SANDIP FOUNDATION'S

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

(An autonomous institute permanently affiliated to Savitribai Phule Pune University, Pune and Accredited by NBA, NAAC 'A' Grade)

BACHELOR OF TECHNOLOGY IN INFORMATION TECHNOLOGY

PROGRAM STRUCTURE AND SYLLABI FOR I to VIII SEMESTERS FROM ACADEMIC YEAR 2023 - 24

CURRICULA FOR UG PROGRAMS

Table 1: Coverage of Subject Area over Curriculum (UG Programs)

Semester	Subject Area Coverage
I-II	Engineering Sciences (Physics & Chemistry), Engineering Mathematics,Elements of basic engineering (Mechanical, Civil & Electrical), Personality Development, Indian Knowledge System (IKS)
III-IV	Combined institute and program core courses, Open Electives, Foreign Languages (At least one), Value Added Courses, Skill Development Courses, Employability Certificate Courses
V-VI	Combined institute and program core courses, Program Electives towards specialisation, Vacational Internship (Mandatory), Value Added Courses, Skill Development Courses, Employability Certificate Courses
VII - VIII	Program core courses Program Electives, Program lined Project work,Value Added Courses

Table 2: Coding for Courses used in Curriculum

Course Code XXYYZZZE	**Definitions**
XX	Year of curriculum implementation
YY	Branch code
ZZZ	Level of program & Course no. 1: First Year (UG) 2: Second Year (UG) 3: Third Year (UG) 4: Fourth Year (UG) 5: First Year (PG) 6: Second Year (PG)
E	Suffix only for elective
VAC	Value Added Course
Branch Code (YY)	**Branch/Program**
00	Institute Level Course/Program
01	Engineering Sciences and Humanities
10	Computer Engineering
11	Electrical Engineering
12	Mechanical Engineering
13	Automation & Robotics
14	Civil Engineering
15	Information Technology
16	Master of Business Administration (M.B.A.)
17	Electronics & Telecommunication Engineering
18	Artificial Intelligence & Data Science

Table 3(a): Distribution of Credits and Marks for B.Tech Programs

	Part I: Program Courses								
	Semester								Total
	I	II	III	IV	V	VI	VII	VIII	
Credits	22	22	21	21	20	21	22	22	171
Marks	750	750	725	725	650	675	700	700	5675
Part II: Value Added Courses									
Credits	-	-	1	1	2	1	Audit	Audit	5
Marks	-	-	25	25	50	25	Audit	Audit	125
Total Marks	750	750	750	750	700	700	700	700	5800
TOTAL MINIMUM CREDITS TO EARN (Part I + II)							**171 + 5 = 176**		

Table 3(b): Distribution of Credits and Marks for Honors/Minors Programs (UG)

	Semester				Total
	V	VI	VII	VIII	
Credits	5	4	5	4	18
Marks	150	100	150	100	500

Abbreviations

CIA	Continuous Internal Assessment	**AEC**	Ability Enhancement Course
L	Theory Lecture	**BS**	Basic Science
T	Tutorial	**ES**	Engg. Science
P	Practical	**CEP**	Community Engagement Project
TC	Total Credits	**EC**	Exit Course
CP	Credits for Practical	**HSSM**	Humanities, Social Science and Management
CT	Credits for Theory	**IKS**	Indian Knowledge System
IC	Institute Core	**VSEC**	Vocational and Skill Enhancement Course
IE	Institute Elective	**MD**	Multidisciplinary Minor
OE	Open Elective	**LLC**	Liberal Learning Course
PC	Programme Core	**VEC**	Value Education Course
PE	Programme Elective	**ELC**	Experiential Learning Course
VAC	Value Added Course	a	Oral/ Presentation Examination
HM	Honors / Minor Program Course	b	Practical Examination
SDC	Skill Development Course		
EEC	Employability Enhancement Course		

Formative Assessment for Theory Course *(Scaled to allotted marks)*		
CIA	**Weightage**	**Description**
CIA 1	20%	Home Assignment
CIA 2	40%	Mid-Term Exam (MTE)
CIA 3	20%	Quizzes
CIA 4	20%	Topic Based Presentation
TOTAL	**100%**	

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

MAHIRAVANI, TRIMBAK ROAD, TAL & DIST: NASHIK-422213, MAHARASHTRA,INDIA

First Year of B. Tech Program (2023 Pattern)

Semester – I (Common)

SECTION	Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)						Examination Scheme				Total Marks
					L	T	CT	P	CP	TC	Formative Assessment CIA		Summative Assessment ESE		
											Theory	Lab	Theory	Lab	
I	1	IC (BS)	2301101	Engineering Mathematics-I	3	--	3	--	--	3	50	--	50	--	100
	2	IC (BS)	2301102 / 2301103	Engineering Physics / Engineering Chemistry	2	--	2	2	1	3	25	25	50	--	100
	3	IC (ES)	2312104	Elements of Mechanical Engineering	2	--	2	2	1	3	25	25	50	--	100
	4	IC (ES)	2311105 /2317106	Elements of Electrical Engineering/ Elements of Electronics Engineering	2	--	2	2	1	3	25	25	50	--	100
	5	IC (ES)	2314107	Elements of Civil Engineering	2	--	2	2	1	3	25	25	50	--	100
	6	IC (AEC1)	2301104	Language Communication Lab	--	--	--	2	1	1	--	25	--	25[a]	50
	7	IC (AEC2)	2301105	Social Media Content Creation Lab	--	--	--	2	1	1	--	25	--	25[b]	50
II	8	IC (VSEC)	23YYZZZ	One Group 'A' Course						2					75
	9	IC (ES)	23YYZZZ	One Group 'B' Course						1					25
	10	IC (LLC)	23YYZZZ	One Group 'C' Course						2					50
TOTAL (SECTION I+ II)					**13/12**	**00**	**13/12**	**18/20**	**9/10**	**22**	**150**	**225**	**300**	**75**	**750**

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First Year of B. Tech Program (2023 Pattern)

Semester – II

SECTION	Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)						Examination Scheme				Total Marks
					L	T	CT	P	CP	TC	Formative Assessment CIA		Summative Assessment ESE		
											Theory	Lab	Theory	Lab	
I	1	IC (BS)	2301106	Engineering Mathematics-II	3	--	3	--	--	3	50	--	50	--	100
	2	IC (BS)	2301102 / 2301103	Engineering Physics / Engineering Chemistry	2	--	2	2	1	3	25	25	50	--	100
	3	IC (BS)	2314107	Environmental Science	2	--	2	--	--	2	25	--	50	--	75
	4	IC (ES)	2312108	Engineering Graphics	1	--	1	2	1	2	--	25	50	--	75
	5	IC (ES)	2311105 / 2317106	Elements of Electrical Engineering / Elements of Electronics Engineering	2	--	2	2	1	3	25	25	50	--	100
	6	PC	23YY109	Program Specific Core	2	--	2	--	--	2	25	--	50	--	75
	7	IC (IKS)	2300110	Democracy, Election and Governance	2	--	2	--	--	2	25	--	50	--	75
II	8	IC (VSEC)	23YYZZZ	One Group ‘A’ Course						2					75
	9	IC (ES)	23YYZZZ	One Group ‘B’ Course						1					25
	10	IC (LLC)	23YYZZZ	One Group ‘C’ Course						2					50
TOTAL (SECTION I+ II)					**12/13**	**00**	**12/13**	**20/18**	**10/9**	**22**	**175**	**150**	**400**	**25**	**750**

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First Year of B. Tech Program (2023 Pattern)

Grouping of Courses

(Offered in both Semesters)

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)						Examination Scheme				Total Marks
				L	T	CT	P	CP	TC	Formative Assessment CIA		Summative Assessment ESE		
										Theory	Lab	Theory	Lab	
Group A														
8	IC (VSEC)	2315111	Problem Solving and Programming using Python	1	--	1	2	1	2	--	25	25	25[b]	75
		2312112	Engineering Draftsmanship	1	--	1	2	1	2	--	25	50		75
Group B														
9	IC (ES)	2313113	Introduction to Drone Technology	1	--	1	--		1	--	--	25	--	25
		2312114	Workshop Practice	--	--	--	2	1	1	--	25	--	--	25
Group C														
10	IC (LLC)	2300115	Physical Education and Yoga	--	--	--	4	2	2	--	50	--	--	50
		2300116	Physical Education and Sports	--	--	--	4	2	2	--	25	--	25[b]	50
TOTAL				**3**	**--**	**3**	**14**	**07**	**10**	**--**	**150**	**100**	**50**	**300**
Certificate Course Work (Only for Exit Criteria)														
11	CUG	ECYY1	Skill based Course	--	--	--	--	6*	4	--	100	--	--	100
12	CUG	ECYY2	Internship (2 Weeks)	--	--	--	--	2#	2	--	50	--	--	50
TOTAL				**-**	**--**	**6**	**--**	**--**	**10**	**--**	**150**	**--**	**--**	**150**

* 6 hrs/day for Skill based Course over three consecutive weeks

\# Internship of 2 weeks (36-40 hours of engagement per week) only after satisfactory completion of Skill Based Course work

Program Specific Core Courses (PC)

Sr. No.	Course Code	Course Name
Automation & Robotics/Mechanical/Civil Engineering		
1	2314109	Statics & Dynamics of Engineering Systems
Computer/ Information Technology/ Artificial Intelligence & Data Science		
1	2310109	Fundamentals of Computing & C programming
Electronics & Telecommunication Engineering		
1	2317109	Introduction to EDA tools
Electrical Engineering		
1	2311109	Component Materials and Testing

Skill Based Courses for UG Certificate (Exit Option)

Sr. No.	Course Code	Course Name
Automation & Robotics		
1	EC131	Robot Maneuverability
Computer Engineering		
1	EC101	Java Script
Information Technology		
1	EC151	Data Analytics using MS-Excel, POWER BI & Tableau
Artificial Intelligence & Data Science		
1	EC181	Elementary Data Analytics using MS-Excel
Electronics & Telecommunication Engineering		
1	EC171	Identification of active and passive components
Electrical Engineering		
1	EC111	Basics of Electrical Wiring System
Civil Engineering		
1	EC141	Basics of Civil Engineering for Construction
Mechanical Engineering		
1	EC121	Basic Machining operations using Lathe

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) *(2023 Pattern)*

Sem-I

2301101: Engineering Mathematics -I

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3 hrs/week	Th:03	Theory	CIA: 50
			End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Convert given complex number into polar form.
2. Understand and distinguish Mean Value Theorems, Define Taylor's and Maclaurin's series, know the indeterminate forms.
3. Define and understand functions of several variables.
4. Know the concept and properties of Jacobian.
5. Compare different forms of matrix.
6. Acquire the knowledge of Eigen values and Eigen vectors.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Solve Algebric equations using De-Moivre's theorem.

CO2: Apply Mean Value Theorems for solving examples and Taylor's and Maclaurin's series to find the expansions of functions.

CO3: Apply Euler's theorem on Homogeneous functions to find partial order derivatives .

CO4: Discuss maxima and minima of functions of two variables.

CO5: Solve examples of rank, nullity and inverse of a matrix.

CO6: Apply Cayley Hamilton theorem to find inverse of a matrix.

Unit 1:Complex Number **6 hrs**	**CO**
Complex numbers and their applications: Revision of complex numbers, Argand diagram, Polar form of complex number, Euler's theorem, De-Moiré's Theorem (without proof), Roots of algebraic equations.	CO1
Hyperbolic functions, Inverse hyperbolic functions, Separation into real and imaginary parts	
Unit 2: Differential Calculus **7 hrs**	CO2
Mean Value Theorems : Rolle's Theorem , Lagrange's Mean Value Theorem, Cauchy's Mean Value Theorems	
Expansion of Functions: Taylor's series and Maclaurin's series, Expansion of functions using standard expansions.	
Indeterminate Forms: L Hospital's Rule, Evaluation of Limits.	
Unit 3:Partial Differentiation **8 hrs**	CO3
Introduction to functions of two and three variables, Partial Derivatives, Euler's Theorem on Homogeneous functions, Partial derivative of composite function.	
Unit 4: Applications of Partial Differentiation **6 hrs**	CO4
Jacobian , Errors and Approximations	
Maxima and Minima of functions of two variables.	
Unit 5: System of Linear Equations **8 hrs**	CO5
Rank of a Matrix, System of Linear equations, Linear Dependence and Independence.	
Linear and Orthogonal Transformations.	
Unit 6: Linear Algebra **7 hrs**	CO6
Eigen values and Eigen vectors, Cayley Hamilton Theorem, Diagonalization of a matrix.	

Recommended books

1. Basic Engineering Mathematics Volume 2 – H.K.Dass , Dr. Rama Verma.
2. Wiley C. R "Advanced Engineering Mathematics" Mc Graw Hill Inc.,New York Ed.1993.
3. Higher Engineering Mathematics by B. V.Ramana (Tata McGraw Hill).
4. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.).

Reference books

1. B. S. Grewal, Higher Engineering Mathematics, 43rd edition, Khanna Publishers.
2. R. K. Jain, S. R. K. Iyengar, Advanced Engineering Mathematics, 2nd Edition, Narosa Publishing House
3. Amit Sharma, Vijay Kumar, Naveen Mani, Reeta Bhardwaj, A Text Book of Applied Mathematics I, Bharti Publication (P) Ltd., New Delhi
4. David E. Penney and C. Henry Edwards , Single variable calculus, Prentice Hall; 6th edition , 2002.

LIST OF ASSIGNMENTS (CIA-1)

1. Find the roots of Algebric equations using De- Moivre's theorem.
2. Verify Mean Value Theorms and to evaluate limits using L Hospital's rule.
3. Apply Euler's theorem on Homogeneous functions to find partial order derivatives.
4. Find approximate error and find maxima and minima of functions of two variables.
5. Solve the system of linear equations.
6. Find Eigen values and Eigen vectors.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) *(2023 Pattern)*

Sem -I/II

2301102: Engineering Physics

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory	CIA : 25
Practical: 02 hrs/week	Practical: 01		End-Sem:50
		Pract:	25
		Oral:	--
		Termwork	--

Course Objectives: To understand

1. To provide basic concepts to resolve many engineering and technological problems.
2. After completing this course student will be able to appreciate and use the methodologies to analyze and design a wide range of engineering systems.
3. To understand the recent trends and advances in technology, this requires precise control over dynamics of microscopic engineering systems.
4. Basic sciences like physics also invoke manipulation of processes over micro and even Nano scale level as there is a growing demand of solid understanding the principles of basic sciences.
5. Physics provides the basic ideas and gives the solution for developing mathematical and analytical abilities with higher precision.

Course Outcomes:

On completion of the course, learner will be able to–

CO1:- Apply the mathematical skill to resolve optical problems in the field of engineering.

CO2:- Examine the applications related with Laser and Optical Fibre, and Nanotechnology in engineering field.

CO3:- Analyze the behaviour of semiconductor & semiconducting devices regarding their conductivity.

