Programming – Python program with Raspberry PI with focus on interfacing external gadgets, controlling output, reading input from pins.

UNIT-IV: Controlling Hardware-

Connecting LED, Buzzer, Switching High Power devices with transistors, Controlling AC Power devices with Relays, Controlling servo motor, speed control of DC Motor, unipolar and bipolar Stepper motors

Sensors- Light sensor, temperature sensor with thermistor, voltage sensor, ADC and DAC, Temperature and Humidity Sensor DHT11, Motion Detection Sensors, Wireless Bluetooth Sensors, Level Sensors, USB Sensors, Embedded Sensors, Distance Measurement with ultrasound sensor

UNIT-V: IoT Physical Servers and Cloud Offerings–

Introduction to Cloud Storage models and

communication APIs Webserver – Web server for IoT, Cloud for IoT, Python web application framework Designing a RESTful web API

TEXT BOOKS:

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547

2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

REFERENCE BOOKS:

1. Peter Waher, 'Learning Internet of Things', Packt Publishing, 2015 3. Editors Ovidiu Vermesan

2. N. Ida, Sensors, Actuators and Their Interfaces, SciTech Publishers, 2014.

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B. TECH VII SEMESTER	**OEC**	L	T	P	C
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20EC7T15   **ANALOG AND DIGITAL IC APPLICATIONS**
(OPEN ELECTIVE –IV)

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

1   To understand the analysis & design of different types of active filters using op-amps

2   To learn the internal structure, operation and applications of different analog ICs

3   In this course, students can study Integrated circuits for all digital operational designs like adder, subtractor, multipliers, multiplexers, registers, counters, flip flops, encoders, decoders and memory elements like RAM and ROM.

4   Design and to develop the internal circuits for different digital operations and simulate them using hardware languages using integrated circuits.

5   Understand the concepts of Latches and Flip-Flops and Design of Counters using Digital ICs, modeling of sequential logic integrated circuits using VHDL

Course Outcomes:

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

CO1:   Design circuits using operational Amplifier for various applications

CO2:   Understand the concept of A/D & D/A Converters

CO3:   Analyze and design amplifiers and active filters using Op-amp.

CO4:   Understand the concepts of Combinational logic circuits in digital system

CO5:   Understand the concepts of sequential logic circuits in digital system

SYLLABUS

UNIT-I: **OPERATIONAL AMPLIFIER**

The Ideal Operational Amplifier; Operational Amplifier Internal Circuit. Op-Amp parameters & Measurement, DC Characteristics, input & output off set voltages & currents, slew rate, CMRR, PSRR, drift, AC Characteristics and Compensation Techniques.

UNIT-II: **OPERATIONAL AMPLIFIER APPLICATIONS**

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Basic Op-Amp Applications; Inverting and Non-inverting amplifier,. Integrator and differentiator, Difference amplifier, Instrumentation Amplifier; AC Amplifier; V to I and I to V Converters. Op-Amp Circuits using Diodes, Sample and Hold Circuit, Comparator, Regenerative Comparator (Schmitt Trigger).

D-A AND A-D CONVERTERS   Introduction; Series Op-Amp Regulator; Basic DAC Techniques Weighted Resistor DAC,R-2R DAC ; AD Converters, Flash ADC and Successive approximation Converter.

UNIT-III: FILTERS USING OP-AMP & 555 TIMERS

Analysis of Butterworth active filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and all pass filters.

Description of Functional Diagram of 555 Timer; Monostable Operation; Astable Operation and its Applications and PLL, Applications PLL. VCO and its applications.

UNIT-IV: Digital Design Using HDL

Design flow, program structure, VHDL requirements, Levels of Abstraction, Elements of VHDL, Concurrent and Sequential Statements, Packages, Libraries and Bindings, Objects and Classes, Subprograms, Comparison of VHDL and Verilog HDL.

UNIT-V: Combinational And sequential Logic Design

Combinational Logic Design: Adders & Sub tractors, ALU, Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, parity circuits, comparators, multipliers, Barrel Shifter, Simple Floating-Point Encoder, Dual Priority Encoder.

Sequential Logic Design: Flip-Flops, Counters, Ring Counter, Johnson Counter, Modulus N Synchronous Counters, Shift Registers, Modes of Operation of Shift Registers, Universal Shift Register. Linear feedback shift register and applications.

TEXT BOOKS:

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGrawHill,4th Edition,2005

2. Linear Integrated Circuits – D. Roy Choudhury, New Age International (p) Ltd, 2nd Edition,2003.

REFERENCES:
1. "Fundamentals of Digital logic design with VHDL". Stephen Brown & Zvonko Vranesic, Tata McGraw Hill, 2nd edition.2004

2. Designing with TTL Integrated Circuits: Robert L. / John R. Morris & Miller.

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20CS7T13 DATA ANALYTICS (OPEN ELECTIVE –IV)

Course Objectives:

1. To understand Data Analytics lifecycle and Business Challenges.

2. To understand Analytical Techniques

3. To understand various tools and technologies to handle big data

Course Outcomes:

CO1: Understand big data and data analytics life cycle.

CO2: Explore various supervised learning methods.

CO3: Explore various unsupervised learning methods.

CO4: Understand and apply ARIMA model on time series data.

CO5: Learn various technology and tools in big data analytics.

SYLLABUS

UNIT-I

Introduction to Big Data Analytics: Big Data Overview, State of the Practice in Analytics, Key Roles for the new big data Ecosystem, Examples of Big Data Analytics. Data Analytics Life Cycle: Data Analytics life cycle Overview, Discovery, Data Preparation, Model,Planning, Model Building, Communicate Results, Operationalize, Case Study.

UNIT-II

Supervised Learning: Decision Trees – Overview of Decision Trees, The General Algorithm, Decision Tree Algorithms, Evaluating a Decision Tree. Naive Bayes: Baye's Theorem, Naïve Baye's Classifier, Diagnostics of Classifiers.