CO4:- Apply the concepts of physics for Non Destructive Testing & examine its applications in various field

Unit I - Wave Optics **7 hrs**	**CO**
(A) Interference – Introduction to interference, Types of Interference, Interference due to thin film of uniform thickness(with derivation), applications: anti-reflection coating using interference of light, Numericals on uniform thin film. Interference due to wedge shaped film (qualitative discussion), band width derivation, Applications: Flatness of surface, Numericals on band width, wedge angle, etc.	CO1
(B) Diffraction – Definition, types of diffraction, Fraunhofer's diffraction at single slit, conditions for maxima and minima, intensity pattern, Fraunhofer diffraction from a diffraction grating, Conditions for Principal maxima, minima, Numericals on diffraction grating. Rayleigh's criterion, resolving power of grating, resolving power of telescope.	
Unit II - Laser and Optic Fibre **7hrs**	CO2
(A) Laser -Basics of laser and its mechanism, Metastable state, Population inversion, characteristics of laser, Ruby laser, Gas laser: CO2, Semiconductor laser, Applications of lasers: Holography, industrial, medical.	
(B) Optic Fiber - Introduction, parameters: Acceptance Angle, Acceptance Cone, Numerical Aperture, Types of optical fiber- step index and graded index, Attenuation and reasons for losses in optic fibers (qualitative), Communication system: basic building blocks Advantages of optical fiber communication over conventional methods. Numericals on Numerical Aperture	
Unit III – Semiconductor Physics **7 hrs**	CO3
Band theory, Classification of solid on the basis of band theory, Electrical conductivity of conductors and semiconductors, Numericals on conductivity of conductor and semiconductor. Fermi Dirac probability distribution function, Fermi energy and fermi level, position of Fermi level in intrinsic semiconductors (with derivation) & in extrinsic semiconductors, Energy band picture of p-n junction. Solar cell and its applications. Hall effect: Derivation for Hall voltage, Hall coefficient, applications of Hall effect, Numericals on Hall Effect.	
Unit IV: Non Destructive Testing and Nanotechnology **7 hrs**	CO4
(A) Non Destructive Testing – Classification of Non-destructive testing methods, Principles of physics in Non-destructive Testing, Advantages of Non-destructive testing methods, Acoustic Emission Testing, Ultrasonic (thickness measurement, flaw detection), Radiography testing	
(B) Nanotechnology - Introduction to nanotechnology - Quantum confinement and surface to volume ratio - Properties of nanoparticles: optical, electrical, mechanical, Applications of nanoparticles: Medical (targeted drug delivery), electronics, space and defense, automobile	

LIST OF PRACTICALS

Sr. No.	Title	CO
1	Experiment based on Newton's rings (determination of wavelength of monochromatic light, determine radius of curvature of plano-convex lens)	CO1
2	To find out Resolving power of Diffraction Grating/Telescope	CO1
3	Study of position of diffraction minima by studying diffraction at a single slit	CO1
4	To determine unknown wavelength by using plane diffraction grating	CO1, CO2
5	Any Experiment based on Laser (Thickness of wire, determination of number of lines on grating surface)	CO2
6	To determine band gap of given semiconductor	CO3
7	To determine Hall coefficient and charge carrier density	CO3
8	To study I-V characteristics and determine Fill factor of solar cell	CO3

REFERENCE BOOKS:

1. Fundamentals of Physics, Resnick and Halliday (John Wiley and Sons)
2. Optics, Jenkins and White (Tata Mcgraw Hill)
3. Principles of Physics, Serway and Jewett (Saunders college publishing)
4. Introduction to Solid State Physics, C. Kittel (Wiley and Sons)
5. Principles of Solid State Physics, H. V. Keer, New Age International
6. Laser and Non-Linear Optics, B. B. Laud (Oscar publication)
7. Nanotechnology: Principles and Practices, Dr. S. K. Kulkarni (Capital Publishing Company)

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) *(2023 Pattern)*

Sem-I/II

2301103: Engineering Chemistry

Teaching Scheme:	Credits	Examination Scheme	
Theory: 02 hrs/week	Th:02	Theory	CIA: 25
Practical: 02 hrs/week	Practical: 01		End-Sem:50
		Pract:	25
		Oral:	--
		Termwork	--

Course Objectives:

1. To understand technology involved in analysis and improving quality of water as commodity.
2. To gain knowledge about fossil fuels used and future fuels.
3. To familiarize the students to various electro-analytical techniques that facilitates the study of materials.
4. To develop consciousness about corrosion and its prevention.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Utilize different methods for analysis of water and techniques used for purification of water.

CO2: Analyze the fuel and suggest an appropriate alternative fuels.

CO3: Choose appropriate instrumental method for analysis of materials.

CO4: Apply the different methods of corrosion control for preventing material destruction.

Unit 1: Water Technology **7 hrs**	**CO**
Sources, conservation of water, impurities in water and their effects. WHO guideline and BIS guideline for drinking water,	CO1
Hardness of water: Types, Units and Numericals. Determination of hardness (by EDTA method using molarity concept) and alkalinity, numerical	
Boiler troubles – priming and foaming, boiler corrosion, caustic embrittlement, scale and sludge, causes and effects, methods of prevention.	
Water treatment: i) Zeolite method and numericals ii) Demineralization method, Softening of water, lime-soda, ion-exchange process and numerical	
Unit-2: Fuels & Combustion **7 hrs**	CO2
Introduction (definition, classification of fuel based on chemical reactions and characteristics of an ideal fuel), Calorific value (CV): Higher calorific value (HCV) and Lower calorific value (LCV), Solid fuel – Coal: Analysis of Coal-Proximate and Ultimate analysis, numerical, Liquid fuel: Petroleum: Refining of petroleum /crude oil and composition, boiling range and uses of various fractions Gaseous fuel: Composition, properties and applications of CNG, Hydrogen gas as a future fuel	
Unit 3: Battery Technology & Electro-analytical Techniques **6 hrs**	CO3
Battery Technology: Types of reference electrode (calomel electrode), indicator electrode (glass electrode), Basic requirements for commercial batteries. Construction, working and applications of: Zn-Ag_2O, Ni-Cd, Zn-air and Lithium ion battery.	
Conductometry: Introduction, conductivity cell, Conductometric titrations of acid versus base with titration curve.	
pH-metry: Introduction, standardization of pH meter, pH metric titration of strong acid versus strong base with titration curve.	
Unit 4: Corrosion & its prevention **8 hrs**	CO4
Types of corrosion – Dry and Wet corrosion, mechanism of dry corrosion, nature of oxide films, wet corrosion – mechanism: hydrogen evolution and oxygen absorption, galvanic cell corrosion, Factors influencing rate of corrosion. Methods of corrosion control and preventioni) Using inhibitors, ii) Cathodic protection-sacrificial anode and impressed current methods iii) Protective coatings-metal coatings-galvanizing and tinning.	

LIST OF PRACTICALS

Sr. No.	Title	CO
1	To determine hardness of water by EDTA method	CO1
2	To determine alkalinity of water	CO1
3	Proximate analysis of coal.	CO2
4	To determine strength of strong acid using pH meter	CO3
5	Titration of a mixture of weak acid and strong acid with strong base using digital conductivity meter.	CO3
6	Preparation of polystyrene/phenol-formaldehyde/urea-formaldehyde resin	CO3
7	To coat copper and zinc on iron plate using electroplating.	CO4
8	To determine maximum wavelength of absorption of $CuSO_4$, verify Beer's law and find unknown concentration of given sample.	CO4

Textbooks

1. Engineering Chemistry, Dr.S.S.Dara,Dr.S.S.Umare,S.Chand Publications.
2. Engineering Chemistry by Jain & Jain, DhanpatRai Publishing, 15thEdn.

Reference books

1. Engineering Chemistry, Wiley India Pvt. Ltd.
2. Inorganic Chemistry, 5 Edn by Shriver and Atkins, Oxford University Press.
3. Basic Concept of Analytical Chemistry, 2ed , S. M. Khopkar, New Age-International Publisher
4. Instrumental Methods of Chemical Analysis, G. R. Chatwal& S. K. Anand, Himalaya Publishing House.

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F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2312104: Elements of Mechanical Engineering

Teaching Scheme:	**Credits - 03**	**Examination Scheme**	
Theory: 02hrs/week	**Th: 02**	**Theory**	**CIA:25**
Practical: 02 hrs/week	**Practical: 01**		**End-Sem:50**
		Termwork:	**25**

Course Objectives:

1. To understand different power transmitting elements.
2. To explain the basic concept of engineering thermodynamics and its application. To identify the sources of energy and their conversions
3. To identify different power producing and absorbing devices as per applications.
4. To Classify different manufacturing processes.

Course Outcomes: On completion of the course, learner will be able to--

CO1: Illustrate and elaborate different power transmitting elements.
CO2: Interpret basic governing laws in thermal engineering. Compare different energy resources and their applications
CO3: Identify different power producing and absorbing devices as per applications.
CO4: Classify different manufacturing processes.

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F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2312104: Elements of Mechanical Engineering

Units		
Unit 1	**Elements of Power Transmission System (06 Hrs.)**	**CO**
Mechanical Elements: Function, sketch, description, use of - Shaft, axle, key, coupling(rigid flange coupling), bearing(ball bearing), clutch-single plate clutch, brake (disc brake and Drum Brake) ***Power transmission devices*** - construction, working, comparison and application of belt drive (flat and V belt), chain drive and spur gear drive arranged with simple gear train		**CO1**
Unit 2	**Introduction to Thermal Engineering (08 Hrs.)**	**CO2**
Laws of Thermodynamics, heat engine, heat pump, refrigerator *(simple numerical)* Modes of heat transfer: conduction, convection and radiation, Fourier's law, Newton's law of cooling, Stefan Boltzmann's law. *(Simple numerical),* Two stroke and Four stroke engines (Petrol, Diesel and CNG engines) ***Energy Sources & its Conversion*** Thermal energy, Hydropower energy, Nuclear energy, Solar energy, Wind energy, Hydrogen energy.		
Unit 3	**Applied Thermal Engineering (6 Hrs.)**	**CO3**
Power producing devices: Boiler (water tube and fire tube), Turbines-impulse and reaction ***Power absorbing devices***: Pumps - reciprocating and centrifugal, compressors (single acting single stage reciprocation air compressor), refrigeration-vapour compression refrigeration process, household refrigerator, window air conditioner (working with block diagram)		
Unit 4	**Basic Manufacturing Processes (06 Hrs.)**	**CO4**
Introduction to Manufacturing Processes (Casting, Forging, Sheet Metal Working), Metal Joining Processes - Welding, Soldering and Brazing, Centre Lathe Machine Operations, Drilling Operations.		
Books & Other Resources		

Reference Books:-

1. Khan, B. H., "Non-Conventional Energy Sources, Tata McGraw-Hill Publisher Co. Ltd.
2. Boyle, Godfrey, "Renewable Energy",2nd Ed., Oxford University Press
3. Khurmi, R.S. ,and Gupta, J. K.,"A Textbook of Thermal Engineering", S. Chand & Sons
4. Incropera, F. P. and Dewitt, D.P., (2007), "Fundamentals of Heat and Mass Transfer, 6th Ed., John Wiley and Sons, USA
5. Groover, Mikell P., (1996), "Fundamentals of Modern Manufacturing: Materials, Processes, and Systems", Prentice Hall, USA
6. Norton, Robert L., (2009), "Kinematics and Dynamics of Machinery", Tata McGrawHill
7. Cleghorn, W. L., (2005), "Mechanisms of Machines", Oxford University Press
8. Juvinal, R. C., (1994), "Fundamentals of Machine Component Design", John Wiley and Sons, USA
9. Ganeshan, V., (2018), "Internal Combustion Engines", McGraw Hill

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F.Y. B. Tech(Common) (2023 Pattern)

Sem-I

2312104: Elements of Mechanical Engineering

Term Work:- **The student shall complete the following activity as a term work.**		
Group -A		
Expt. No. 1	Study of Different Mechanical Elements – Clutch, Brakes and Gear Drives	**CO1**
Expt. No. 2	Demonstration of Two Stroke and Four Stroke Engine	**CO2**
Expt. No. 3	Study of Any Power Plant	**CO2**
Expt. No. 4	Study of Domestic Refrigerator and Window AC	**CO2**
Expt. No. 5	Study of Water Tube and Fire Tube Boiler	**CO3**
Expt. No. 6	Study of Basic Operation on Centre Lathe Machine	**CO4**
Group -B		
Visit	The Visit of Students to Industry /Workshop is mandatory, to provide awareness and understanding of Course	**CO1,CO4**

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) *(2023 Pattern)*

Sem-I/II

2311105: Elements of Electrical Engineering

Teaching Scheme:	Credits	Examination Scheme	
Theory: 2 hrs/week	Th:02	Theory	CIA: 25
Practical: 02 hrs/week	Termwork: 01		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	25

Course Objectives: To understand

1. To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems.
2. To impart basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
3. To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits.
4. To provide knowledge of the concepts of transformer, different energy conversions techniques.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.

CO2: Apply and analyze the resistive circuits using KVL, KCL under DC supply, series, parallel capacitor as well as characteristics parameters of alternating quantity, suggest applications of various batteries, concept of charging and discharging and depth of charge.

CO3: Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.

CO4: Relate phase and line electrical quantities in poly phase networks.

Unit 1: Electromagnetism **(7 Hrs)**	**CO**
Resistance, Effect of temperature on resistance, resistance temperature coefficient, insulation resistance. Magnetic effect of an electric current, cross and dot conventions, right hand thumb rule, Concept of mmf, flux, flux density, reluctance, permeability and field strength, their units and relationships.	CO1
Simple series magnetic circuit, Introduction to parallel magnetic circuit(Only theoretical treatment), comparison of electric and magnetic circuit,	
Faradays laws of electromagnetic induction, Fleming's right hand rule, statically and dynamically induced e.m.f, self and mutual inductance, coefficient of couplings. Energy stored in magnetic field.	
Unit 2: Electrostatics and Batteries **(7 Hrs)**	
A) Electrostatics: Electrostatic field, electric flux density, electric field strength, absolute permittivity, relative permittivity and capacitance. Capacitor, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors (no derivation) and time constant. B) Batteries :Kirchhoff's law (DC Circuit), Different types of batteries (Lead Acid and Lithium Ion), construction, working principle, applications, ratings, charging and discharging, maintenance of batteries, series -parallel connection of batteries	CO2
Unit 3: AC Fundamentals and Single Phase AC Circuit **(06 Hrs)**	
A) AC Fundamentals: Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of cycle, Period, frequency, instantaneous, peak(maximum), average and r.m.s. values, peak factor and form factor. Phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasor.	CO3
B) Study of AC circuits consisting of pure resistance, pure inductance, pure capacitance, series R-L, R-C and R-L-C circuits, phasor diagrams, voltage, current and power waveforms, resonance in series RLC circuits, concept of impedance, concept of active, reactive, apparent, complex power and power factor, Parallel AC circuits (No numerical), concept of admittance.	
Unit 4: Polyphase A.C. Circuits and Electrical Installations: **(06 Hrs)**	
A) Polyphase A.C. Circuits: Concept of three-phase supply and phase sequence. Balanced and unbalanced load, Voltages, currents and power relations in three phase balanced star-connected loads and delta-connected loads along with phasor diagrams.	CO4
B) Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, Earthing. Elementary calculations for energy consumption:	

Guidelines for Instructor's Manual

The Instructor's Manual should contain following related to every experiment –

1. Brief theory related to the experiment.
2. Apparatus with their detailed specifications.
3. Connection diagram /circuit diagram.
4. Observation table/ simulation waveforms.
5. Sample calculations for one/two reading.
6. Result table.
7. Graph and Conclusions.
8. Few questions related to the experiment.
9. Relevance of practical in real life /industry

Guidelines for Student's Lab Journal

The Student's Lab Journal should contain following related to every experiment –

1. Theory related to the experiment.
2. Apparatus with their detailed specifications.
3. Connection diagram /circuit diagram.
4. Observation table/ simulation waveforms.
5. Sample calculations for one/two reading.
6. Result table.
7. Graph and Conclusions.
8. Few short questions related to the experiment

Guidelines for Lab /TW Assessment

1. There should be continuous assessment for the TW.
2. Assessment must be based on understanding of theory, attentiveness during practical, understanding.
3. Session, how efficiently the student is able to do connections and get the results.
4. Timely submission of journal.

LIST OF PRACTICALS (min 08)

Sr. No.	Title
1	To study safety precautions while working on electrical systems, handling of various equipment's such as multimeter, ammeters, voltmeters, wattmeter's, real life resistors, inductors and capacitors
2	To demonstrate Faradays laws of Electromagnetic Induction Principle
3	To measure steady state response of series RL and RC circuits on AC supply and observations of voltage and current.
4	To Verify KVL and KCL.
5	To Study the different types of batteries, their rating and Testing.
6	To verify the relation between phase and line quantities in three phase balanced star and delta connections of load.

7	To demonstrate different types of electrical protection equipments such as fuses, MCB, MCCB, and ELCB.
8	To study pipe, plate and strip Earthing
9	To study calculation of LT electricity bill.

Textbooks

1. V.D. Toro, Principles of Electrical Engineering, Prentice Hall India, 1989
2. D. P. Kothari, I.J. Nagrath, Theory and Problems of Basic Electrical Engineering, PHI Publication
3. V.K. Mehta, Rohit Mehata Basic Electrical Engineering, S Chand Publications
4. B.L. Theraja, A text book on electrical technology Vol-I

Reference books

1. H Cotton, Electrical technology, CBS Publications
2. L. S. Bobrow, ―Fundamentals of Electrical Engineering‖, Oxford University Press, 2011.
3. E. Hughes, ―Electrical and Electronics Technology‖, Pearson, 2010.
4. D. C. Kulshreshtha, ―Basic Electrical Engineering‖, McGraw Hill, 2009.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) ***(2023 Pattern)***

Sem-I/II

2317106: Elements of Electronics Engineering

Teaching Scheme:	**Credits - 03**	**Examination Scheme**	
Theory: 02hrs/week	**Th: 02**	**Theory**	**CIA:25**
Practical: 02 hrs/week	**Practical: 01**		**End-Sem:50**
		Termwork:	**25**

Course Objectives:

1. To explain the working principle of P-N junction diode and special purpose diodes.
2. To explain the working principle of BJTand OP-AMP as an amplifier.
3. To outlinenumber systems, logic gates, digital circuits and its applications.
4. To explore the working principle of wired and wireless communication system.

Course Outcomes: On completion of the course, learner will be able to--

CO1: Select appropriate diodes as per applications.

CO2: Design a circuit using BJTand OP-AMP as an amplifier.

CO3: Develop and verify the truth table for combinational and sequential circuits.

CO4: Compareand contrast the wired and wireless communication system.

Unit 1: Diodes and Circuits **6 hrs**	**CO**
Introduction to Semiconductor: Intrinsic, Extrinsic, N-type and P-type Semiconductors, P-N Junction Diode: Construction, working principle in forward and reverse biasing, V-I Characteristics. Rectifier: Circuit diagram, modes of operation and input-output waveform of Half Wave Rectifier (HWR) and Full Wave Rectifier (FWR), Rectifier: Circuit diagram, modes of operation and input-output waveform of Bridge configuration, Comparison among HWR, FWR and Bridge configuration rectifier. Zener Diode: symbol, working principle in forward and reverse biasing with circuit diagram, V-I Characteristics and specifications. Light Emitting Diode (LED): symbol, construction, working principle in forward and reverse biasing with circuit diagram, V-I Characteristics.	CO1
Unit 2: Bipolar Junction Transistor and Operational Amplifier **8 hrs**	
Working principle of transistor and its types (NPN, PNP), Bipolar Junction Transistor (BJT): symbol, construction, operation of NPN type transistor, Types of configuration (CE, CB and CC), BJT (NPN type) Common Emitter Circuit diagram and its working, input and output V-I characteristics, Modes of operation of BJT CE configuration on output characteristics with its applications. Performance parameters of BJT: α_{dc} and β_{dc}, Relation between α_{dc} & β_{dc} and numerical on it, Applications of Amplifier: Voltage divider biased single stage BJT (NPN) CE Amplifier: Circuit diagram and function of each component used in circuit. Operational Amplifier (OP-AMP): symbol, block diagram and its working, OP-AMP performance parameters (ideal and practical for IC 741): input offset voltage, input offset current, input bias current, slew rate, Common Mode Rejection Ratio (CMRR), Applications of OP-AMP: (i) Inverting Amplifier, (ii) Non-inverting Amplifier: Circuit diagram, derivation of output voltage, input-output voltage waveform.	CO2
Unit 3: Digital Electronics **7 hrs**	
Number Systems: Binary, Octal Decimal, Hexadecimal and its Conversion, Logic Gates: Symbols, Boolean expressions, Truth Table of NOT, AND, OR, NAND, NOR, EX-OR, EX-NOR Gates, De-Morgan's Theorem and implementation using Logic Gates, Introduction to	CO3

Combinational Circuits and Sequential Circuits. Half Adder and Full Adder: Block schematic, Truth Table, K-map and implementation using Logic gates. Concept of Flip flop, Logic Symbol and Truth Table of D, T, S-R and J-K Flip Flop, Application of Flip Flops	
Unit 4: Communication System 7 **hrs**	
Typical Electronic Communication System and its Block Diagram and its Functional block diagram. Types of Communication media: Wired and Wireless, Twisted Pair, Co-axial Cable and Fiber Optic Cable: working, advantages, limitation and applications, Compare and Contrast wired and wireless communication system. Wireless Media: IEEE Electromagnetic Frequency Spectrum: enlist applications as per frequency and wavelength. Concept of Cellular System, Block diagram of basic cellular system, Global System for Mobile (GSM): Block Diagram, Elements of Architecture, Features. Evolution of Wireless Network: Introduction to 2G, 3G, 4G and 5G wireless network.	CO4

List of Practical: ***(Perform any 4 practical)***	**CO**
1. Implement the Bridge configuration rectifier circuit using 1N4007 diodes on breadboard and observe the input-output voltage waveform.	CO1
2. Build and test and simulate single stage BJT CE amplifier on breadboard and observe the output voltage waveform. Determine the value of voltage gain.	CO2
3. Build and test and simulate) the inverting and non-inverting amplifier using OP-AMP and determine the value of voltage gain. Compare the practical value with theoretical one.	CO2
4. Design, build and test Half Adder and Full Adder Circuits using logic gates on breadboard and verify its truth table.	CO3
5. Study the use cases of ***any two*** 4G / 5G Wireless Networks (viz. Healthcare, Education, Entertainment, Smart Cities, Autonomous Vehicles, Agriculture, Internet of Things etc.)	CO4
6. Perform the experiments using Virtual Lab: V-I characteristics of diode. Link: http://vlabs.iitkgp.ernet.in/be/	CO1

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a hands-on resource and reference.
The Copy of Curriculum, Conduction & Assessment guidelines, List of Experiments are to be attached.

Guidelines for Student's Lab Journal

The laboratory assignments/experiments are to be submitted by student in the form of journal.
Journal consists of Certificate, table of contents, and handwritten write-up for each experiment.
Each experiment should consist of:

1. Title.
2. Objectives.
3. Problem Statement, Outcomes
4. Hardware / Software (If any) requirements.
5. Concept.
6. Experimental procedure / Setup.
7. Observation table
8. Conclusion.

Guidelines for Lab /TW Assessment

Continuous assessment of laboratory work is done based on overall performance. Each lab assignment/ experiment assessment will assign grade / marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment / experiment assessment include:

a) Timely completion.
b) Performance.
c) Punctuality and neatness.

The parameters for assessment are to be known to the students at the beginning of the course.

Textbooks

1) Thomas. L. Floyd, "Electronics Devices", 9th Edition, Pearson (Unit I, II).
2) R.P. Jain, "Modern Digital Electronics", 4th Edition, Tata McGraw Hill (Unit III).
3) Kennedy & Davis, "Electronic Communication Systems", 4th Edition, Tata McGraw Hill (Unit IV).
4) M. Schwartz, "Mobile Wireless Communication", Cambridge University Press (Unit IV).
5) Saro Velrajan, "An Introduction to 5G Wireless Networks: Technology, Concepts and Use- cases". (Unit IV).

Reference books

1) Boylestad and Nashelsky, "Electronic Devices and Circuit Theory", 11th Edition, Pearson. (Unit I, II)
2) Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", 4th Edition, Pearson. (Unit II)
3) J. Schiller, "Mobile Communication", 2nd Edition, Pearson. (Unit IV)
4) Donald Neaman, "Electronic Circuit Analysis and Design", 3rd Edition, Tata McGraw Hill. (Unit I, II)

MOOC / NPTEL Courses:

1) NPTEL Course on "Basic Electronics" by Prof. Mahesh B. Patil, IIT Bombay
   Link: https://nptel.ac.in/courses/108101091
2) NPTEL Course on "Basic Electronics" by Dr. Pramod Agarwal, IIT Roorkee
   Link: https://nptel.ac.in/courses/117107095
3) NPTEL Course on "Basic Electronics" by Prof. Chitralekha Mahanta, IIT Guwahati
   Link: https://nptel.ac.in/courses/117103063

Virtual Lab Links:

1) Basic Electronics Virtual Lab developed by IIT Kharagpur:
   Link: http://vlabs.iitkgp.ernet.in/be/
2) Digital Electronics Virtual Lab developed by IIT Roorkee:
   Link: https://de-iitr.vlabs.ac.in/List%20of%20experiments.html
3) Digital Electronics Virtual Lab developed by IIT Guwahati:
   Link: https://www.iitg.ac.in/cseweb/vlab/Digital-System-Lab/index.php
4) Electronic Circuits Simulation using Virtual Lab developed by IIT Kharagpur:
   Link: https://be-iitkgp.vlabs.ac.in/List%20of%20experiments.html

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) ***(2023 Pattern)***

Sem-I

2314107: Elements of Civil Engineering

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2hrs/week	**Th:02**	**Theory**	**CIA: 25**
Practical: 2hrs/week	**Practical: 01**		**End-Sem:50**
		Pract:	**--**
		Oral:	**--**
		Termwork	**25**

Course Objectives: The student should be able to

1. Impart knowledge about the branches of civil engineering and utilize the knowledge of civil engineer in the construction of various infrastructures.
2. Impart knowledge of the basic materials and planning of building construction.
3. Impart knowledge to uses of maps and modern survey equipment for field surveys.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Use the knowledge of civil engineering to construct infrastructure projects for 21st century.

CO2: Use different civil Engineering materials and building planning in the construction as per the requirement, and the properties of materials.

CO3: Use modern survey methods.

CO4:Use different building planning principles and rules as per the requirement.

Unit 1: Introduction to civil engineering	**7 hrs**	**CO**
a) Introduction to structural engineering, geotechnical engineering, Construction technology, hydraulics, water resources and irrigation engineering, transportation engineering, environmental and sanitary engineering, GIS, earthquake engineering.		CO1
b) Role of Civil Engineers in the development of the nation. Role of Civil Engineer in the construction of buildings, dams, expressways, and infrastructure projects for 21st century. Importance of an interdisciplinary approach in civil engineering.		
Unit 2: Materials and construction	**7 hrs**	CO2
a) Basic materials for construction –Requirement, types, uses, properties, and importance of Civil Engineering materials like, Stone, brick, wood, glass, aluminum, cement, aggregates, concrete, steel, RCC, PSC, recycling of materials.		
b) *Substructure:* Definition and function of foundation (only concepts of settlement and bearing capacity of soils) Types of shallow foundations, deep foundations (only concept of friction and end bearing pile)		
c) *Superstructure:* Types of loads –dead load and live load, wind loads, earthquake considerations. Types of construction –Load bearing, framed, composite. Fundamental requirement of masonry.		
Unit 3: Surveying, Levelling and Mapping	**7 hrs**	CO3
a) Introduction: Definition of Surveying, Aims and applications, Fundamental principles of surveying, Classification of surveying, Plans and maps, Scales, Units of measurement.		
b) Linear Measurement: Methods, Instruments used in chain surveying, Selection of stations, Chaining, Ranging, Offsetting.		
c) Aims and applications, Definition of various terms, Instruments for leveling, Methods of leveling, Recording observations in level-book, Computing reduced levels by HI and rise & fall method, Definition of contour, Characteristics of contours of different terrains and application of contour maps, Introduction to planimeter, Introduction to Global positioning system (GPS), remote sensing (RS) and Geographical information system (GIS).		
Unit 4: Planning for built environment	**7 hrs**	
a) Definition and concept of plan of a simple residential building, Elementary principles and basic requirements for building planning, elevation, and section of a residential building.		CO4
b) Role of by-laws in regulating the environment, concept of built –up area, carpet area, plinth area, plot area, FSI.		
c) Use of various eco-friendly materials in construction, Concept of green buildings. Concept of an integrated built environment – natural and manmade.		

Term work **Any 6 practical exercises** from those given below should be carried out, record to be submitted in the field book and file which will form a part of term work.	**CO**
1. Study of any four types of maps and writing their uses.	CO3
2. Exercise on use of Dumpy level and Auto level.	CO3
3. Measurement of area of irregular figures by Digital planimeter.	CO3
4. Drawing of plan elevation and section for residential buildings, single-storeyed frames, load bearing structure. Preparing schedule of opening one half imperial sheet.	CO4
5. Determination of coordinates of a traverse using Global positioning system (GPS).	CO3
6. Measurement of distance by EDM and comparing it with the distance measure using tape.	CO3
7. Visit to a construction site for studying the various construction materials used, types of structures, type of foundation and components of superstructure submission of visit report.	CO2
8. Demonstration of use of any four civil engineering softwares.	CO1

Textbooks

1. Surveying and levelling by Kanetkar, Kulkarni- Pune Vidyarthi Prakashan
2. Build planning and build environment by Shah Kale,Patki-Tata MC Gaw Hill
3. Civil engineering materials by Dr S.V. Devdhar -Khanna Publications

Reference books

1) Basic Civil Engineering by M. S. Palanichamy Tata Mc-Graw Hill Publishing Co. Ltd.
2) Basic Civil Engineering B. Y. Shatheesh Gopi-Pearson
3) Elements of Civil Engineering and Engg Mech by R. V. Raikr– PHI Learning Pvt. Ltd.
4) Civil Engg. Drawing by S. C. Rangwala, Publication: Charotar Pub. House Anand
5) Surveying Vol. I & II by Dr. B. C. Punmia, Publication: Laxmi Publication Delhi
6) Surveying Vol. I and II, Author: S. K. Duggal, Publisher: Tata Mc-Graw hill Publication New Delhi
7) Building Construction, Author: Dr. B. C. Punmia, Publisher: Laxmi Pub. Delhi
8) Engineering Material, Author: Dr. S. C. Rangwala, Publisher: Charotar Pub. House
9) Elements of Civil Engineering Author: Dr. R. K. Jain and Dr. P. P. Lodha Publisher: McGraw Hill Education, India Pvt. Ltd.
10) Highway Engineering Author: Khanna S. K. and Justo C. E. G. Publisher: Nemchand and Brothers

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) ***(2023 Pattern)***

Sem-I

2301104 : Language Communication Lab

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 0 hrs/week	**Th:00**	**Theory**	**CIA: --**
Practical: 02 hrs/week	**Practical: 01**		**End-Sem:--**
		Pract:	--
		Oral:	**25**
		Termwork	--

Course Objectives:

1. To sensitize students to the nuances of English speech sounds, word accent, intonation and rhythm
2. To bring about a consistent accent and intelligibility in students' pronunciation of English by providing an opportunity for practice in speaking
3. To improve the fluency of students in spoken English and neutralize their mother tongue influence
4. To train students to use language appropriately for public speaking and interviews.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Better understanding of nuances of English language through audio- visual experience and group activities

CO2: Neutralization of accent for intelligibility.

CO3: Speaking skills with clarity and confidence which in turn enhances their employability skills.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) *(2023 Pattern)*

Sem-I

2301104 : Language Communication Lab

Module 1 **7 hrs**	**CO**
Computer Assisted Language Learning (CALL) Lab: *Understand:* Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening. *Practice*: Introduction to Phonetics – Speech Sounds – Vowels and Consonants. **Interactive Communication Skill Lab**: *Understand:* Communication at Work Place- Spoken vs. Written language. *Practice:* Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.	CO1
Module 2 **7 hrs**	
CALL Lab: *Understand:* Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context. *Practice:* Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context. **ICS Lab**: *Understand:* Features of Good Conversation – Non-verbal Communication. *Practice:* Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette	CO2
Module 3 **7 hrs**	
Technical skill Essential of writing – Technical paper / report writing, concise writing Administrative / Business documentation - Circular writing- meeting – agenda-minutes - Resolution	CO2
Module 4 **7 hrs**	
Getting ready for job – Before interview- Curriculum vitae / Resume -covering letter e-mail writing During Interview- Mock interview- Psychometric test- Follow up After Interview – Excelling profession – Team spirit – work culture	CO3

Textbooks

1) Thomas. L. Floyd, “Electronics Devices”, 9th Edition, Pearson (Unit I, II).
2) R.P. Jain, “Modern Digital Electronics”, 4th Edition, Tata McGraw Hill (Unit III).
3) Kennedy & Davis, “Electronic Communication Systems”, 4th Edition, Tata McGraw Hill (Unit IV).
4) M. Schwartz, “Mobile Wireless Communication”, Cambridge University Press (Unit IV).
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2) Ramakant A. Gayakwad, "Op-Amps and Linear Integrated Circuits", 4th Edition, Pearson. (Unit II)
3) J. Schiller, "Mobile Communication", 2nd Edition, Pearson. (Unit IV)
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1) NPTEL Course on "Basic Electronics" by Prof. Mahesh B. Patil, IIT Bombay
   Link: https://nptel.ac.in/courses/108101091
2) NPTEL Course on "Basic Electronics" by Dr. Pramod Agarwal, IIT Roorkee
   Link: https://nptel.ac.in/courses/117107095
3) NPTEL Course on "Basic Electronics" by Prof. Chitralekha Mahanta, IIT Guwahati
   Link: https://nptel.ac.in/courses/117103063

Virtual Lab Links:

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2) Digital Electronics Virtual Lab developed by IIT Roorkee:
   Link: https://de-iitr.vlabs.ac.in/List%20of%20experiments.html
3) Digital Electronics Virtual Lab developed by IIT Guwahati:
   Link: https://www.iitg.ac.in/cseweb/vlab/Digital-System-Lab/index.php
4) Electronic Circuits Simulation using Virtual Lab developed by IIT Kharagpur:
   Link: https://be-iitkgp.vlabs.ac.in/List%20of%20experiments.html

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) *(2023 Pattern)*

Sem-I

2301105: Social Media Content Creation Lab

Teaching Scheme:	**Credits: 01**	**Examination Scheme**	
Theory: --	**Th: 00**	**Theory**	**CIA: --**
Practical: 2 hr/week	**PR: 01**		**End-Sem: --**
		Pract:	**25**
		Oral:	**--**
		Termwork	**25**

Course Objectives: The student should be able to

1. Understanding the ethics while designing social media content
2. Understand and design the topic based social media content without violating IPR
3. Understand and learn basics of tools for digital content development

Course Outcomes:

On completion of the course, learner will be able to –

CO1: Recognize and produce ethically correct contents for social media

CO2: Write script and collect relative data for content delivery without violating IPR

CO3: Understand and use different content creation tools

CO4: Launch his/her own social media channel/blog on YouTube/Google etc

Sr. No.	**List of Practical's**	**CO**
1	Identify the local/global topic before human society and create a presentation for it.	CO1
2	Study of different FOSS tools required to create video content for social media	CO3
3	Create and setup your own social blog or YouTube Channel	CO4
4	Create a sample video using script, presentation, and Tools on some engineering topic	CO1 to CO4
5	Create a sample video using script, presentation, and Tools on some historical topic	CO1 to CO4
6	Create a sample video using script, presentation, and Tools on some Health topic	CO1 to CO4
7	Create a sample video using script, presentation, and Tools on some cooking topic	CO1 to CO4

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) *(2023 Pattern)*

Sem-II

2301106: Engineering Mathematics -II

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3 hrs/week	Th:03	Theory	CIA: 50
	Termwork: 00		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Understand Ordinary Differential Equation and its applications.
2. Apply the various applications of first order first degree differential equation and Engineering related problems..
3. Acquire the knowledge of Directional derivatives of a scalar point function.
4. Learn advanced integration techniques such as Reduction formulae, Gamma and Beta functions, differentiation under integral sign and error function.
5. Familiarize with the concept of tracing of the curve for a given equation.
6. Understand multiple integrals and their applications.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Apply different methods to solve first order first degree differential equations and Identify Integrating factors which makes the given differential equation Exact.