Regression –Linear Regression, Logistic Regression.

UNIT-III

Unsupervised Learning: Association Rule Mining–Overview, Apriori Algorithm, Evaluation of Candidate Rules, Applications of Association Rules. Cluster Analysis – Overview of Clustering, k-means

UNIT IV

Time Series Analysis: Overview of Time Series Analysis, ARIMA Model

Text Analysis: Text Analysis Steps, Example, Collecting Raw Data, Representing Text, TFIDF, Categorizing Documents by Topics, Determining Sentiments, Gaining Insights.

UNIT-V

Technology and Tools: MapReduce and Hadoop- Analytics for Unstructured Data, The Hadoop Ecosystem In-DataBase Analytics: SQL Essentials, In-Database Text Analysis, Advanced SQL.

TEXT BOOKS:

1. David Dietrich, Barry Hiller, "Data Science and Big Data Analytics", EMC education services, Wiley publications, 2012.

REFERENCE BOOKS:

1. Bill Franks, Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with

advanced analytics, John Wiley & sons, 2012.

2. Glenn J. Myatt, Making Sense of Data, John Wiley & Sons, 2007 Pete Warden, Big Data Glossary, O"

Reilly, 2011.

3. Jiawei Han, Micheline Kamber "Data Mining Concepts and Techniques", Second Edition, Elsevier, Reprinted 2008.

B. Tech VII Semester	OEC	L	T	P	C
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20CS7T14 BLOCK CHAIN TECHNOLOGY (OPEN ELECTIVE –IV)

Course Objectives

By the end of the course, students will be able to

- Understand how major block chain systems work.
- To securely interact with them.
- Design, build, and deploy smart contracts and distributed applications.
- Integrate ideas from block chain technology into their own projects.

Course Outcomes

CO 1: Understand the design principles of Bitcoin and Ethereum.

CO 2: Understand and apply Nakamoto consensus.

CO 3: Analyze the differences between proof-of-work and proof-of-stake consensus.

CO 4: Understand cryptocurrency

CO 5: Understand cryptocurrency Regulations

SYLLABUS

Unit I: Basics:

Distributed Database, Two General Problem, Byzantine General problem and Fault Tolerance, Hadoop Distributed File System, Distributed Hash Table, ASIC resistance, Turing Complete. • Cryptography: Hash function, Digital Signature - ECDSA, Memory Hard Algorithm, Zero Knowledge Proof.

Unit II: Blockchain:

Introduction, Advantage over conventional distributed database, Blockchain Network, Mining Mechanism, Distributed Consensus, Merkle Patricia Tree, Gas Limit, Transactions and Fee, Anonymity, Reward, Chain Policy, Life of Blockchain application, Soft & Hard Fork, Private and Public blockchain.

Unit III: Distributed Consensus:

Nakamoto consensus, Proof of Work, Proof of Stake, Proof of Burn, Difficulty Level, Sybil Attack, Energy utilization and alternate.

Unit IV: Cryptocurrency: History, Distributed Ledger, Bitcoin protocols - Mining strategy and rewards, Ethereum - Construction, DAO, Smart Contract, GHOST, Vulnerability, Attacks, Sidechain, Namecoin

Unit V: Cryptocurrency Regulation:

Stakeholders, Roots of Bit coin, Legal Aspects-Crypto currency Exchange, Black Market and Global Economy.

Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.

Text Book

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller and Steven Goldfeder, Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction, Princeton University Press (July 19, 2016).

Reference Books

1. Antonopoulos, Mastering Bitcoin: Unlocking Digital Cryptocurrencies
2. Satoshi Nakamoto, Bitcoin: A Peer-to-Peer Electronic Cash System
3. DR. Gavin Wood, "ETHEREUM: A Secure Decentralized Transaction Ledger,"Yellow paper.2014.
4. Nicola Atzei, Massimo Bartoletti, and Tiziana Cimoli, A survey of attacks on Ethereum smart contracts

B. TECH VII SEMESTER	OEC	L	T	P	C
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20CS7T15   **SOFTWARE PROJECT MANAGEMENT (OPEN ELECTIVE –IV)**

Course Objectives:

At the end of the course, the student shall be able to:

- To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project

- To compare and differentiate organization structures and project structures

- To implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

Course Outcomes:

Upon the completion of the course students will be able to:-

CO1: Apply the process to be followed in the software development life-cycle models.

CO2: Apply the concepts of project management & planning.

CO3: Implement the project plans through managing people, communications and change

CO4: Conduct activities necessary to successfully complete and close the Software projects

CO5: Implement communication, modeling, and construction & deployment practices in software development.

SYLLABUS

UNIT I:

Conventional Software Management: The waterfall model, conventional software Management performance.

Evolution of Software Economics: Software Economics, pragmatic software cost estimation.

Improving Software Economics: Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT II:

The Old Way and The New: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life Cycle Phases: Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of The Process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT III:

Model Based Software Architectures: A Management perspective and technical perspective.

Work Flows of the Process: Software process workflows, Iteration workflows.

Checkpoints of the Process: Major mile stones, Minor Milestones, Periodic status assessments.

UNIT IV:

Iterative Process Planning: Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.

UNIT V:

Process Automation: Automation Building blocks, The Project Environment.

Project Control and Process Instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Project Estimation and Management: COCOMO model, Critical Path Analysis, PERT technique, Monte Carlo approach (Text book 2)

TEXT BOOKS:

1. Software Project Management, Walker Royce, Pearson Education, 2005.

2. Software Project Management, Bob Hughes, 4th edition, Mike Cotterell, TMH.

REFERENCES:

1. Software Project Management, Joel Henry, Pearson Education.

2. Software Project Management in practice, Pankaj Jalote, Pearson Education, 2005.

3. Effective Software Project Management, Robert K.Wysocki, Wiley,2006.

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20IT7T13   **CLOUD COMPUTING (OPEN ELECTIVE –IV)**

Course Objectives:

- Explain the technology and principles involved in building a cloud environment

- To implement Virtualization

- Understand various types of cloud and its services

- Contrast various programming models used in cloud computing

Course Outcomes:

CO1: Describe the principles of parallel and distributed computing and evaluation of cloud computing from existing technologies

CO2: Illustrate Virtualization for Data-Center Automation.

CO3: Explain and characterize different cloud deployment models and service models

CO4: Program data intensive parallel applications in cloud.

CO5: Understand commercial cloud computing technologies such as AWS, AZURE and AppEngine

SYLLABUS

UNIT-I: Introduction:

Cloud Computing at a Glance, The Vision of Cloud Computing,   Defining a Cloud, A Closer Look, Cloud Computing Reference Model,   Characteristics and Benefits, Challenges Ahead, Historical Developments, Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Amazon Web Services (AWS), Google AppEngine, Microsoft Azure, Hadoop, Force.com and Salesforce.com, Microsoft Aneka.

UNIT-II: Virtualization:

Virtualization, Introduction, Characteristics of Virtualized, Environments Taxonomy of   Virtualization Techniques, Execution Virtualization, Other Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples: Xen, VMware, Microsoft Hyper – V.

UNIT-III: Cloud Computing Architecture:

Cloud Reference Model, Architecture, Infrastructure / Hardware as a Service, Platform as a Service, Software as a Service, Types of Clouds, Public Clouds, Private Clouds, Hybrid Clouds, Community Clouds, Economics of the Cloud, Open Challenges, Cloud Definition Cloud Interoperability and Standards Scalability and Fault Tolerance Security, Trust, and Privacy.

UNIT-IV: Data Intensive Computing: Map-Reduce Programming:

What is Data-Intensive Computing? Characteristics, Challenges, Historical Perspective. Technologies for Data Intensive Computing: Storage Systems, Programming Platforms.

Cloud Applications: Scientific Applications, Healthcare: ECG Analysis in the Cloud, Social Networking, Media Applications, Multiplayer Online Gaming.

UNIT-V: Cloud Platform in Industry and Cloud Applications:

Cloud Platforms in Industry: Amazon Web Services, Compute Services, Storage Services, Communication Services, Additional Services, Google App Engine, Architecture and Core Concepts, Application Life-Cycle, Cost Model, Observations, Microsoft Azure, Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance.

TEXTBOOKS:

1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi Mastering Cloud Computing McGraw Hill Education.

REFERENCES:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014

2. Buyya, Rajkumar, James Broberg, and Andrzej M. Goscinski, eds. Cloud computing: Principles and paradigms. Vol. 87. John Wiley & Sons, 2010.

3. Hwang, Kai, Jack Dongarra, and Geoffrey C. Fox. Distributed and cloud computing: from parallel processing to the internet of things. Morgan Kaufmann, 2013.

B. TECH VII SEMESTER	**OEC**	**L**	**T**	**P**	**C**
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20IT7T14

BUSINESS INTELLIGENCE
(OPEN ELECTIVE –IV)

Course Objectives:

- Introduce the concepts and components of Business Intelligence (BI)
- Evaluate the technologies that make up BI (data warehousing, OLAP)
- Identify the technological architecture that makes up BI systems

Course Outcomes:

CO1: Understand concepts and components of Business Intelligence.

CO2: Explain the complete life cycle of BI development.

CO3: Illustrate technology and processes associated with Business Intelligence framework.

CO4: Demonstrate a business scenario, identify the metrics, indicators and make recommendations to achieve the business goal.

CO5: Ability to design expert system using AI tools.

SYLLABUS

UNIT-I:

Business intelligence: Effective and timely decisions, Data, information and knowledge, The role of mathematical models, Business intelligence architectures, Ethics and business intelligence

Decision support systems: Definition of system, Representation of the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system

UNIT-II:

Role of OLAP tools in the BI architecture, OLAP performance directly on operational databases, A peek into the OLAP operations on multidimensional data, Leveraging ERP data using analytics. **Getting started with business intelligence:** Using analytical information for decision support, Information sources before dawn of BI, Business intelligence (BI) defined, Evolution of BI and role of DSS, EIS, MIS and digital dashboards, Need for BI at virtually all levels, BI for past, present and future, The BI value chain, Introduction to business analytics.

UNIT-III:

BI Definitions and concepts: BI Component framework, Need of BI, BI Users, Business Intelligence applications, BI Roles and responsibilities, Best practices in BI/DW, The complete BI professional, Popular BI tools.

Basis of data integration: Need for data warehouse, Definition of data warehouse, data mart,OSS, Raiph Kimball's approach vs. W.H.Inmon's approach, Goals of a data warehouse, constituents of a data warehouse, Extract, transform, load, data Integration, Data integration technologies, Data quality, Data profiling.

UNIT-IV:

Business Intelligence Applications:

Marketing models: Relational marketing, Sales force management,

Logistic and production models: Supply chain optimization, Optimization models for logistics planning, Revenue management systems.

Data envelopment analysis: Efficiency measures, Efficient frontier, The CCR model, Identification of good operating practices

UNIT-V:

Knowledge Management: Introduction to Knowledge Management, Organizational Learning and Transformation, Knowledge Management Activities, Approaches to Knowledge Management, Information Technology (IT) In Knowledge Management, Knowledge Management Systems Implementation, Roles of People in Knowledge Management

Artificial Intelligence and Expert Systems:

Concepts and Definitions of Artificial Intelligence, Artificial Intelligence Versus Natural Intelligence, Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, Development of Expert Systems

TEXT BOOKS:

1. Fundamental of Business Intelligence" Grossmann W, Rinderle-Ma Springer, 2015
2. "Fundamentals of Business Analytics" – By R N Prasad and SeemaAcharya, Publishers: Wiley India.