CO2: Solve different engineering problems using differential equations.

CO3: Find the divergence and curl of a vector point function.

CO4: Evaluate the integrals using Gamma function and Beta function.

CO5: Trace the curve for a given equation.

CO6: Evaluate multiple integrals and apply to find area bounded by curves, volume bounded by surfaces.

Unit 1:First Order Ordinary Differential Equations **6 hrs**	**CO**
Exact Differential Equations, Equations reducible to exact form.	CO1
Linear Differential Equations (LDE). Equations reducible to Linear form, Bernoulli's Equations.	
Unit 2: Applications of Differential Equations **7hrs**	CO2
Applications of Differential Equations to orthogonal Trajectories, Newton's law of cooling, Kirchhoff's law of electrical circuits, One dimensional conduction of Heat.	
Unit 3: Vector Calculus **8hrs**	CO3
Del operators, Scalar and vector fields, Gradient of a scalar point function, properties.	
Directional derivatives of a scalar point function. Divergence and curl of a vector point function and its properties.	
Unit 4: Integral Calculus **6 hrs**	CO4
Reduction formulae, Gamma and Beta functions, Differentiation under Integral sign.	
Unit 5: Curve Tracing **7 hrs**	CO5
Tracing of curves – Cartesian, Polar and Parametric Curves, Rectification of curves.	
Unit 6: Multiple Integrals and their Applications **8 hrs**	CO6
Double and Triple Integration , Change of order of Integration , Applications to find Area , Volume , Mass.	

Recommended books

1. Kreyszig. E., Advanced Engineering Mathematics, 10th edition, John Wiley andSons, Singpore 2012.
2. Dr. K. Ganesan, Dr. Sundarammal Kesavan , Professor K. S. Ganapathy Subramanian, Dr. V. Srinivasan , Matrices and Calculus , Gamma Publications , Revised edition , 2013.
3. Advanced Engineering , 7e, by Peter V. O'Neil(Thomson Learning)

Reference books

1. B. S. Grewal, Higher Engineering Mathematics, 43rd edition, Khanna Publishers.
2. Kandasamy P etal , Engineering Mathematics , Volume I (4th revised edition) , S. Chand and Co., New Delhi , 2000.
3. R. K. Jain, S. R. K. Iyengar, Advanced Engineering Mathematics, 2nd Edition, Narosa Publishing House.
4. Venkataraman M. K. , Engineering Mathematics – First Year (2nd edition) , National Publishing Co., Chennai, 2000.

LIST OF ASSIGNMENTS (CIA-1)

1. Find the solution of First Order Differential Equation.
2. Apply first order DE for finding temp, time, current. voltage.
3. Find the directional derivatives of a scalar point function.
4. Obtain the reduction formulae for standard trigonometric functions and use Gamma and Beta Functions to evaluate the integrals.
5. Trace the the curves of different forms and find the length of curves for various forms of curves.
6. Evaluate double and triple integrals.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) ***(2023 Pattern)***

Sem-II

2314107:Environmental Science

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2hrs/week	**Th:02**	**Theory**	**CIA: 25**
Practical: Nil	**Practical: Nil**		**End-Sem:50**
		Pract:	**--**
		Oral:	**--**
		Termwork	**--**

Course Objectives: The student should be able to have

1. An Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities and population explosion.
2. An understanding of the environmental impact of developmental activities.
3. An understanding of the causes, effects and control of various types of environmental pollution.
4. An Acquaintance of environmental pollution control by enactment of various environmental protection laws.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Describe the scope, importance of sustainability, Concept of population explosion and Control.

CO2: Explain the importance of Natural Resources for the sustenance of life and conservation of Natural resources.

CO3:Illustrate the adverse effects of pollution and remedial solutions.

CO4:Awareness of various environmental laws for environmental protection.

Unit 1: Multidisciplinary nature of Environmental Studies **7 hrs**	**CO**
a) Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, acid rains, ozone layer depletion, Population growth and explosion, Factors causing population change (birth,death, immigration and emigration), effects. Definition of Carrying Capacity; Malthusian view: concept of 'over-population' and shortage of resources.	CO1
b) Threats to the ecosystem: habitat destruction, genetic erosion; loss of diversity; increasing human consumption. Green Revolution, Basic principls of Green Revolution. Elements of Sustainable agriculture. Mixed farming, mixed cropping.	
Unit 2: Natural resources and associated problems **7 hrs**	
a) Forest resources: Use and over –exploitation, deforestation –Timber extraction –Mining, dams and other effects on forest and tribal people. Water resources: Use and over utilization of surface and ground water –Floods, drought, conflicts over water, dams –benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources. Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.	CO2
b) Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Land resources. Concept of carbon credits and carbon trading in regulating emmissions. Implementation of CNG Programme, Phasing out of old commercial vehicles and promotion of public transport.	
Unit 3: Environmental Pollution **7 hrs**	
Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Solid Waste Management: Sources, Classification, effects and control .Biomedical, Hazardous and e –waste management.	CO3
Unit 4: Social Issues and the Environment **7 hrs**	
a) Rain water harvesting, Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.	CO4
b) Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism.	

Textbooks

1. Environmental studies by Anubha Kaushik and C.P.Kaushik.
2. Environmental Studies by P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

Reference books

1) Text Book of Environmental Studies by Deeshita Dave & P. Udaya Bhaskar, Cengage learning.
2) Glimpses of Environment by K.V.S.G. Murali Krishna Published by Environmental Protection Society, Kakinada, A.P.

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** **F.Y. B. Tech(Common) (2023 Pattern)** Sem-II 2312108: Engineering Graphics

Teaching Scheme: **TH : 1 Hrs./Week** **PR : 2 Hrs./Week**	**Credits** **Th:01** **Practical: 01**	**Examination Scheme:** **CIA : --** **ESE : 50** **Termwork: 25**

Course Objectives:-

1. To develop the manual drawing skill, drawing interpretation skill.
2. To understand the projections of lines and planes.
3. To understand the projections of solids.

Course Outcomes:-

On completion of the course, learner will be able to

- **CO1:** draw the basic views related to projections of Lines.
- **CO2:** Able to draw the basic views related to projections of Planes.
- **CO3:** Able to draw the basic views related to projections of Solids.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) (2023 Pattern)

Sem-II

2312108: Engineering Graphics

Units		CO
Unit 1	**Projections of Lines (4 Hrs.)**	**CO1**
Projections of points, projections of lines, lines inclined to one reference plane, lines inclined to both reference planes. . (Lines in First Quadrant Only).		
Unit 2	**Projections of Planes (4 Hrs.)**	**CO2**
Projection of planes, inclination of the plane with HP and VP. (Planes in First Quadrant Only).		
Unit 3	**Projections of Solids (4 Hrs.)**	**CO3**
Introduction to Solids, Types of Solids, and Projections of Solids inclined to one and both reference planes (Prism and Pyramid – max. six side base only) (Note – Problems of Solids resting on H.P. Only)		

Books & Other Resources

Text Books:-

1. Bhatt, N. D. and Panchal, V. M., (2016), "Engineering Drawing", Charotar Publication, Anand, India
2. K. Venugopal, K, (2015), "Engineering and Graphics", New Age International, New Delhi
3. Jolhe, D. A., (2015), "Engineering Drawing with introduction to AutoCAD", Tata McGraw Hill, New Delhi
4. Rathnam, K., (2018), "A First Course in Engineering Drawing", Springer Nature Singapore Pte. Ltd., Singapore

Reference Books:-

1. Madsen, D. P. and Madsen, D. A., (2016), "Engineering Drawing and design", Delmar Publishers Inc., USA
2. Bhatt, N. D., (2018), "Machine Drawing", Charotor Publishing House, Anand, India
3. Dhawan, R. K., (2000), "A Textbook of Engineering Drawing", S. Chand, New Delhi
4. Luzadder, W. J. and Duff, J. M., (1992), "The Fundamentals of Engineering Drawing: With an Introduction to Interactive Computer Graphics for Design and Production", Peachpit Press, USA
5. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Loving, R. O., Dygon, J. T., (1990), "Principles of engineering graphics", McMillan Publishing, USA
6. Jensen, C., Helsel, J. D., Short, D. R., (2008), "Engineering Drawing and Design", McGraw-Hill International, Singapore

Term Work:- Sheet No. 1 to 3 on A2 (594X420mm) Half Imperial Size Drawing Sheet.		**CO**
Sheet No. 1	To Draw Projections of Lines (Two Problems)	CO1
Sheet No. 2	To Draw Projections of Planes (Two Problems)	CO2
Sheet No. 3	To Draw Projections of Solids (Two Problems)	CO3

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) ***(2023 Pattern)***

Sem-II

2314109:Statics & Dynamics of Engineering Systems

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2hrs/week	**Th:02**	**Theory**	**CIA: 25**
Practical: --	**Practical: --**		**End-Sem:50**
		Pract:	**--**
		Oral:	**--**
		Termwork	**--**

Course Objectives: The student should be able to

1. To impart knowledge about force systems and methods to determine resultant centroid and moment of inertia.
2. To teach methods to calculate force of friction.
3. To impart knowledge about types of supports and reactions and to determine reaction of beams.
4. To train students to solve problems related to particle mechanics using principles of kinematics, kinetics and work power energy.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Determine resultant of various force systems

CO2: Determine centroid, moment of inertia and solve problems related to friction

CO3: Draw free body diagram and Determine reactions of beams.

CO4: Calculate position, velocity and acceleration of particle using principles of kinematics

Unit 1: Resolution and Composition of Forces **7 hrs**	**CO**
Principle of statics, Force system, Resolution and composition of forces, Resultant of concurrent forces. Moment of a force, Varignon's theorem, resultant of parallel force system, Couple, Equivalent force couple system, Resultant of parallel general force system	CO1
Unit 2: Distributed Forces and Friction **7 hrs**	CO2
Moment of area, Centroid of plane lamina and wire bends, Moment of Inertia. Friction- Laws of friction, application of friction on inclined planes Wedges and ladders friction Application to flat belt	
Unit 3: Equilibrium **7 hrs**	CO3
Free body diagram Equilibrium of concurrent, parallel forces in a plane Equilibrium of general forces in a plane Equilibrium of three forces in a plane, Types of beams, simple and compound beams, Type of supports and reaction	
Unit 4: Kinematics of Particle **7 hrs**	CO4
Kinematics of linear motion- Basic concepts Equation of motion for constant acceleration Motion under gravity. Kinematics of curvilinear motion- Basic Concepts Equation of motion in Cartesian coordinates Equation of motion in path coordinates Equation of motion in polar coordinates	

Text Books

1. Vector Mechanics for Engineers, by F. P. Beer and E. R. Johnson, McGraw-Hill Publication
2. Engineering Mechanics by R. C. Hibbeler, Pearson Education
3. D. S. Kumar, "Engineering Mechanics – Statics and Dynamics", S. K. Kataria and Sons Publication

Reference Books

1. Engineering Mechanics by S. P. Timoshenko and D. H. Young, McGraw- Hill publication
2. Engineering Mechanics by J. L. Meriam and Craige, John Willey
3. Engineering Mechanics by F L Singer, Harper and Rowe publication
4. Engineering Mechanics by A. P. Boresi and R. J. Schmidt, Brooks/Cole Publication

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) ***(2023 Pattern)***

Semester - II

2310109: Fundamentals of Computing & C programming

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 02 hrs/week	**TH:02**	**Theory**	**CIA: 25**
Practical: --	**Practical:00**		**ESE: 50**
		Practical:	**--**
		Oral:	**--**
		Term work	**--**

Course Objectives: To understand

1. To learn the problem-solving techniques writing algorithm and flowchart.
2. To learn the fundamentals of computer organization, syntax and semantics for C programminglanguage.
3. To learn to write, compile and debug programs (in C language).
4. To introduce the constructs of structured programming.

Course Outcomes:

On completion of the course, learner will be able to–

CO1. To formulate simple algorithms for arithmetic and logical problems.

CO2. To translate the algorithms to programs (in C language).

CO3. To implement conditional branching, iteration and recursion.

CO4. To decompose a problem into functions and synthesize in a a complete.

Unit 1: Introduction to Programming **(07 Hrs.)**	**CO**
Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, syntax and logical errors in compilation, object and executable code.	CO1
Unit 2:Arrays Arithmetic expressions and precedence **(07 Hrs.)**	CO2
Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops. Arrays (1-D, 2-D), Character arrays and Strings. Searching, Basic Sorting Algorithms (Bubble, Insertionand Selection), Finding roots of equations, notion of order of complexity through example programs (noformal definition required).	
Unit 3: Function **(07 Hrs.)**	CO3
Functions (including using built in libraries), Parameter passing in functions, call by value,passingarraysto functions: idea of call by reference, Recursion, as a different way of solving problems. Exampleprograms, such as Finding Factorial, Fibonacci series, Ackerman function etc. Quick sort or Merge sort.	
Unit 4: Structure and Pointers **(07 Hrs.)**	CO4
Structures, Defining structures and Array of Structures, Idea of pointers, defining pointers, use of pointers in self-referential structures, notion of linked list (noimplementation), File handling	

Textbooks

1. R. G. Dromey, “How to Solve it by Computer”, 1st Edition, Prentice-Hall International,1982.
2. Brian W Kernighan, Dennis M Ritchie, “C Programming Language”, 2nd Edition, Pearson, 1988.
3. E. Balagurusamy, “Programming in ANSI C”, 8th Edition, McGraw Hill, 2019.

Reference books

1. Maureen Sprankle, “Problem Solving and Programming Concepts”, 7th Edition, Prentice Hall, 1989.
2. YashavantKanetkar, “Let Us C”, 16th edition, BPB publications,2018
3. Herbert Schildt, “C: The Complete Reference”, 4th Edition, McGraw Hill,2000

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) ***(2023 Pattern)***

Sem-II

2317109: Introduction to EDA Tools

Teaching Scheme:	Credits	Examination Scheme
Theory: 00 hrs/week	**TH: 00**	**Pract: 50** **Oral:--** **Termwork:25**
Practical: 04 hrs/week	**Practical: 02**	

Course Objectives:

1. To outline the need of Electronic Design Automation (EDA) tools.
2. To plot the frequency response of amplifiers using Multisim/e-Sim.
3. To explore the MATLAB/Scilab environment.
4. To explore various advanced EDA tools for industrial applications.

Course Outcomes: On completion of the course, learner will be able to --

CO1: Recognize the need of EDA tool.

CO2: Analyze the frequency response of amplifier developed with Multisim/e-Sim simulator.

CO3: Develop MATLAB code for basic operations.

CO4:Visualize the effectiveness of industrial application process using advanced EDA tool.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) ***(2023 Pattern)***

Sem-II

2317109: Introduction to EDA Tools

Unit 1: Basics of EDA Tools **6 hrs**	**CO**
Introduction to EDA Tools, Need of EDA Tools, Major classes of EDA tools and its applications, Essential EDA concepts: Design View, Design Data, Design Hierarchy, Design Style, Design Partitioning, Brief introduction of various simulators, Process of developing project file in EDA tools, File formats of EDA tools.	CO1
Unit 2: Electronics Design and Analysis using Multisim / e-Sim **8 hrs**	
Multisim/e-Sim Environment: Design Process, Setting environment preferences, Schematic capture of circuits, Libraries of Components, List of Instruments, Placing components, Wiring components, simulation and result display in MultiSim/e-Sim. Concept of frequency response: Single stage and Multistage BJT CE/MOSFET CS amplifier, frequency response analysis. Device modeling: Clippers and clampers using diode, voltage regulator, AC voltage measurement.	CO2
Unit 3: Introduction to MATLAB / SCILAB **6 hrs**	
MATLAB / SCILAB environment: MATLAB / SCILAB window Command window Workspace Command history Setting directory working with the MATLAB / SCILAB user interface Basic commands Assigning variables, operations with variables. Data types: int float, double, long character etc., MATLAB / SCILAB command format, BODMAS Rules, Arithmetic and logical operations, Operators and special characters.	CO3
Unit 4: EDA Tools for Industrial Applications **8 hrs**	
Proteus/TinkerCAD: Schematic Description, Input files, element values, Nodes, circuit elements, sources, output variables, format of circuit and output files, Placing graphs, probes and generators, Design Rule Check Process, Development of Program Code, Process for implementing circuits. PCB Layout design using Proteus. Introduction to Simulink, Simulink Environment & Interface, Study of Library, Circuit Oriented Design, Equation Oriented Design. Virtual Instrumentation: LabVIEW Software and Hardware, LabVIEW Application in Process, Biomedical, Electronic Instrumentation and Industrial automation.	CO4

List of Practical: ***(Perform any 10 practical)***	**CO**
1. Study of Electronic Design Automation Tool environment and getting started with various EDA tool schematic windows.	CO1
2. AC analysis of single stage and multistage BJT CE/MOSFET CS amplifier circuit and plot the frequency response using Multisim / e-sim.	CO2
3. DC analysis of NMOS and PMOS Transistor using Multisim / e-sim and obtain the operating point.	CO2
4. Perform experiment using e-Sim (Oscad): Bridge Rectifier / Clipper / Clamper Circuits Link: https://esim.fossee.in/circuit-design-simulation-marathon	CO2
5. Perform Matrix based arithmetic and logical operations using MATLAB / Scilab.	CO3

6. Write a MATLAB code to obtain the rank, eigen values and eigen vectors from given matrix.	CO3
7. Design a Data Acquisition System using Proteus / TinkerCAD.	CO4
8. Simulate the PCB artwork design of linear regulated DC power supply using Proteus.	CO4
9. Study the LabVIEW based design of Cathode Ray Oscilloscope / Digital Storage Oscilloscope / Spectrum Analyzer / Logic Analyzer etc.	CO4
10. Simulate any industrial automation process using MATLAB Simulink.	CO3
11. Perform experiment using Virtual Lab: Studies on BJT CE Amplifier Link: https://be-iitkgp.vlabs.ac.in/List%20of%20experiments.html	CO2

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a hands-on resource and reference.

The Copy of Curriculum, Conduction & Assessment guidelines, List of Experiments are to be attached.

Guidelines for Student's Lab Journal

The laboratory assignments/experiments are to be submitted by student in the form of journal. Journal consists of Certificate, table of contents, and handwritten write-up for each experiment. Each experiment should consist of:

1. Title.
2. Objectives.
3. Problem Statement, Outcomes
4. Software requirements.
5. Concept.
6. Experimental procedure / Setup.
7. Observation table
8. Conclusion.

Guidelines for Lab /TW Assessment

Continuous assessment of laboratory work is done based on overall performance. Each lab assignment/ experiment assessment will assign grade / marks based on parameters with appropriate weightage. Suggested parameters for overall assessment as well as each lab assignment / experiment assessment include:

a) Timely completion.
b) Performance.
c) Punctuality and neatness.

The parameters for assessment are to be known to the students at the beginning of the course.

Textbooks

1) Essential Electronic Design Automation (EDA), by Mark D. Birnbaum, Pearson, ISBN: 0131828290.
2) Electronic Design Automation for Integrated Circuits Handbook – 2, by Scheffer Lavagno Scheffer Martin.
3) A Guide to MATLAB: For Beginners and Experienced User by Brian R Hunt, Ronald L Lipsman, J. M. Rosenberg 3rd Edition.
4) Circuit Analysis with Multisim by David Báez-López, Félix E. Guerrero-Castro, Morgan and Claypool Publishers.

Reference books

1) Essential Circuit Analysis Using Proteus® by Farzin Asadi
2) Introduction to Scilab: For Engineers and Scientists by Sandeep Nagar, Apress.
3) MATLAB for Beginners: A Gentle Approach: Peter Kattan Revised Edition.
4) Hands-on exercise manual for LabView programming, data acquisition and analysis by Jeffrey Y. Beyon, Prentice Hall.
5) User Manual for e-Sim. Link: https://static.fossee.in/esim/manuals/eSim_Manual_2.3.pdf

MOOC / NPTEL Courses

1) NPTEL Course on "ESim - EDA tool for circuit design, simulation, analysis and PCB design" by Prof Kannan Moudgalya, IIT Bombay
   Link: https://onlinecourses.swayam2.ac.in/aic20_sp59/preview

Virtual Lab / Other Links:

1) Electronic Circuits Simulation using Virtual Lab developed by IIT Kharagpur:
   Link: https://be-iitkgp.vlabs.ac.in/List%20of%20experiments.html

Other Links:

1) http://www.linear.com/
2) http://www.expresspcb.com/
3) http:/www.spice.sourceforge.net/

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) ***(2023 Pattern)***

Sem-II

2311109: Component Materials and Testing

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2hrs/week	**Th:02**	**Theory**	**CIA: 25**
	Practical: --		**End-Sem:50**
		Pract:	**--**
		Oral:	**--**
		Termwork	**--**

Course Objectives:

1. Knowledge of Electronic, electrical components & devices is quite essential for a student of electronic engineering and electrical engineering.
2. With the knowledge of these active and passive components he will work successful in every field of the branch.
3. Therefore a student in electronics and electrical engineering must be equipped with the fundamental knowledge about electronic /electrical components, semiconductor diode, active and passive component , ICs for successful handling of industrial problems.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Identify and distinguish between passive components such as resistor, capacitor, inductor .

CO2: Identify and distinguish between active components such as diode, LED, photodideetc

CO3: Identify Different types of transducer and there application.

CO4: Make use of different types of ICs and construction of ICs.

Unit 1: Passive circuit elements **7 Hrs**	**CO**
Resistor Introduction of Passive circuit, Resistors, Resistor Types, Power rating, Value tolerance, Resistor color code and calculation of value using color coding, resistor troubles, and checking resistor with an ohmmeter.	CO1
Inductor Introduction of Inductor, Types of inductor, inductance of inductor, comparison of different cores, variable inductor	
Capacitor Introduction of Capacitors, Capacitance, and capacitor connected to a battery, Factors controlling capacitance, Types of capacitors, voltage rating of capacitors, troubles in capacitors, checking of capacitor with ohmmeter.	
Unit 2: Active circuit elements **7 Hrs**	CO2
Introduction of Diode , Diode parameters, Diode rating , Diode testing ,Diode fabrication ,Application of diode , LED, construction of LED , Applications of LED , Photodiodes, zener diode , construction of zener diode , Application of Zener diode	
Unit 3: Transducers **7 Hrs**	
Classification of transducers, Resistive position transducer, Resistive pressure transducer, Inductive pressure transducer, Capacitive pressure transducer, Linear variable differential transformer (LVDT), Piezoelectric Transducer, Strain gauge, Temperature transducer, and Photoelectric transducers.	CO3
Unit 4: Integrated Circuit **7 Hrs**	
Introduction , Advantage of Ics, Drawbacks of Ics, Scale of integration , Classification of Ics by structure ,comparison between different Ics ,Classification by function , IC terminology , Ics symbol , Fabrication of IC component Popular application of ICs , study of data sheet of ICs	CO4

Textbooks

1) A Textbook of Electrical Technology - Volume I B.L.Theraja (Basic Electrical Engineering)

2) A Textbook of Electrical Technology - Volume II B.L.Theraja (Basic Electrical Engineering)

Reference books

1) Modern Digital Electronics, R.P.jain 4th edn

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) ***(2023 Pattern)***

Sem-II

2300110: Democracy, Election & Governance

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2hrs/week	**Th:02**	**Theory**	**CIA: 25**
Practical: --	**Termwork: --**		**End-Sem:50**
		Pract:	**--**
		Oral:	**--**
		Termwork	**--**

Course Objectives:

1. To introduce the students meaning of democracy and the role of the governance.
2. To help them understand the various approaches to the study of democracy and governance
3. To give students the conceptual tools to understand how democracy as a model of governance can be complimented by institution building.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Demonstrate knowledge of the constitutional structure of democracy in India

CO2: Examine the election process in the country.

CO3: Analyze the democratic framework with the help of its standards of governance.

CO4: Show awareness of institutional practices of regulation, lobbying, etc.

Unit 1: Democracy- Foundation and Dimensions	**7 hrs**	**CO**
i) Constitution of India		CO1
ii) Different models of Democracy		
iii) Dimensions of Democracy-Social, Economic & political		
Unit-2: Elections	**7 hrs**	CO2
i) History of panchayat Raj institution in the lost independence period		
ii) 73rd and 74th Constitutional Amendment act: Institutions at the local level		
iii) Election commission of India, local body elections-urban & rural.		
Unit 3: Governance	**7 hrs**	CO3
i) Meaning and Concepts		
ii) Government and Governance		
iii) Initiatives in Good Governance		
Unit-4: Dynamics of Civil Society	**7 hrs**	CO4
i) New Social Movements and Various interests, Role of NGO's		
ii) Political significance of Media and Popular Culture		

Reference books

1. Banerjee-Dube, I. (2014). A history of modern India. Cambridge University Press.
2. Basu, D. D. (1982). Introduction to the Constitution of India. Prentice Hall of India.
3. Bhargava, R. (2008). Political theory: An introduction. Pearson Education India.
4. Bhargava, R., Vanaik, A. (2010) Understanding Contemporary India: Critical Perspective. New Delhi: Orient Blackswan.
5. Chandhoke. N., Proyadardhi.P, (ed) (2009), 'Contemporary India: Economy, Society, Politics', Pearson India Education Services Pvt. Ltd, ISBN 978-81- 317-1929-9.
6. Chandra, B. (1999). Essays on contemporary India. Har-Anand Publications.
7. Chaterjee, P. (1997). State and Politics in India.
8. Dasgupta. S., (ed) (2011), 'Political Sociology', Dorling Kindersley (India) Pvt. Ltd., Licensees of Pearson Education in south Asia. ISBN: 978-317-6027- 7.
9. Deshpande, S. (2003). Contemporary India: A Sociological View, New Delhi:Viking Publication.
10. Guha, R. (2007). India After Gandhi: The History of the World's Largest. Democracy, Harper Collins Publishers, New York.

E-Resources: http://eci.nic.in/

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) ***(2023 Pattern)***

Semester – I/II

2315111: Problem Solving and Programming using Python

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 01 hrs/week	**TH:01**	**Theory**	**CIA : - -**
Practical: 02 hrs/week	**Practical:01**		**End-Sem: 25**
		Pract:	**25**
		Oral:	**--**
		Termwork	**25**

Course Objectives: To understand

1. To understand problem solving, problem solving aspects, programming and to know about Various program design tools.
2. To learn problem solving with computers
3. To learn basics, features and future of Python programming.
4. To acquaint with data types, input output statements, decision making, looping and functions in Python
5. To learn features of Object Oriented Programming using Python
6. To acquaint with the use and benefits of files handling in Python

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Inculcate and apply various skills in problem solving.

CO2: Choose most appropriate programming constructs and features to solve the problems in diversified domains.

CO3: Exhibit the programming skills for the problems those require the writing of well-Documented programs including use of the logical constructs of language, Python.

CO4: Demonstrate significant experience with the Python program development environment.

Unit I: Programming Methodology **(04 Hrs)**	**CO**
Problem definition, Types of Problem, Step involving in Problem Solving, Algorithms, Flowcharts and Pseudo-codes, implementation of Algorithms, Basics of Python Programming: Features of Python, History and Future of Python, Literal constants, variables and identifiers, Data Types, Input operation, Comments, Reserved words, Indentation, Operators and expressions, Expressions in Python.	CO1
Unit II: Decision Control Statements **(04 Hrs)**	CO2
Decision control statements, Selection/conditional branching Statements: if, if-else, nested if, if-elif-else statements, Basic loop Structures/Iterative statements: while loop, for loop, selecting appropriate loop, Nested loops, break, continue, pass, else statement used with loops, Other data types: Tuples, Lists and Dictionary.	
Unit III: Functions and Modules **(06 Hrs)**	CO3
Need for functions, Function: definition, call, variable scope and lifetime, the return statement, Defining functions, Lambda or anonymous function, documentation string, good programming practices, Introduction to modules, Introduction to packages in Python, Introduction to standard library modules.	

LIST OF PRACTICALS

Sr. No.	Title	CO
1	Write a python program to simulate simple calculator that performs basic tasks such as addition, subtraction, multiplication and division.	**CO2**
2	Write a python program to swap value of two variables.	**CO2**
3	To accept an object mass in kilograms and velocity in meters per second and display its momentum. Momentum is calculated as e=mCO2 where m is the mass of the object and c is its velocity.	**CO2**
4	To accept N numbers from user. Compute and display maximum in list, minimum in list, sum and average of numbers.	**CO2**
5	To accept N numbers from user. Compute and display maximum in list, minimum in list, sum and average of numbers.	**CO2**
6	To accept from user the number of Fibonacci numbers to be generated and print the Fibonacci series.	**CO3**
7	To accept two numbers from user and compute smallest divisor and Greatest Common Divisor of these two numbers.	**CO3**
8	Write a python program to create student name database using list and perform operations like add, delete, search student name in the list.	**CO3**

Textbooks

1. R. G. Dromey, "How to Solve it by Computer", 1st Edition, Prentice-Hall International,1982.
2. Reema Thareja, "Python Programming Using Problem Solving Approach", Oxford University Press, ISBN 13: 978-0-19-948017-6.
3. R. Nageswara Rao, "Core Python Programming", Dreamtech Press; Second edition ISBN-10: 938605230X, ISBN-13: 978-9386052308 ASIN: B07BFSR3LL

Reference books

1. Maureen Spankle, "Problem Solving andbProgramming Concepts", Pearson; 9th edition, ISBN-10: 9780132492645, ISBN-13: 978- 0132492645
2. Jeeva Jose, P. Sojan Lal, "Introduction to Computing & Problem Solving with Python", Khanna Computer Book Store; First edition, ISBN-10: 9789382609810, ISBN-13: 978-9382609810.
3. R. G. Dromey, "How to Solve it by Computer", Pearson Education India; 1st edition, ISBN-10: 8131705625, ISBN-13: 978-8131705629
4. Paul Barry, "Head First Python- A Brain Friendly Guide", SPD O'Reilly, 2nd Edition, ISBN:978-93-5213-482-3.
5. Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education, ISBN-10: 9789387572942, ISBN-13: 978-9387572942, ASIN: 9387572943.
6. Romano Fabrizio, "Learning Python", Packt Publishing Limited, ISBN: 9781783551712, 1783551712.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) ***(2023 Pattern)***

Sem-I/II

2312112: Engineering Draftsmanship

Teaching Scheme:	**Credits**	**Examination Scheme:**
TH : 1 Hr./Week	**TH:01**	**CIA:--**
PR : 2 Hrs./Week	**Practical: 01**	**End-Sem:50**
		TW : 25

Course Objectives:-

1. To acquire basic knowledge about engineering drawing language, line types, dimension methods, and simple geometrical construction. To acquire basic knowledge about the various CAD drafting software's and its basic commands required to construct the simple engineering objects.
2. To acquire basic knowledge about physical realization of engineering objects and shall be able to draw its different views
3. To visualize three dimensional engineering objects and shall be able to draw their isometric views.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Draw the fundamental engineering objects using basic rules and able to construct the simple geometries. Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools.

CO2: Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.

CO3: Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.

Units		
Unit 1	**Fundamentals of Engineering Drawing (02 Hrs.)**	**CO**
Content- Fundamentals of Engineering Drawing, Need of Engg. Drawing and Design, Different layouts of Sheets, Types of Lines and Dimensioning, Geometrical Constructions- Simple only. **Introduction to CAD** Content –What is CAD, Introduction to AutoCAD, Different Commands and Their Function, Use of AutoCAD to Draw simple drawings and dimensioning.		**CO1**
Unit 2	**Orthographic Projections (6 Hrs.)**	**CO2**
Content – Principle of Projections, Introduction to First and Third Angle Method of Projections, Orthographic Projections of Machine Element/Parts, Sectional Orthographic Projection.		
Unit 3	**Isometric Projections (6 Hrs.)**	**CO3**
Content – Introduction to Isometric Projections and Isometric View, Isometric Projections from Given Orthographic View.		