REFERENCE BOOKS:

1. Larissa T Moss and Shaku Atre – Business Intelligence Roadmap : TheCompleteProject Lifecycle for Decision Support Applications, Addison WesleyInformation Technology
2. David Loshin - Business Intelligence: The Savvy Manager's Guide, Publisher: Morgan Kaufmann.

B. Tech VII Semester	OEC	L	T	P	C
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20HS7T02 **POLYMER CHEMISTRY**
(OPEN ELECTIVE –IV)

PREREQUISITES: Chemistry I and Chemistry II of AICTE syllabus

Course Outcomes

CO1: After studying this course, the learners are expected to: Relate polymer properties to their structure and conformation

CO2: Analyse different mechanisms of polymer formation and use this information in the synthesis of different polymers.

CO3: Distinguish between enthalpic and entropic contributions to polymerisation/crystallization.

CO4: Distinguish between absolute and relative methods for molecular weight determination.

CO5: Determine the flow properties of polymer melts and solutions.

CO6: Interpret experimental data and determine parameters such as polymerization ratesand copolymer composition.

CO7: Estimate the solubility of a given polymer in various solvents and blends.

CO8: Evaluate the effect of factors such as polymer structure, molecular weight, branching and diluents on crystallinity.

CO9: Assess the effect of synthetic polymers on the environment.

SYLLABUS

Unit 1. Definitions, origin, nomenclature, classification and types of macromolecules; molecular weight (MW) and its distribution; Determination of molecular weight – methods for measuring number average, weight average, viscosity average MW; gel permeation chromatography; spectroscopic techniques to determine chemical composition and molecular microstructure, thermal transitions; melting temperature and glass transition temperature. Colligative properties, osmotic pressure, light scattering, refractive index, viscosity, small angle X-ray scattering (6)

Unit 2tep-Growth Polymerization: Reactivity of functional groups; kinetics; molecular weight in open and closed system cyclization vs. linear polymerization, cross-linking and gel point; process condition; step-copolymerization, examples of step polymers (3)

Unit 3. Free radical Polymerization: Nature of chain polymerization and its comparison with step polymerization; radical vs. ionic polymerizations; structural arrangements of monomer units; kinetics of chain polymerization; molecular weight and its distribution; chaintransfer, inhibition, retardation, auto-acceleration; energetic characteristics; techniques of radical polymerization – bulk, solution, emulsion, suspension polymerization; examples of polymers made by radical chain polymerization (4)**.** Ionic Polymerization: Propagation and termination of cationic polymerization, anionic and ring opening polymerization, active polycarbanions (2)

Unit 4. Copolymerization: types of copolymers, copolymer compositions, reactivity ratio; radical and ionic co-polymerizations; Block and Graft copolymer synthesis, examples (2). Thermodynamics of polymer solutions; Flory-Huggins theory, theta conditions; solubility parameters; fractionation of macromolecules, osmotic pressure, lower criticalsolution temperature (3)

 Unit 5. Naturally occurring polymers, biodegradability, biosynthesis, polymers frombio/renewable resources (2)

Polymers for Electronics: Polymer resists for integrated circuit fabrication, lithography and photolithography, Electron beam, X-ray and ion sensitive resists, Conducting polymers, types, properties and applications, electroluminescence, molecular basis of electrical conductivity, Photonic applications and non-linear optics, optical information storage (3)

Text Books:

1. NPTEL Polymer Chemistry Course, D. Dhara, IIT Kharagpur

2. Polymer chemistry and Physics of Modern Materials, 2nd edn, J. M. G. Cowie, Stanley Thornes, UK, 1998

3. Contemporary Polymer Chemistry, 3rd edn. H. R. Allcock, F. W. Lampe and J. E.Mark, Pearson

4. Polymers: Chemistry and Physics of Modern Materials, J.M.G. Cowie, CRC Press

5. Introduction to Physical Polymer Science, L. H. Sperling, Wiley

6. Introduction to Soft matter, I. W. Hamley, John Wiley and Sons, 2007

7. Polymer Chemistry, 2nd edn, P. C. Hiemenz and T. P. Lodge, CRC Press (2007)

B. TECH VII SEMESTER	OEC	L	T	P	C
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20MB7T03 **TOTAL ENGINEERING QUALITY MANAGEMENT (OPEN ELECTIVE –IV)**

Course Objective

To understand the Engineering and Management aspects of Planning, Designing, Controlling and Improving Quality in Manufactured products.

Course Outcome

1. To understand the fundamentals of quality

2. To understand the role of TQM tools and techniques in elimination of wastages and reduction of defects

3. To develop quality as a passion and habit

4. To Facilitate the understanding of Quality Management principles and process.

5. The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

SYLLABUS

UNIT I

Quality Gurus And TQM Kitemarks: Definition, Need & Evolution of TQM – Contributions of Quality Guru's – Edward Deming – Joseph Juran – Philip Crosby – Genichi Taguchi – Walter Shewart – Criteria for Deming's Prize.

UNIT II

Product Design & Analysis : Dimensions of product and service quality, Basic Design Concepts and TQM – Design Assurance – Design Validation –Failure Mode Effect Analysis – Fault Tree Analysis – Design for Robustness – Value Analysis.

UNIT III

Process Improvement & Modern Production Management Tools

Control Charts – Process Capability, -Bench Marking, Six Sigma Approach – Total Productive Maintenance – Just-In-Time – Lean Manufacturing Paradigms.

UNIT IV

Quality Improvement Tools & Continuous Improvement

Traditional Q-7Tools, New Q-7 Tools, Quality Function Deployment (QFD), Kaizen 5S, Poka-Yoke, Failure Mode and Effects Analysis(FMEA) – Stages, Types, Taguchi Quality Loss Function(QFD) – Total Productive Maintenance (TPM).

UNIT V

Quality Management Systems ISO 9000, ISO 9001: 2008, QS 9000, ISO 14000, TS16949:2002 and EMS14001 certifications of quality systems- Elements, Documentation, Quality Auditing — Concepts, Requirements and Benefits – TQM Implementation in manufacturing and service sectors.

TEXT BOOKS

1. Total Engineering Quality Management, Sunil Sharma, 1st Edition, MacMillan India Limited.

2. Total Quality Management, Poornima M. Charantimath, 2nd Edition, Pearson Education.

3. Dale H. Besterfiled, et at., "Total quality Management", Pearson Education Asia, Third Edition, Indian Reprint 2006.

REFERENCES

1. "Quality and Performance Excellence", James R Evans, Edition, 7th Edition, Cengage Learning.

2. "Quality Management", Howard S Gitlow, Alan J Oppenheim, Rosa Oppenheim, David M Levine,3rd Edition , Tata McGraw Hill Limited.

3. "Fundamentals of Quality Control & Improvement", Amitava Mitra, 3rd Edition, Wiley Publications, 2012.

4. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8th Edition, First Indian Edition, Cengage Learning, 2012.

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B. TECH VII SEMESTER — OEC | **3** | **0** | **0** | **3** |

20MB7T04 STRESS MANAGEMENT (OPEN ELECTIVE –IV)

OBJECTIVES

This course examines different sources from where individuals experience a stress response. Through diligent individual and group study, students will be able to learn to apply stress management principles in order to achieve high levels of performance and understand the role of relationships to the management of stress and health.

Course Outcomes

1. Understand the physiological systems that are affected by stressors and the long-term effects and illnesses that can result from stressors.

2. Understand the specific applications of stress as it relates to the workplace and different target groups.

3. Create effective stress management plans for individual clients and for workplace environments. Enhancing significance of training and development, performance evaluation

SYLLABUS

UNIT I: UNDERSTANDING STRESS

Meaning – Symptoms – Work Related Stress – Individual Stress – Reducing Stress - Sources of stress –Consequence of stress-Burnout-symptoms of Burnout- Stress vs Burnout-Model of stress-strategies for coping stress (individual and organizational strategies)

UNIT II: TIME MANAGEMENT

Techniques – Importance of Planning the day –developing concentration – Prioritizing, Beginning at the start – Techniques for conquering procrastination – Sensible delegation – Taking the right breaks – Learning to say "No."

UNIT III:CAREER PLATEAU

Career plateau – Identifying Career plateaus – Structural and Content - Plateauing – Making a fresh start – Importance of Sabbaticals – Counseling out – Executive leasing – Sustaining a marketable Career.

UNIT IV:CRISIS MANAGEMENT

Implications – People issues – Structure issues – Environmental issues –Learning to keep calm - Preventing interruptions – Controlling crisis – Pushing new ideas – Empowerment – Work place Humour, Developing a sense of Humour – Learning to laugh – Role of group cohesion and team spirit.

UNIT V: SELF DEVELOPMENT

Improving personality – Leading with Integrity – Enhancing Creativity – Effective Decision Making – Sensible Communication – The Listening Game – Managing Self – Mediation for peace – Yoga for Life

TEXT BOOKS

1. Bhatia R.L., The Executive Track: An Action Plan for Self Development Wheeler Publishing, New Delhi

2. Charavathy. S.K, "Human Values for Manager", McGraw Hill/Henely Management Series

REFERENCES

1. Jeffr Davison, Managing Stress, Prentice Hall of India, New Delhi

2. Jerrold S Greenberg, Comprehensive Stress Management, Jain Books, 2009

B. TECH VII SEMESTER	OEC	L	T	P	C
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20AD7T11 NATURAL LANGUAGE PROCESSING (OPEN ELECTIVE –IV)

Pre-requisite: Nil

Course Educational Objective: The Objective of the course is to make learn the basic elements of C programming, control structures, derived data types, Modular programming, user defined structures, basics of files and its I/O operations.

Course Outcomes: At the end of this course, the student will be able to

CO1: Familiar with the basic components of NLP.

CO2: Applying N-gram models to predict a sequence of text.

CO3: Build a basic language understanding system using preliminary concepts of NLTK library.

CO4: Exposure on advanced techniques for understanding patterns in text

CO5: Understand the semantics of linguistic components in a natural dialogue

Syllabus

UNIT – I:

Introduction

Knowledge in Speech and Language Processing; Ambiguity; Models and Algorithms; Language, Thought and Understanding; History Regular Expressions Regular Expression; Words; Corpora; Text Normalization; Minimum Edit Distance

UNIT – II

N-gram Language Models

N-Grams; Evaluating Language Models, Generalization and Zeros, Smoothing: Laplace Smoothing; Add-k Smoothing; Backoff and Interpolation; Kneser-Ney Smoothing

UNIT – III

Natural language processing tools in Python (NLTK Package)

Part-I: Introduction to NLTK; Tokenizing; Filtering Stop words; Stemming; Tagging parts of speech; Lemmatizing; Chunking; Chinking

Part-II: Using Named Entity Recognition (NER); Getting Text to Analyze; Using a Concordance; Making a Dispersion Plot;

UNIT – IV

Information Extraction:

Relation Extraction Algorithms; Using Patterns to extract relations; Relation extraction via supervised learning; Semi supervised relation extraction via

bootstrapping; Distant Supervision for Relation Extraction; Evaluation of Relation Extraction; Extracting Times; Extracting Events and their Times; Template Filling

UNIT – V

Word Senses and WordNet

• Defining Word Senses; How many senses do words have?