Books & Other Resources

Text Books:-

1. Bhatt, N. D. and Panchal, V. M., (2016), "Engineering Drawing", Charotar Publication, Anand, India
2. K. Venugopal, K, (2015), "Engineering and Graphics", New Age International, New Delhi
3. Jolhe, D. A., (2015), "Engineering Drawing with introduction to AutoCAD", Tata McGraw Hill, New Delhi
4. Rathnam, K., (2018), "A First Course in Engineering Drawing", Springer Nature Singapore Pte. Ltd., Singapore

Reference Books:-

1. Madsen, D. P. and Madsen, D. A., (2016), "Engineering Drawing and design", Delmar Publishers Inc., USA
2. Bhatt, N. D., (2018), "Machine Drawing", Charotor Publishing House, Anand, India
3. Dhawan, R. K., (2000), "A Textbook of Engineering Drawing", S. Chand, New Delhi
4. Luzadder, W. J. and Duff, J. M., (1992), "The Fundamentals of Engineering Drawing: With an Introduction to Interactive Computer Graphics for Design and Production", Peachpit Press, USA
5. Giesecke, F. E., Mitchell, A., Spencer, H. C., Hill, I. L., Loving, R. O., Dygon, J. T., (1990), "Principles of engineering graphics", McMillan Publishing, USA
6. Jensen, C., Helsel, J. D., Short, D. R., (2008), "Engineering Drawing and Design", McGraw-Hill International, Singapore

Term Work:- Sheet No. 1 to 3 on A2 (594X420mm) Half Imperial Size Drawing Sheet		**CO**
Sheet No. 1	Types of Lines, Letter and Dimensioning	**CO1**
Sheet No. 2	To draw One Principal and One Sectional view of any Machine Element.	**CO2**
Sheet No. 3	To draw Isometric view of Machine Element (Two Problems)	**CO3**

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) ***(2023 Pattern)***

Sem-I/II

2313113: Introduction to Drone Technology

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 1 hrs/week	**Th:01**	**Theory**	**CIA: --**
Practical: --	**Practical: --**		**End-Sem:25**
		Pract:	**--**
		Oral:	**--**
		Termwork	**--**

Course Objectives: The student should be able to

1. Identify and describe common components of drone
2. Understand and design the application specific drone.
3. Understand and explain basics of aerodynamics

Course Outcomes:
On completion of the course, learner will be able to

CO1: Recognize and describe the role of drone in present, past and future society

CO2: Comprehend basic components of drone.

CO3: Explain the impact of various payloads of drone.

CO4: Interpret the aspects of legal issues

CO5: Implement and design application oriented drone.

Unit 1: Introduction to Drone and its legal aspects **7Hrs**	**CO**
Types of Drones and Their Technical Characteristics, Main Existing Drone Types, Level of Autonomy, Size and Weight, Differences in Energy Source, Widely Used Drone models, Legal issues on the use of frequency spectrum and electronic equipment, surveillance and compliance. Flight zones	CO1 to CO4
Unit 2: PayLoad Calculation and drone assembling **7Hrs**	CO1 to CO5
Types of Payloads and their application sensors, other payloads and frequency spectrum issues. Parts of a Drone, Motor, Propellers, Flight Controllers, Electronic Speed Controllers, Safe Assembly of Drone and Drone air Flight for aerial Photos. Battery management systems	

Text Books:

1. The future of Drone Use Opportunities and Threats from Ethical & Legal Perspectives
2. DIY Drones for the Evil Genius: Design, Build, and Customize Your Own Drones
3. Build a Drone: A Step-by-Step Guide to Designing, Constructing, and Flying Your Very Own Drone Barry Davies
4. Drones: An Illustrated Guide to the Unmanned Aircraft that are Filling our Skies

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) *(2023 Pattern)*

Semester – I/II

2312114: Workshop practice

Teaching Scheme:	Credits	Examination Scheme	
Theory: 00 hrs/week	TH:00	Theory	CIA: - -
Practical: 02 hrs/week	Practical: 01		End - Sem: - -
		Practical :	--
		Oral:	--
		Term work	25

Course Objectives: To understand

1. To understand industrial safety norms and working of machine tools and functions of its parts.

2. To develop the skill through hands-on practices using hand tools, power tools, machine tools in manufacturing and assembly shop leading to understanding of a production processes.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Familiar with safety norms to prevent any mishap in workshop.

CO2: handle appropriate hand tool, cutting tool and machine tools to manufacture a job.

CO3: understand the construction, working and functions of machine tools and their parts.

CO4: know simple operations (Turning and Facing) on a center lathe.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) *(2023 Pattern)*

Semester – I/II

2312114: Workshop practice

LIST OF PRACTICALS

Guidelines for Laboratory Conduction

A. Any 6 from 1st to 7th Experiments

B. Any 2 from 8th to 11th Experiments

Sr. no	Title of Experiment	CO
1	Study of Safety on the Manufacturing shop and Industrial safety norms.	CO1
2	Lathe Machine- Demonstration and Working Principle: Introduction, Working Principle, Main Parts of lathe machine and machine accessories, Operations of Lathe Machine, Specification Functions of lathe Machine (At least one turning job is to be demonstrated).	CO2, CO3,CO4
3	Drilling Machine- Demonstration and Working Principle: Definition, Types, Parts, Working Principle, Operations on Vertical drilling machine/Radial drilling machine, Drilling tool, Tool holding devices, Concept of speed, feed and depth of cut.	CO2, CO3
4	Milling machine- Demonstration and Working Principle: What is milling machine, Milling machine Parts, Operation, Working Principle, Construction, Table movements, Indexing and Multipoint cutter and Gear Cutting Operation.	CO2, CO3
5	Grinding/ Shaper machine- Demonstration (Any one) : Grinder: Surface grinding machines, Tool and cutter grinding machines. Shaper: Shaping Machine Working Principle, Mechanism used in Shaper machine.	CO2, CO3
6	Injection Moulding Machine- Demonstration and Working Principle: Basics of Injection Moulding Process, machine parts and its function	CO2, CO3
7	CNC Turning Machine- Demonstration: Basics of CNC manufacturing and CNC programming.	CO2, CO3
8	One job using different welding operations : Study and demonstration of metal joining processes using Arc Welding, Gas Welding and Spot Welding machines.(Any one)	CO2
9	One job using different sheet Metal operations: Sheet metal working and Brazing Use of sheet metal, working hand tools, cutting, punching, blanking, bending, spot welding	CO2
10	Fitting Shop- One job involving following operations: marking, filing to size, centre punching, drilling, tapping, one simple male- female joint.	CO2
11	Carpentry Shop- One carpentry job involving wood turning .Use and setting of hand tools like hacksaws, jack planes, chisels and gauges for construction of various joints, wood turning and modern wood turning methods.	CO2

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) *(2023 Pattern)*

Semester – I/II

2300115: Physical Education and Yoga

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	**Th:00**	**Theory**	**CIA: --**
Practical: 4 hrs/week	**Practical: 02**		**End-Sem:--**
		Pract:	**--**
		Oral:	**--**
		Termwork	**50**

Course Aim and Objectives: **56 hrs**

Introduction to Physical Education and Yoga

· · **Introduction to Yoga -** History of Yoga**,** Introduction to Ashtanga Yoga.

· **Mobility exercises – Neck up & down, Side to side, shoulder rotation, Twisting, Squats.**

· **Practice of Prone and Supine Asanas**

A student will have to perform standing and seating asanas, Pavanmuktasana, Shavasana, Setubandhasana, · Ardha Halasana, Salabhasana, Bhujangasana, Halasana, Makarasana, Dhanurasana

The following points to be covered:

- Benefits &Contraindication of each asana

Practice of Sitting and Standing Asanas:-

A student will have to perform sitting and standing asana

Vajrasana, Dandasan, Vakrasana, Ushtrasana, Uttanmandukasana, Bhadrasan, Vrikshasana, Shashankasan, Trikonasana, Padahastasana, Chakrasana - sideward, Tadasana

The following points to be covered:

- Benefits & Contraindication of each asana

Course Outcomes: The outcomes of the course are to create awareness among students about Yoga, and to facilitate knowledge about Asanas, This will help them to incorporate yogic practices in their lifestyle.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Common) *(2023 Pattern)*

Semester – I/II

2300116: Physical Education and Sports

Teaching Scheme:	Credits	Examination Scheme	
Theory: --	**Th:00**	**Theory**	**CIA: --**
Practical: 4 hrs/week	**Practical: 02**		**End-Sem:--**
		Pract:	**25**
		Oral:	**--**
		Termwork	**25**

Course Aim and Objectives:

1. The aim of the scheme is to make Physical Education as an integral part of Educational System. Students studying in the colleges should have the benefit of Physical Education to improve their health during the course of college education. It is designed to ensure that on completion of this training they would attain the minimum prescribed standard.
2. The object of the scheme is to enhance physical efficiency and maintain fitness of mind, body and character, which would help the student to be mentally alert and physically efficient to withstand the strain and fatigue of daily life. It would prepare them for the strenuous training which will help them to be fit to face the different barriers in life. The students will undergo this scheme for the first year of his/her under graduate Course education.

Course Outcomes:

To enhance physical efficiency and maintain fitness of mind, body and character, which would help the student to be mentally alert and physically Efficient to withstand the strain and fatigue of daily life.

Participation in the scheme: 56 hrs

Compulsory Activities: Under this category, a student shall have to choose total three activities, at least one from each part of group B (Running, Jumping, Endurance and Strength) during the sem, and have to participate in them throughout the sem. Whatever may be choices according to the availability, students shall have to show sufficient skill and have to achieve minimum prescribed target at the end of the SEM.

The Scheme: Choices for Compulsory Activities and tests for its evaluation: (Opt any three activities, out of which one from each selected parts i.e. Part A/B/C/D/)

List of Activities and tests:-

PART	EVENT	STUDENT	TESTS FOR EVALUATION
Part A	100 m. Run	(Male and Female)	50 yard dash (150 feet)
	400 m. Run	(Male and Female)	
Part B	High Jump or Pole Vault	(Male and Female)	Standing Vertical Jump
	Long Jump	(Male and Female)	
	Triple Jump	(Male and Female)	
Part C	12.5 Km. Cross Country	(Male)	Cooper's Test (12 minutes run and walk test)
	5 Km. Cross Country	(Female)	
	1500 m. Run	(Male)	
Part D	Rope Climbing	(Male)	Medicine Ball put for male and Sit Ups test for female
	Chin Ups/Flex Arm hang	(Male and Female)	
	Sit Ups	(Male and Female)	
	Push Ups and Modified push ups	(Male and Female)	

1. Optional Activities:

The Scheme: Optional Activities (Opt any Two, out of which one from individual event and one from team event)

A student shall have to participate in two types of physical activities viz.

Group (A) - Optional Activities (Opt any Two, out of which one from individual event and one from team event)

Name of Individual Event	**Individual Events Test for Evaluation**
Gymnastics	Flex arm Hang Test for Girls Vertical Reach Test for Boys
Judo	Pushups and 12 Minutes run and walk test
Malkhamb/Rope Malkhamb	Flex arm Hang Test for Girls Vertical Reach Test for Boys
Table Tennis	Eye-hand Coordination Test
Tennis	Dyer's Tennis Test
Weight Lifting and Power Lifting	Sit ups, Pushups, Standing Vertical Jump
Wrestling	Pushups and 12 Minutes run and walk test
	Sit and Reach Test
Name of Team Event	**Team Events Test for Evaluation**
Basketball	Johnson's Basketball Test
Football	Mc Donald's Soccer Skill Test
Hockey	SAI Hockey Skill test
Kabaddi	6X10 M. Shuttle Run Test
Kho –Kho	6X10 M. Shuttle Run Test
Volleyball	SAI Volleyball Skill test

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

F.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-II:Data Analytics using MS-Excel, POWER BI & Tableau (EC151)

Certificate Course Work (Only for Exit Criteria)

Teaching Scheme:	**Credits** : 4	**Examination Scheme**	
Theory:	**Pr:4**	**Theory**	**CIA:**
Practical: 6 hrs/day for 3 weeks	**Exit Course**		**End-Sem:**
6 hrs/day for Skill based Course over three consecutive weeks		**Pract:**	--
		Oral:	--
		Termwork	--100

Course Objectives: The student should be able to

1. collect, classify, clean, and analyze the data using Excel, Power BI, and tableau
2. comprehend basic and advanced level skills for data anlytics using Excel, PowerBi, and Tableau
3. Use Excel, Tableau, PowerBI for data analysis proficiently

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and understand types of data, can collect, classify, clean, and analyze it for further processing

CO2: apply various data analytics techniques on various types of data as per industry demand

CO3: use Excel, PowerBI and Tableau at proficient level

CO4: implement interactive dashboards and applications for DataAnalytics in Excel, PowerBI, and Tableau

Module 1: MS Excel Introduction **15Hrs**	**CO**
What is a Spreadsheet? Excel Rows and Columns, Enter Text and numbers in a cell, How to edit text in a cell, How to centre text and numbers, Font Formatting excel, How to change the color of a cell, How to save your work in excel, Currency symbols in excel, How to Merge cells, How to use Auto fill in excel, Adding Simple Addition formula, The Sum Function in excel, Copy and Paste, How to use Paste Special, How to Multiply in excel, How to add a comment to a cell, How to Sort data in excel, Create an excel chart, Move and Resize your chart, Charts Styles and Layouts, Chart Titles and Series Titles, Chart Layout Panel in Excel, The Format chart Panel, Create Pie chart in Excel, Add Lables to a Pie Chart, Format Pie chart segments, Create a 2D line Chart in Excel, Format your Axis titles, Predict the future with a Trendline chart, Sparkline charts	CO3
Module 2 Excel Functions and Data Processing **15Hrs**	CO1 to CO4
The SUM Function, How to multiply in excel, Subtract and Divide, Combine the Arithmetic Operators, A Budget Spread Sheet, The Average Function, The Date Function, Time Functions in Excel, A Time table Project, Financial Projects, The Student Averages Project, The IF Function, Conditional Formatting in excel, CountIF, Count IFS, SUMIF, SUMIFS, Flash Fill, Data Tables in Excel, A Second Data Table, Excel Scenarios, Goal Seek, Absolute Cell References, Named Ranges in Excel, Create a Custom Name in Excel, More on Named Ranges, Excel Pivot Tables, Reference other Worksheets, The LOOKUP Function, The VLOOKUP Function in Excel, Searching with MATCH and INDEX, Create a Business Invoice,How to Create an Excel Template, Data Forms in Excel, Drop Down Lists in Excel, Add your own Error Messages, Array Formulas Intermediate Excel, Frequency Distribution Intermediate Excel, Hyperlinks in Excel, Object Linking and	

Embedding, Insert Drawing Objects	
Module 3 PowerBI Introduction 15Hrs	CO1 to CO4
SQL server Introduction: Data, Databases and RDBMS Software, Database Types: OLTP, DWH, OLAP, Microsoft SQL Server Advantages, Versions and Editions of SQL Server, SQL: Purpose, Real-time Usage Options, SQL versus Microsoft T-SQL [MSSQL], Microsoft SQL Server Components and Usage, Database Engine Component and OLTP, BI Components, Data Science Components, ETL, MSBI and Power BI Components, Power BI Job Roles in Real-time: Data Analyst , Business Analyst, Power BI Developer, Power BI for Data Scientists, Comparing MSBI and Power BI, Comparing Tableau and Power BI, MCSA 70-778, MCSA 70-779 Exam,Types of Reports in Real-World, Interactive & Paginated Reports, Analytical & Mobile Reports, Data Sources Types in Power BI, Power BI Licensing Plans – Types, Power BI Training : Lab Plan, Power BI Dev & Prod Environments, Understanding the Power BI Tools, Installing Power BI & Connecting to Data, Working with the query Editor, Working with the data model and creating a visualization	
Module 4 PowerBI Reports 15Hrs	CO1 to CO4
Power BI Desktop Installation, Data Sources & Visual Types, Canvas, Visualizations and Fields, Get Data and Memory Tables, In-Memory xvelocity Database, Table and Tree Map Visuals, Format Button and Data Labels, Legend, Category and Grid, PBIX and PBIT File Formats, Visual Interaction, Data Points, Disabling Visual Interactions, Edit Interactions - Format Options, SPOTLIGHT & FOCUSMODE, CSV and PDF Exports. Tooltips, Power BI EcoSystem, Architecture, Slicer Visual : Real-time Usage, Orientation, Selection Properties, Single & Multi Select, CTRL Options, Slicer : Number, Text and Date Data, Slicer List and Slicer Dropdowns, Visual Sync Limitations with Slicer, Disabling Slicers,Clear Selections, Grouping : Real-time Use, Examples	
Module 5 Tableau Introduction 15Hrs	CO1 to CO4
Tableau web, tableau desktop, tableau server, Connecting to Excel Files, Connecting to Text Files, Connect to Microsoft SQL Server, Connecting to Microsoft Analysis Services, Creating and Removing Hierarchies, Bins, Joining Tables, Data Blending. Reports: Parameters, Grouping Example 1, Grouping Example 2, Edit Groups, Set, Combined Sets, Creating a First Report, Data Labels, Create Folders, Sorting Data, Add Totals, Sub Totals and Grand Totals to Report	
Module 6 Tablaeu Charts 15Hrs	CO1 to CO4
Area Chart, Bar Chart, Box Plot, Bubble Chart, Bump Chart, Bullet Graph, Circle Views, Dual Combination Chart, Dual Lines Chart, Funnel Chart, Traditional Funnel Charts, Gantt Chart, Grouped Bar or Side by Side Bars Chart, Heatmap, Highlight Table, Histogram, Cumulative Histogram, Line Chart, Lollipop Chart, Pareto Chart, Pie Chart, Scatter Plot, Stacked Bar Chart, Text Label, Tree Map, Word Cloud, Waterfall Chart, Geographic map, Filled map, Crosstab, Combines axis, Motion chart, Reference lines	

CURRICULUM STRUCTURE

FOR

FOUR YEARS B.Tech

PROGRAM IN

INFORMATION TECHNOLOGY

(Sem –III To Sem – VIII)