• Relations between senses

WordNet: Sense relations in WordNet; Word Sense Disambiguation; Alternate WSD algorithms and Tasks

Text Books:

1. Daniel Jurafsky, James H. Martin ,"Speech and Language Processing" , Third Edition, PHI, 2020.

2. https://realpython.com/nltk-nlp-python/#getting-text-to-analyze

Reference Books:

1. Natural Language Processing with Python: Analysing Text with the Natural Language Toolkit, Steven Bird, Ewan Klein, 2011

2. Applied Text Analysis with Python: Enabling Language-Aware Data Products with Machine Learning, Benjamin Bengfort, Rebecca Bilbro, 2018

3. Speech and Language Processing, 2nd Edition, Daniel Jurafsky, James H. Martin, 2009

B. TECH VII SEMESTER	OEC	L	T	P	C
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20AM7T11 DEEP LEARNING
(OPEN ELECTIVE –IV)

Pre-requisite: Linear Algebra, Calculus, Python Programming

Course Objective: *This **course*** explains understanding basics of deep neural networks, CNN architectures of deep neural networks, concepts of Artificial Neural Networks, basics of Data science in Deep learning, applications of deep learning in AI and Data Science

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

CO1: Explain the basics in deep neural networks

CO2: Apply Convolution Neural Network for image processing

CO3: Explain the basics of Artificial Intelligence using deep learning

CO4: Apply deep learning algorithms for data science

CO5: Apply deep learning algorithms for variety applications

SYLLABUS

Unit-1:

DEEP NETWORKS BASICS

Linear Algebra: Scalars -- Vectors -- Matrices and tensors; Probability Distributions -- Gradient-based Optimization – Machine Learning Basics: Capacity – Over fitting and under fitting – Hyper parameters and validation sets -- Estimators -- Bias and variance -- Stochastic gradient descent -- Challenges motivating deep learning; Deep Networks: Deep feed forward networks; Regularization -- Optimization .

Unit-2:

CONVOLUTIONAL NEURAL NETWORKS

Convolution Operation -- Sparse Interactions -- Parameter Sharing -- Equivariance -- Pooling -- Convolution Variants: Strided -- Tiled -- Transposed and dilated convolutions; CNN Learning: Nonlinearity Functions -- Loss Functions -- Regularization -- Optimizers -- Gradient Computation.

Unit-3:

DEEP LEARNING ALGORITHMS FOR AI

Artificial Neural Networks – Linear Associative Networks – Perceptrons -The Back propagation Algorithm - Hopfield Nets - Boltzmann Machines - Deep RBMs - Variational Auto encoders - Deep Backprop Networks- Auto encoders

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Unit-4:

DATA SCIENCE AND DEEP LEARNING

Data science fundamentals and responsibilities of a data scientist - life cycle of data science – Data science tools - Data modeling, and featurization - How to work with data variables and data science tools - How to visualize the data - How to work with machine learning algorithms and Artificial Neural Networks

Unit-5:

APPLICATIONS OF DEEP LEARNING

Detection in chest X-ray images -object detection and classification -RGB and depth image fusion -NLP tasks - dimensionality estimation - time series forecasting - building electric power grid for controllable energy resources - guiding charities in maximizing donations and robotic control in industrial environments.

Text Books:

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, ``Deep Learning'', MIT Press, 2016

2. Stone, James. (2019). Artificial Intelligence Engines: A Tutorial Introduction to the Mathematics of Deep Learning, Sebtel Press, United States, 2019

3. Vance, William, Data Science: A Comprehensive Beginners Guide to Learn the Realms of Data Science (Hardcover - 2020), Joiningthedotstv Limited

4. Wani, M.A., Raj, B., Luo, F., Dou, D. (Eds.), Deep Learning Applications, Volume 3,Springer Publications 2022

5. Charu C. Aggarwal, ``Neural Networks and Deep Learning: A Textbook'', Springer International Publishing, 2018.

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MINOR COURSE	**MN**	**3**	**1**	**0**	**4**

20AMMN01 **INTRODUCTION TO DATA SCIENCE**
(Minor Engineering Course)

Course Objectives:
- The objective of this course is to explain the relevant parts of statistics, computer science, and machine learning that are crucial to data science.
- Data science draws on tools from the empirical sciences, statistics, reporting, analytics, visualization, business intelligence, expert systems, machine learning, databases, data warehousing, data mining, and big data.
- The goal is to present data science from a pragmatic, practice-oriented viewpoint.

Course Outcomes: At the end of this course, the student will be able to
CO1: **Understand** roles and stages of data science project.
CO2: **Loading** different data sets into R environment
CO3: **Visualize** the data using graphs.
CO4: **Learn** data preprocessing using R
CO5: **Mapping** various business problems to machine learning tasks

SYLLABUS

UNIT – I: Introduction to Data Science:
The data science process, the roles in a data science project, Stages of a data science project, setting expectations, Summary.

UNIT – II: Loading data into R:
Working with data from files, working with well-structured data from files or URLs, Using R on less-structured data, Working with relational databases, A production-size example, Loading data from a database into R, Working with the PUMS data.

UNIT – III: Exploring Data:
Using summary statistics to spot problems, Typical problems revealed by data summaries, Spotting problems using graphics and visualization, Visually checking distributions for a single variable, Visually checking relationships between two variables.

UNIT – IV: Managing data:
Cleaning data, Treating missing values (nas), Data transformations, Sampling for modeling and validation, Test and training splits, Creating a sample group column, Record grouping, Data provenance.

UNIT – V: Modeling methods:

Choosing and evaluating models, Mapping problems to machine learning tasks, Solving classification problems, Solving scoring problems, Working without known targets, Problem-to-method mapping, Evaluating models, Evaluating classification models, Evaluating scoring models, Evaluating probability models, Evaluating ranking models, Evaluating clustering models Validating models, Identifying common model problems, Quantifying model soundness, Ensuring model quality.

Text Books:

1. Practical Data Science with R by NINA ZUMEL JOHN MOUNT

Reference Books:

1. Data Science from Scratch: First Principles with Python by Joel Grus
2. Data Science for Dummies is a book by Lillian Pierson.

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20AMMN02   **INTRODUCTION TO ARTIFICIAL INTELLIGENCE**
(Minor Engineering Course)

Course Objectives:

- To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
- To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
- To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning.

Course Outcomes: At the end of this course, the student will be able to

CO1: Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.

CO2: Apply the language/framework of different AI methods for a given problem

CO3: Implement basic AI algorithms- standard search algorithms or dynamic programming.

CO4: Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports

SYLLABUS

UNIT – I: **Introduction:**

History, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

UNIT – II: **Problem solving:**

state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction.

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

B.Tech in Artificial Intelligence & Machine Learning

UNIT – III: Logic concepts:

Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

UNIT – IV: Knowledge representation:

Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames. Advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, CYC theory, case grammars, semantic web.

UNIT – V: Expert system and applications:

Introduction phases in building expert systems, expert system versus traditional systems

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory .Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

Text Books:
1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning
2. Artificial intelligence, A modern Approach , 2nded, Stuart Russel, Peter Norvig, PEA

Reference Books:
1. Artificial Intelligence- Deepak Khemani, TMH, 2013
2. Introduction to Artificial Intelligence, Patterson, PHI.
3. Atificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5th ed, PEA.

E-Resources:
1. https://nptel.ac.in
2. http://aima.cs.berkeley.edu/

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MINOR COURSE	**MN**	**3**	**1**	**0**	**4**

20AMMN03

**NOSQL DATABASES
(Minor Engineering Course)**

Course Objectives:

- Define, compare and use the four types of NoSQL Databases (Document-oriented, Key Value Pairs, Column oriented and Graph)
- Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases.
- Explain the detailed architecture, define objects, load data, query data and performance tune Document oriented NoSQL databases.
- Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data.

Course Outcomes:

CO1: Identify what type of NoSQL database to implement based on business requirements (key-value, document, full text, graph, etc.)

CO2: Apply NoSQL data modeling from application specific queries

CO3: Use Atomic Aggregates and de-normalization as data modeling techniques to optimize query processing.

SYLLABUS

UNIT – I: Introduction to NoSQL:

Definition And Introduction, Sorted Ordered Column-Oriented Stores, Key/Value Stores, Document Databases, Graph Databases, Examining Two Simple Examples, Location Preferences Store, Car Make And Model Database, Working With Language Bindings.

UNIT – II: Interacting with NoSQL:

If NoSql Then What, Language Bindings For NoSQL Data Stores, Performing Crud Operations, Creating Records, Accessing Data, Updating And Deleting Data.

UNIT – III: NoSQL Storage Architecture:

Working With Column-Oriented Databases, H base Distributed Storage Architecture, Document Store Internals, Understanding Key/Value Stores In Mem cached And Redis, Eventually Consistent Non-Relational Databases.

UNIT – IV: NoSQL Stores:

Similarities Between Sql And Mongodb Query Features, Accessing Data From Column-Oriented Databases Like H base, Querying Redis Data Stores, Changing Document Databases, Schema Evolution In Column-Oriented Databases, H base Data Import And Export, Data Evolution In Key/Value Stores.

UNIT – V: Indexing and Ordering Data Sets:

Essential Concepts Behind A Database Index, Indexing And Ordering In Mongodb, Creating and Using Indexes In Mongodb, Indexing And Ordering In Couchdb, Indexing In Apache Cassandra .

Text Books:

1. Pramod Sadalage and Martin Fowler, NoSQL Distilled, Addison-Wesley Professional, 2012.
2. Dan McCreary and Ann Kelly, Making Sense of NoSQL, Manning Publications, 2013

Reference Books:

1. Shashank Tiwari, Professional NoSQL, Wrox Press, Wiley, 2011, ISBN: 978-0-470-94224-62)Gaurav Vaish, Getting Started with NoSQL, Packt Publishing, 2013.

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MINOR COURSE	**MN**	**3**	**1**	**0**	**4**

20AMMN04

SOCIAL NETWORK ANALYSIS
(Minor Engineering Course)

Pre-requisite: Graph Theory, Computer Networks.

Course Objectives:

- The learning objective of the course Social Network Analysis is to provide students with essential knowledge of network analysis applicable to real world data with examples from today's most popular social networks

Course Outcomes: At the end of this course, the student will be able to

CO1: Develop semantic web applications

CO2: Represent social network data using the principles of Ontology

CO3: Implement community mining algorithms to extract knowledge from Social Network Applications.

CO4: Predict human behavior in social web and related communities.

CO5: Use visualization tools to represent the knowledge of social network data.

SYLLABUS

UNIT – I: Introduction:

Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web - Social Network analysis: Development of Social Network Analysis - Key concepts and measures in network analysis - Electronic sources for network Analysis: Electronic discussion networks, Blogs and online communities - Web-based networks -Applications of Social Network Analysis.

UNIT – II: Modeling, Aggregating And Knowledge Representation:

Ontology and their role in the Semantic Web: Ontology-based knowledge Representation - Ontology languages for the Semantic Web: Resource Description Framework - Web Ontology Language - Modeling and aggregating social network data: State-of-the-art in network data representation - Ontological representation of social individuals - Ontological representation of social relationships - Aggregating and reasoning with social network data – Advanced Representations.

UNIT – III: Extraction And Mining Communities In Web Social Networks:

Extracting evolution of Web Community from a Series of Web Archive - Detecting communities in social networks - Definition of community - Evaluating communities - Methods for community detection and mining - Applications of community mining algorithms - Tools for detecting communities social network infrastructures and communities - Decentralized online social networks - Multi- Relational characterization of dynamic social network communities.

UNIT – IV: Predicting Human Behavior And Privacy Issues:

Understanding and predicting human behavior for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context - Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis - Trust transitivity analysis - Combining trust and reputation - Trust derivation based on trust comparisons - Attack spectrum and countermeasures.