WITH PROVISIONS

OF

EXIT OPTION PROGRAMS

AND

HONORS/MINORS PROGRAMS

IN

Advance E-commerce Application Development

Abbreviations

CIA	Continuous Internal Assessment	**AEC**	Ability Enhancement Course
L	Theory Lecture	**BS**	Basic Science
T	Tutorial	**ES**	Engg. Science
P	Practical	**CEP**	Community Engagement Project
TC	Total Credits	**EC**	Exit Course
CP	Credits for Practical	**HSSM**	Humanities, Social Science and Management
CT	Credits for Theory	**IKS**	Indian Knowledge System
IC	Institute Core	**VSEC**	Vocational and Skill Enhancement Course
IE	Institute Elective	**MD**	Multidisciplinary Minor
OE	Open Elective	**LLC**	Liberal Learning Course
PC	Programme Core	**VEC**	Value Education Course
PE	Programme Elective	a	Oral/ Presentation Examination
VAC	Value Added Course	b	Practical Examination
HM	Honors / Minor Program Course		
SDC	Skill Development Course		
EEC	Employability Enhancement Course		

Formative Assessment for Theory Course *(Scaled to allotted marks)*		
CIA	**Weightage**	**Description**
CIA 1	20%	Home Assignment
CIA 2	40%	Mid-Term Exam (MTE)
CIA 3	20%	Quizzes / Research Based Activity
CIA 4	20%	Topic Based Presentation
TOTAL	**100%**	

B. Tech Information Technology

Semester – III

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
				L	T	P	C	Formative Assessment CIA		Summative Assessment ESE		
								Theory	Lab	Theory	Lab	
1	PC	2315201	Discrete Mathematics and Logic	3	--	--	3	50	--	50	--	100
2	PC	2315202	Object Oriented Programming	3	--	--	3	50	--	50	--	100
3	PC	2315203	Data Structures	2	--	--	2	25	--	50	--	75
4	PC	2315204	Object Oriented Programming Lab	--	--	2	1	--	--	--	25[a]	25
5	PC	2315205	Data Structure Lab	--	--	2	1	--	--	--	50[b]	50
6	OE	2315206	Open Elective-I	3	--	--	3	50	--	50	--	100
7	IC (HSSM)	2300201	Principles of Managements	2	--	--	2	25	--	50	--	75
8	IC (VEC)	2300202	Industrial Psychology	2	--	--	2	25	--	50	--	75
9	IC (MD)	2300203	Multidisciplinary –Design Thinking	1	--	2	2	25	25	--	25[a]	75
10	IC (CEP)	2300204	Community Engagement Project	--	--	4	2	--	25		25[a]	50
11	SDC	2315701	PC Repairing Course	--	--	2	--	--	--	--	--	--
12	EEC	2315801	Software Testing Certification Course	--	--	--	--	--	--	--	--	--
TOTAL				**16**	**00**	**12**	**21**	**225**	**75**	**300**	**125**	**725**
Open Elective I												
7	OE	2315206A	E-commerce Application Design	3	--	--	3	50	--	50	--	100
7	OE	2315206B	Computer Graphics & Animation	3	--	--	3	50	--	50	--	100
Value Added Course												
13	VAC	VAC151	Advanced Python Programming	-	--	2	1	--	25	--	--	25

B. Tech Information Technology

Semester – IV

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
				L	T	P	C	Formative Assessment CIA		Summative Assessment ESE		
								Theory	Lab	Theory	Lab	
1	PC	2315207	Software Engineering and Project Management	3	--	--	3	50	--	50	--	100
2	PC	2315208	Advanced Database Management	3	--	--	3	50	--	50	--	100
3	PC	2315209	Microprocessor & Interfacing	2	--	--	2	25	--	50	--	75
4	PC (MD)	2315210	Wireless Sensor Network	2	--	--	2	25	--	50	--	75
5	PC	2315211	Software Engineering and Project management Lab	--	--	2	1	--	--	--	25[a]	25
6	PC	2315212	Advanced Database Management Lab	--	--	2	1	--	--	--	25[b]	25
7	OE	2315213	Open Elective-II	2			2	25	--	50	--	75
8	IE (VEC)	2300205	First Level Course in Foreign Language	2	--	--	2	25	--	50	--	75
9	IC (HSSM)	2300206	Industrial Economics	2	--	--	2	25	--	50	--	75
10	SDC (VSEC)	2315702	Motherboard Repairing Course	--	--	2	1	--	25	--	--	25
11	EEC	2315802	System Analyst Certification Course	--	---	--	--	---	--	--	--	--
12	IC (AEC)	2300207	Industrial Work Study	2	--	--	2	25	--	50	--	75
TOTAL				**17**	**00**	**08**	**21**	**250**	**25**	**400**	**50**	**725**
First Level Course in Foreign Language (Any One)												
8	IE (VEC)	2300205A	German Language	2	--	--	2	25	--	50	--	75
8	IE (VEC)	2300205B	French Language	2	--	--	2	25	--	50	--	75
Open Elective II												
7	OE	2315213A	Web Design using HTML & CSS	2	--	--	2	25	--	50	--	75
7	OE	2315213B	Intellectual Property Rights & Laws	2	--	--	2	25	--	50	--	75
Value Added Course												
13	VAC (VSEC)	VAC152	Block Chain & Crypto System	--	--	2	1	--	25	--	--	25
Course Work (for Exit Criterion to UG Diploma)												
Minor Project				--	--	--	2	--	50	--	--	50
Internship (2 Weeks)				--	--	--	2	--	50	--	--	50

B. Tech Information Technology

Semester – V

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
				L	T	P	C	Formative Assessment CIA		Summative Assessment ESE		
								Theory	Lab	Theory	Lab	
1	PC	2315301	Interactive Web Application Development	3	--	--	3	50	--	50	--	100
2	PC	2315302	Data Science and Big Data Analytics	3	--	--	3	50	--	50	--	100
3	PC	2315303	Computer Network	2	--	--	2	25	--	50	--	75
4	PC	2315304	Data Scienceand Big Data Analytics Lab	--	--	4	2	25	-	--	25[a]	50
5	PC	2315305	Internet & Web Programming Lab	--	--	2	1	--	--	--	50[b]	50
7	PE	2315307	Program Elective-I	4	--	--	4	50	--	50	--	100
8	OE	2315308	Open Elective III	3	--	--	3	50	--	50	--	100
9	SDC (MD)	2315703	Network & Troubleshooting course	--	--	2	1	--	25	--	--	25
10	EEC (MD)	2315803	Advanced Excel Course	--	--	2	1	--	--	--	50[b]	50
TOTAL				**15**	**00**	**10**	**20**	**250**	**25**	**250**	**125**	**650**
Open Elective III												
8	OE	2315308A	Data Mining	3	--	--	3	50	--	50	--	100
8	OE	2315308B	Foundation of Data Analytics	3	--	--	3	50	--	50	--	100
Value Added Course												
11	VAC (MD)	VAC153	Human Computer Interaction	1	--	2	2	--	50	--	--	50
Honors / Minor Courses (Advance E-commerce Application Development)												
1	HM	2315391	Advance Web Designing and Deployment	4	--	--	4	50	--	50	--	100
2	HM	2315392	Advance Web Designing and Deployment lab	--	--	2	1	--	25	--	25[a]	50

Program Elective I:

1. Web Technology (2315307A)
2. AI & Robotics (2315307B)

B. Tech Information Technology

Semester – VI

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
				L	T	P	C	Formative Assessment CIA		Summative Assessment ESE		
								Theory	Lab	Theory	Lab	
1	PC	2315309	Design and Analysis of Algorithm	3	--	--	3	50	--	50	--	100
2	PC	2315310	Introduction to Machine Learning	2	--	--	2	25	--	50	--	75
3	PC	2315311	System Programming	2	--	--	2	25	--	50	--	75
4	PC	2315312	System Programming Lab	--	--	2	1	--	--	--	50[b]	50
5	PC	2315313	Design and Analysis of Algorithm Lab	--	--	2	1	--	--	--	25[a]	25
6	PC	2315314	Machine Learning Lab	--	--	2	1	--	--	--	50[b]	50
7	PE	2315315	Program Elective-II	4	--	--	4	50	--	50	--	100
8	PE	2315316	Program Elective-III	4	--	--	4	50	--	50	--	100
9	IE (MD)	2301301	Computer Oriented Numerical Methods	2	--	--	2	25	--	50	--	75
10	SDC (VSEC)	2315704	Printer Repairing Course	--	--	2	1	--	25	--	--	25
11	EEC	2315804	Advanced Web Designing Course	--	--	--	--	--	--	--	--	--
TOTAL				**17**	**00**	**08**	**21**	**225**	**25**	**300**	**125**	**675**
Value Added Course												
12	VAC (VSEC)	VAC154	Machine Learning Lab	--	--	2	1	--	--	--	25[a]	25
Honors/Minor Courses (Advance E-commerce Application Development)												
1	HM	2315393	Android Application Development	4	--	--	4	50	--	50	--	100
Course Work (for Exit Criterion to UG Diploma) (B. Voc)												
Internship (4 weeks)				--	--	--	2	--	50	--	--	50

Program Elective II:

1. Business Analytics and Intelligence (2315315A)
2. Neural Network (2315315B)

Program Elective III:

1. Mobile Computing (2315316A)
2. Ubiquitous Computing (2315316B)

B. Tech Information Technology

Semester – VII

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
				L	T	P	C	Formative Assessment CIA		Summative Assessment ESE		
								Theory	Lab	Theory	Lab	
1	PC	2315401	Object Oriented Analysis and Design	2	--	--	2	25	--	50	--	75
2	PC	2315402	Information and Cyber Security	2	--	--	2	25	--	50	--	75
3	PC	2315403	Information and Cyber Security Lab	--	--	2	1	--	--	--	25[a]	25
4	PC	2315404	Object Oriented Analysis and Design Lab	--	--	2	1	--	25	--	25[b]	50
5	PE	2315405	Program Elective-IV	2	--	--	2	25	--	50	--	75
6	PC (MD)	2315406	Artificial Intelligence	2	--	--	2	25	--	50	--	75
7	IC (ELC)	2300401	Industry Internship	--	--	--	8	--	100	--	50[a]	150
8	IC (ELC)	2300402	Project Stage – I	--	--	8	4	--	100	--	75[a]	175
9	SDC	2315705	Raspberry pie Repairing Course	--	--	2	--	--	--	--	--	--
10	EEC	2315805	LaTeX Course	--	--	--	--	--	--	--	--	--
TOTAL				**08**	**00**	**12**	**22**	**100**	**225**	**200**	**175**	**700**
Value Added Course												
1	VAC	VAC155	Introduction to Industry 4.0/ 5.0	--	--	2	--	--	--	--	--	--
Honors/Minor Courses (Advance E-commerce Application Development)												
1	HM	2315491	Understanding payment gateways and E-Commerce Law	3	--	--	3	--	--	100	--	100
2	HM	2315492	Understanding payment gateways and E-Commerce Law Lab	--	--	4	2	--	25	--	25[a]	50

Program Elective IV:

1. Generative Adversarial Networks (2315405A)
2. Internet of Things (2315405B)

B. Tech Information Technology

Semester – VIII

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs./Week)				Examination Scheme				Total Marks
				L	T	P	C	Formative Assessment CIA		Summative Assessment ESE		
								Theory	Lab	Theory	Lab	
1	PC	2315407	Advance Computer Architecture	3	--	--	3	50	--	50	--	100
2	PC	2315408	Multimedia Systems	3	--	--	3	50	--	50	--	100
3	PE	2315409	Program Elective V	3	--	--	3	50	--	50	--	100
4	PE	2315410	Program Elective VI	3	--	--	3	50	--	50	--	100
5	IC (ELC)	2300403	Research Methodology	4	--	--	4	50	--	50	--	100
6	IC (ELC)	2300404	Project Stage – II	--	--	8	4	--	100	--	75[a]	175
7	SDC (MD)	2315706	OS Installation and Backup Recovery Course	--	--	4	2	--	--	--	25[a]	25
8	EEC	2315806	Advanced Network Computing Course	--	--	--	--	--	--	--	--	--
TOTAL				**16**	**00**	**12**	**22**	**250**	**100**	**250**	**100**	**700**
Value Added Course												
9	VAC	VAC156	Soft Computing Lab	--	--	2	--	--	--	--	--	--
Honors/Minor Courses (Advance E-commerce Application Development)												
1	HM	2315493	Vertical and horizontal Integration of businesses for Ecommerce	4	--	--	4	50	--	50	--	100

Program Elective V:

1. Natural Language Processing (2315409A)
2. Embedded Systems (2315409B)

Program Elective VI:

1. Computer Oriented Operation Research (2315410A)
2. Cloud Computing (2315410B)

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(I.T.) (2023 Pattern)

Sem-III

2315201 - Discrete Mathematics and Logic

Teaching Scheme: TH : 03 Hrs./Week PR :	Credits Th:03 Practical:	Examination Scheme: CIA : 50 ESE : 50

Course Objectives:-

1. To use appropriate set, function and relation models to understand practical examples, and interpret the associated operations and terminologies in context.
2. Determine number of logical possibilities of events.
3. Learn logic and proof techniques to expand mathematical maturity.
4. Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Design and analyze real world engineering problems by applying set theory, propositional logic and mathematical induction

CO2: Develop skill in expressing mathematical properties of relation and function

CO3: Identify number of logical possibilities of events to design professional engineering Solutions

CO4: Model and solve computing problem using tree and graph Analyze the properties of binary operations and evaluate the algebraic structure

CO5: Apply abstract algebra in combinatorics, coding theory and questions regarding geometric constructions

Units		
Unit 1	**Set Theory and Logic** **(07 Hrs.)**	**CO**
Introduction and significance of Discrete Mathematics, Sets– Naïve Set Theory (Cantorian Set Theory), Axiomatic Set Theory, Set Operations, Cardinality of set, Principle of inclusion and exclusion. Types of Sets – Bounded and Unbounded Sets, Diagonalization Argument, Countable and Uncountable Sets, Finite and Infinite Sets, Countably Infinite and Uncountably Infinite Sets, Power set, Propositional Logic- logic, Propositional Equivalences, Application of Propositional Logic- Translating English Sentences, Proof by Mathematical Induction and Strong Mathematical Induction		**CO1, CO3**
Unit 2	**Relations & Functions** **(07 Hrs.)**	**CO2**
Relations and their Properties, n-ary relations and their applications, Representing relations , Closures of relations, Equivalence relations, Partial orderings, Partitions, Hasse diagram, Lattices, Chains and Anti-Chains, Transitive closure and Warshall‘s algorithm. Functions- Surjective, Injective and Bijective functions, Identity function, Partial function, Invertible function, Constant function, Inverse functions and Compositions of functions, The Pigeonhole Principle.		
Unit 3	**Counting Principles** **(07 Hrs.)**	**CO3**
The Basics of Counting, rule of Sum and Product, Permutations and Combinations, Binomial Coefficients and Identities, Generalized Permutations and Combinations, Algorithms for generating Permutations and Combinations		
Unit 4	**Graph Theory** **(07 Hrs.)**	**CO4**
Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, the handshaking lemma, Single source shortest path- Dijkstra's Algorithm, Planar Graphs, Graph Colouring		
Unit 5	**Trees** **(07 hrs.)**	CO4, CO5
Introduction, properties of trees, Binary search tree, tree traversal, decision tree, prefix codes and Huffman coding, cut sets, Spanning Trees and Minimum Spanning Tree, Kruskal‘s and Prim‘s algorithms, The Max flow- Min Cut Theorem (Transport network)		
Unit 6	**Algebraic Structures and Coding Theory** **(07 Hrs.)**	CO5
The structure of algebra, Algebraic Systems, Semi Groups, Monoids, Groups, Homomorphism and Normal Subgroups, and Congruence relations, Rings, Integral Domains and Fields, Coding theory, Polynomial Rings and polynomial Codes, Galois Theory –Field Theory and Group Theory		
Books & Other Resources		
Text Books:-		

1. C. L. Liu, ―Elements of Discrete Mathematics‖, TMH, ISBN 10:0-07-066913-9.
2. N. Biggs, --"Discrete Mathematics", 3rd Ed, Oxford University Press, ISBN 0 –19-850717–8

Reference Books:-

1. Bernard Kolman, Robert C. Busby and Sharon Ross, ―Discrete Mathematical Structures‖, Prentice-Hall of India /Pearson, ISBN: 0132078457, 9780132078450.
2. Narsingh Deo, "Graph with application to Engineering and Computer Science", Prentice Hall of India, 1990, 0 – 87692 – 145 – 4.
3. Eric Gossett, "Discrete Mathematical Structures with Proofs" Wiley India Ltd, ISBN:978-81-265-2758-8
4. Sriram P & Steven S., "Computational Discrete Mathematics", Cambridge University Press, ISBN 13: 978-0-521-73311-3.
5. Kenneth H. Rosen, ―Discrete Mathematics and its Applications‖, Tata McGraw-Hill, ISBN 978- 0-07-288008-3

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

SY Btech Information Technology(2023 Pattern)

Sem-III

2315202: Object Oriented Programming

Teaching Scheme: TH : 03 Hrs./Week PR :	Credits=03 Th:03 Practical:	Examination Scheme: CIA : 50 ESE : 50 TW :

Course Objectives:-

1. To teach the student the concepts of object oriented and procedure programming
2. To differentiate between functions, classes and objects
3. To learn to overload functions and operators
4. To design applications using dynamic memory management techniques

Course Outcomes:-

On completion of the course, learner will be able to

- CO1: To differentiate object oriented programming and procedural programming.
- CO2: To construct classes, functions and objects
- CO3: To develop programs using dynamic memory management techniques
- CO4: To implement the constructors, destructors and inheritance & handle exception.