UNIT – V: Visualization And Applications Of Social Networks:

Graph theory - Centrality - Clustering - Node-Edge Diagrams - Matrix representation - Visualizing online social networks, Visualizing social networks with matrix-based representations - Matrix and Node-Link Diagrams - Hybrid representations - Applications - Cover networks - Community welfare - Collaboration networks - Co-Citation networks.

Text Books:

1. Peter Mika, "Social Networks and the Semantic Web", 1stEdition, Springer 2007.
2. BorkoFurht, "Handbook of Social Network Technologies and Applications", 3rd Edition, Springer, 2015

Reference Books:

1. GuandongXu ,Yanchun Zhang and Lin Li, "Web Mining and Social Networking – Techniques and applications", First Edition Springer, 2011.

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MINOR COURSE	**MN**	**3**	**1**	**0**	**4**

20AMMN05 **NATURAL LANGUAGE PROCESSING**
(Minor Engineering Course)

Pre-requisite: Machine Learning.

Course Objectives:

- Each students the leading trends and systems in natural language processing.

- Make them understand the concepts of morphology, syntax, semantics and pragmatics of the language and that they are able to give the appropriate examples that will illustrate the above mentioned concepts.

- Teach them to recognize the significance of pragmatics for natural language understanding.

- Enable students to be capable to describe the application based on natural language processing and to show the points of syntactic, semantic and pragmatic processing.

Course Outcomes: At the end of this course, the student will be able to

CO1: Understand the fundamental concepts of Natural language processing.

CO2: Apply basic evaluating language models for the probability of the test set

CO3: Apply techniques for extracting limited forms of semantic content from texts.

CO4: Analyze parsing algorithms through the use of context-free.

SYLLABUS

UNIT – I:

Regular Expressions, Text Normalization, Edit Distance, Words, Corpora, Minimum Edit Distance.

UNIT – II:

Labeling for Parts of Speech- English Word Classes, Part-of-Speech Tagging, Named Entities and Named Entity Tagging, HMM Part-of- Speech Tagging.

UNIT – III:

Formal Grammars of English- Constituency, Context-Free Grammars, Some Grammar Rules for English, Treebanks, Grammar Equivalence and Normal Form, Lexicalized Grammars.

UNIT – IV:

Representation of Sentence Meaning- Computational Desiderata for Representations, Model- Theoretic Semantics, First-Order Logic, Event and State Representations, Description Logics.

UNIT – V:

Semantic Parsing, Information Extraction- Relation Extraction, Relation Extraction Algorithms, Extracting Times, Extracting Events and their Times, Template Filling.

Text Books:

1. Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition, Daniel Jurafsky and James H Martin, Third Edition, 2020.
2. Natural Language Processing Recipes, Akshay Kulkarni, AdarshaShivananda, 2019, Apress

Reference Books:

1. Applied Text Analysis with Python, Benjamin Bengfort, Tony Ojeda, Rebecca Bilbro, 2018, O'Reilly Media.
2. Natural Language Processing: An information Access Perspective by KaviNarayana Murthy, 2006, Ess Publications.
3. Statistical Language Learning, Charniack, Eugene, 1993, MIT Press.

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MINOR COURSE	**MN**	**3**	**1**	**0**	**4**

20AMMN06 **ROBOTIC PROCESS AUTOMATION**
(Minor Engineering Course)

Pre-requisite: No perquisite for this course.

Course Objectives:

- The learning objective of the course **Robotic Process Automation Design & Development** is a software technology that makes it easy to build, deploy, and manage software robots that emulate human's actions interacting with digital systems and software.

- Just like people, software robots can do things like understand what's on a screen, complete the right keystrokes, navigate systems, identify and extract data, and perform a wide range of defined actions.

Course Outcomes: At the end of this course, the student will be able to

CO1: Describe RPA, where it can be applied and how it's implemented.

CO2: Understand the RPA and the ability to differentiate it from other types of automation.

CO3: Describe the different types of variables, Control Flow and data manipulation techniques.

CO4: Identify and understand Image, Text and Data Tables Automation.

CO5: Describe how to handle the User Events and various types of Exceptions and strategies.

SYLLABUS

UNIT – I: **RPA Foundations-1:**

What is RPA - Flavors of RPA- History of RPA- The Benefits of RPA- The downsides of RPA- RPA Compared to BPO, BPM and BPA - Consumer Willingness for Automation- The Workforce of the Future.

UNIT – II: **RPA Foundations-1:**

The Workforce of the Future- RPA Skills-On-Premise Vs. the Cloud- Web Technology- Programming Languages and Low Code- OCR-Databases- APls- Al-Cognitive Automation-Agile, Scrum, Kanban and Waterfall, Devops- Flowcharts.

UNIT – III: **RPA Platforms:**

Components of RPA- RPA Platforms-About Ui Path- - The future of automation - Record and PIay - Downloading and installing Ui Path Studio -Learning Ui Path Studio- Task recorder - Step-by step examples using the recorder.

UNIT – IV: Sequence, Flowchart, and Control Flow:

Sequencing the workflow- Activities-Control flow, various types of loops, and decision making-Step-by step example using Sequence and Flowchart-Step-by-step example using Sequence and Control flow-Data Manipulation-Variables and Scope - Collections-Arguments - Purpose and use-Data table usage with examples - Clipboard management-File operation with step-by-step example-CSV/Excel to data table and vice versa [with a step-by-step example).

UNIT – V: Taking Control of the Controls:

Finding and attaching windows- Finding the control- Techniques for waiting for a control- Act on controls - mouse and keyboard activities- Working with Ui Explorer- Handling events- Revisit recorder- Screen Scraping- When to use OCR- Types of OCR available- How to use OCR- Avoiding typical failure points.

Text Books:

1. Tom I'aulli, The Robotic Process Automation land book:A Guide to Implementing RPA Systems,2020,lSBN-13 (electronic):978-7-4842-5729-6, Publisher : A press
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