Units		
Unit 1	**Principal of Object-Oriented Programming** **(06 Hrs.)**	**CO**
Object Oriented Programming Paradigm, Basic Concept of OOP, Benefits of OOP, Application of OOP, Structure of C++ Program, Tokens, Keywords, Identifiers, Constant, Basic Data Types, Operators, Operator Overloading, Call by Reference		**CO1**
Unit 2	**Classes and Object** **(07 Hrs.)**	**CO2**
Specifying Classes, Defining Member Function, Nesting of Member function, Private Member function, Arrays within a class, Static Data Members, Arrays of Object, Friendly Function, Object as Function arguments		
Unit 3	**Constructor and Object Overloading** **(07 Hrs.)**	**CO3**
Constructors, Parameterized Constructor, Multiple Constructor, Dynamic Initialization, Copy Constructor, Destructors, Operator Overloading, Overloading Unary Operator, Overloading Binary Operator, Data Conversion		
Unit 4	**Inheritance and Polymorphism** **(06 Hrs.)**	**CO4**
Inheritance: Introduction, Need of Inheritance, Types of Inheritance, Benefits of Inheritance, Cost of Inheritance, Constructors in derived Classes, Method Overriding, Abstract Classes and Interfaces. Polymorphism and Software Reuse: Introduction, Types of Polymorphism (Compile Time and Run Time Polymorphism), Mechanisms for Software Reuse, Efficiency and Polymorphism		
Unit 5	**Exception Handling and Generic Programming** **(06 Hrs.)**	
Exception: Errors, Types of Errors, Exception and its Types, Exception-Handling Fundamentals, Uncaught Exception, Using try and Catch, Multiple Catch Clauses, Nested Try Statements, User Define Exception using Throw. Generics: What are Generics? Introduction to Language Specific Collection Interface: List Interface and Set Interface, Collection Classes: ArrayList Class and LinkedList Class		**CO4**
Unit 6	**File Handling and Design Patterns** **(07 Hrs.)**	
File Handling: Introduction, Concepts of Stream, Stream Classes, Byte Stream Classes, Character Stream, Classes, Using Stream, and Other Useful I/O Classes, Using the File Class, Input/output Exceptions, Creation of Files, Reading/Writing Character, Reading/Writing Bytes, Handling Primitive Data Types, Concatenating and Buffering Files, Random Access Files.Design Patterns: Introduction, Types of Design Patterns, Adapter, Singleton, Iterator		**CO4**
Books & Other Resources		

Text Books:-

1. Object Oriented Programming with C++, by E. Balagurusamy, McGraw-Hill Publication
2. C++, the Complete Reference, 4th Edition, Herbert Schildt, TMH.

Reference Books:-

1. C++ Primer, 3rd Edition, S. B. Lippman and J. Lajoie, Pearson Education.
2. The C++ Programming Language, 3rd Edition, B. Stroutstrup, Pearson Edu.
3. Object-Oriented Design Using Java, Dale Skrien, McGraw-Hill Publishing, 2008

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech(Information Technology) (2023 Pattern)

Sem-III

2315203: Data Structures

Teaching Scheme: TH : 02 Hrs./Week	Credits Th:02	Examination Scheme: CIA : 25 ESE : 50

Course Objectives:-

1. To study data structures and linked list operations implementations.
2. To learn linear data structures stack, queue,and different searching and sorting techniques.
3. To study advanced data structures such as trees.
4. To study some advanced data structures such as graphs and tables.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Demonstrate use of sequential data structures- Array and Linked lists to store and process data.

CO2: Understand the computational efficiency of the principal algorithms for searching and sorting and apply principles of data structures-stack and queue to solve computational problems.

CO3:Demonstrate applicability of nonlinear data structures-Binary Tree,Binary Search Tree ,Threaded Binary Tree.

CO4: Apply implement learned algorithm design techniques and data structures to solve problems.

Units

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech(Information Technology) (2023 Pattern)

Sem-III

2315203: Data Structures

Unit 1	Introduction to Data Structures (07 Hrs.)	CO
Introduction to Data Structures: Concept of data,Information,Knowledge,Data object, Data structure,Definition of Abstract Data Types (ADT). **Analysis of algorithm:** Frequency count and its importance in analysis of an algorithm, Time complexity & Space complexity of an algorithm,Big 'O', 'Ω' and 'Θ' notations **Sequential Organization:** Overview of Array, Array as an Abstract Data Type, Multidimensional array and Address Calculation: Row major and Column Major **Linked Organization:** Concept of linked organization, Singly Linked List, Doubly Linked List, Circular Linked List (Operations: Create, Display, Search, Insert, Delete).		**CO1**
Unit 2	**Searching ,Sorting ,Stack & Queue (07 Hrs.)**	
Searching: Linear search,Binary search,Fibonacci search algorithms. **Sorting :** Concept of internal and external sorting, sort stability, Bubble sort, Insertion sort, Quick sort, Merge sort and comparison of all sorting methods. Analyze Insertion sort, Quick Sort, Binary search for Best, Worst and Average case. **Stack:** Concept of stack, Concept of implicit and explicit stack, stack as an ADT using sequential and linked organization, Applications of stack: recursion, converting expressions from infix to postfix or prefix form, evaluating postfix or prefix form. **Queue:** Concept of queues as ADT, Implementation of queue using array and linked organization,Concept of circular queue, double ended queue, Applications of queue: priority queue.		**CO2**
Unit 3	**Trees (7 Hrs.)**	
Tree : Trees and binary trees-concept and terminology, Expression tree, Binary search tree, Recursive and Non recursive algorithms for binary tree traversals ,Binary search tree as ADT(Insert Search Delete, level wise Display) **Threaded binary tree:** Concept of threaded binary tree (inorder, preorder and postorder). Preorder and In-order traversals of in-order threaded binary tree, Applications of trees.		**CO3**
Unit 4	**Graph and Symbol Table (07 Hrs.)**	
Graph: Concept and terminologies, Graph as an ADT, Representation of graphs using adjacency matrix and adjacency list, Breadth First Search traversal, Depth First Search traversal, Prim's and Kruskal's algorithms for minimum spanning tree, Shortest path using Dijkstra's algorithm, topological sorting. **Symbol Table:**Notion of Symbol Table, OBST, AVL Trees **Heap:** Heap data structure, Min and Max Heap, Heap sort, applications of heap		**CO4**
Books & Other Resources		

Text Books:-

1. E. Horowitz, S. Sahni, D. Mehta, "Fundamentals of Data Structures in C++", Galgotia Book Source, New Delhi, 1995, ISBN 16782928
2. Y. Langsam, M. Augenstin, A. Tannenbaum, "Data Structures using C and C++", 2nd Edition, Prentice Hall of India, 2002, ISBN-81-203-1177-9.

Reference Books:-

1. G. A.V, PAI , “Data Structures and Algorithms “, McGraw Hill, ISBN -13: 978-0-07-066726-6
2. A. Tharp ,"File Organization and Processing", 2008 ,Willey India edition, 9788126518685
3. M. Folk, B. Zoellick, G. Riccardi, "File Structure An Object Oriented Approach with C++", Pearson Education, 2002, ISBN 81 - 7808 - 131 - 8.
4. M. Welss, “Data Structures and Algorithm Analysis in C++", 2nd edition, Pearson Education, 2002, ISBN-81-7808-670-0

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

SY Btech Information Technology(2023 Pattern)
Sem-III
2315204: Object Oriented Programming lab

Teaching Scheme: TH : --- PR : 02hrs/week	Credits=01 Th: Practical: 01	Examination Scheme: CIA : ESE : Oral : 25

Course Objectives:-

1. To teach the student the concepts of object oriented and procedure programming
2. To differentiate between functions, classes and objects
3. To learn to overload functions and operators
4. To design applications using dynamic memory management techniques

Course Outcomes:-

On completion of the course, learner will be able to

- CO1: To differentiate object oriented programming and procedural programming.
- CO2: To construct classes, functions and objects
- CO3: To develop programs using dynamic memory management techniques
- CO4: To implement the constructors, destructors and inheritance & handle exception.

Practical List:-
The student shall complete the following practicals.

Expt. No. 1	Study of C++ Standard library functions	**CO1**
Expt. No. 2	Write a C++ program to find the sum of individual digits of a positive integer.	**CO2**
Expt. No. 3	Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.	**CO2**
Expt. No. 4	Write a C++ program to find both the largest and smallest number in a list of integers.	**CO2**
Expt. No. 5	Program to illustrate default constructor, parameterized constructor and copy constructors.	**CO3**
Expt. No. 6	Write a Program to Demonstrate Friend Function and Friend Class.	**CO4**
Expt. No. 7	Write a Program to Access Members of a Student Class Using Pointer to Object Members.	**CO3**
Expt. No. 8	Write a Program to Generate Fibonacci Series use Constructor to Initialize the Data Members.	**CO3**
Expt. No. 9	Design and develop inheritance for a given case study, identify objects and relationships and implement inheritance wherever applicable.	**CO4**

Expt. No. 10	Using concepts of Object-Oriented programming develop solution for any one application like Banking system with major operations.	**CO3,CO4**
Expt. No. 11	Write a C++ program that creates an output file, writes information to it, closes the file, open it again as an input file and read the information from the file.	**CO3,CO4**
Expt. No. 12	Write C++ Program to Show Runtime Exceptions & to Handle the Exception Methods.	**CO3,CO4**

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** S.Y. B.Tech(Information Technology) (2023 Pattern) Sem-III 2315205: Data Structures Lab

Teaching Scheme: **PR : 02 Hrs./Week**	**Credits** **Practical:01**	**Examination Scheme:** **ESE : 50**

Course Objectives:-

1. To study data structures and their implementations and applications.
2. To learn different searching and sorting techniques.
3. To study linear data structures such as stack and queue.
4. To study some advanced non linear data structures such as trees, graphs and tables.
5. To learn algorithm development and analysis of algorithms.

Course Outcomes:-

On completion of the course, learner will be able to

- CO1: Demonstrate use of sequential data structures- Array and Linked lists to store and process
- CO2: Analyze algorithms and to determine algorithm correctness and time efficiency class.
- CO3: Implement abstract data type (ADT) and data structures for given application.
- CO4: Solve problems using algorithmic design techniques and data structures.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech(Information Technology) (2023 Pattern)
Sem-III
2315205: Data Structures Lab

Suggested List of Laboratory Experiments/Assignments(Any 8)		
Sr.No.	Title	**CO**
1	Write a c++ program to store roll numbers of students of SEIT class in array who attended training program . Write function for searching whether particular student attended training program or not, using 1) Linear search 2)Binary search.	CO1, CO2
2	Write a c++ program to store roll numbers of students of SEIT class in array who attended training program in random order. Write function to arrange list of students according to roll numbers in ascending order , using 1) Selection sort 2)Bubble sort.	CO1, CO2
3	Write a c++ program to store roll numbers of students of SEIT class in array who attended training program in random order. Write function to arrange list of students according to roll numbers in ascending order , using Quick sort .	CO1, CO2
4	Write C++ program to maintain students' information (Roll Number, Name, and Percentage) using singly linked list. Write functions to: a) Add Student at beginning, in between, at last b)Delete the Student from beginning, in between, from last c) Compute total number of Students d) Display all Students in list.	CO1, CO2
5	Implement stack as an abstract data type using singly linked list and use this ADT for conversion of infix expression to postfix and evaluation of postfix expression.	CO2, CO3
6	Implement Circular Queue using Array. Perform following operations on it. a) Insertion (Enqueue) b) Deletion (Dequeue) c) Display (Note: Handle queue full condition by considering a fixed size of a queue.)	CO2, CO3

7	Implement binary search tree and perform following operations: a) Insert (Handle insertion of duplicate entry) b) Delete c) Search d) Display tree (Traversal) e) Display - Depth of tree f) Display - Mirror image g) Create a copy h) Display all parent nodes with their child nodes i) Display leaf nodes j) Display tree level wise **(Note: Insertion, Deletion, Search and Traversal are compulsory, from rest of operations, perform Any three)**	CO2, CO3
8	Implement In-order Threaded Binary Tree and traverse it in In-order and Pre-order.	CO4
9	Represent a graph of your college campus using adjacency list /adjacency matrix. Nodes should represent the various departments/institutes and links should represent the distance between them. Find minimum spanning tree a) Using Kruskal's algorithm. b) Using Prim's algorithm.	CO4
10	Represent a graph of city using adjacency matrix /adjacency list. Nodes should represent the various landmarks and links should represent the distance between them. Find the shortest path using Dijkstra's algorithm from single source to all destination.	CO4
11	Implement Heap sort to sort given set of values using max or min heap.	CO4
Books & Other Resources		

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech(Information Technology) (2023 Pattern)

Sem-III

2315205: Data Structures Lab

Text Books:-

1. Richard F. Gilberg, Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach using C++", Cengage Learning, 5th Edition, ISBN 978-8131504925

2. Mark Allen Weiss, "Data structures and Algorithm Analysis in C++ ", Pearson Education India, 3 edition (2007), ISBN 978-8131714744

3. Ellis Horowitz, Sartaj Sahni, Dinesh Mehta, "Fundamentals of Data Structures in C++", University Press (2008), ISBN 978-8173716065

Reference Books:-

1. Hemant Jain, "Problem Solving in Data Structures & Algorithms using C++", CreateSpace Independent Publishing Platform (2017), ISBN 978-1542396479

2. G A V PAI, "DATA STRUCTURES and Algorithms Concepts, Techniques and Applications", McGraw Hill (2017), ISBN 978-0070667266

3. Michael T. Goodrich, Roberto Tamassia, David Mount, “Data Structures and Algorithms in C++ “, Wiley (2007), ISBN 978-8126512607

4. E Balagurusamy, "Object-Oriented Programming with C++", McGraw Hill Education; Seventh edition (2017), ISBN 978-9352607990

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-III : E-commerce Application Design (2315206A)

Open Elective-I

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3 hrs/week	Th:03	Theory	CIA: 50
			End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Understand and apply e-commerce fundamentals to design applications as per the business requirements
2. Understand and apply security essentials for e-commerce and e-commerce applications
3.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Understand and apply basics of e-commerce to built the e-commerce applications

CO2: Comprehend Importance of e-transactions in e-commerce and issues related to it.

CO3: Explain the socioeconomic impact of e-commerce on various types of businesses and markets.

CO4: Interpret the aspects of legal issues involved in implementing e-commerce

CO5: Design and implement an e-commerce application as per the business requirement.

Unit 1: Introduction **7Hrs**	**CO**
What is Electronic Commerce? Benefits of Electronic Commerce, Various Services, Types of Electronic Commerce Direct Marketing & Selling Supply Chain Integration Corporate Procurement Electronic Data Interchange, Major Projects in Electronic Commerce, Applications of E-Commerce, Value Chain Integration, Supply Chain Integration, Corporate Purchasing, Financial & Information Services, Examples of Today's E-Commerce	CO1 to CO4
Unit 2 E-Transactions **7Hrs**	CO2
On-Line Web Selling, Home Banking and Financial Service, Customer Service & Technical Support, Internet & WWW Tools, Electronic Mail, News Groups, FTP, Telnet, WAIS, Gopher,WWW, Agent, The Model Of Commercial Transactions, Electronic Cash and Payment Schemes, Internet Monetary Payment and Security Requirements, Confidentiality of Payment Information, Payment Information Integrity, Account holder & Merchant	

Authentication, Interoperability, Payment and Purchase Order Process, Account Holder Registration, Merchant Registration, Account holder (Customer) Ordering, Payment Authorization, Problems with simple E-Cash, Creating electronic cash anonymity, Preventing Double Spending, E-Cash Interoperability, Cyber cash, crypto currency, UPI, Verisign, Digicash, Netcash, NetBill, Joint Electronic Payment Initiative (JEPI)	
Unit 3 Socio-economic impact 7Hrs	CO3
e-Marketplace and Describe their Functions, e-Marketplace types and their features. auctions and their characteristics. Benefits, limitations and impacts of auctions. E-Commerce in the wireless environment. Competition in the DE and impact on industry. E-Tourism · Employment and Job Market Online Online Real Estate. Online Publishing and e-Books. Banking and Personal Finance Online.On-Demand Delivery Systems and E-Grocers. Online Delivery of Digital Products.	
Unit 4 Security and legal Issues 7Hrs	CO1 to CO4
Threats in Computer Systems: Virus, Cyber Crime Network Security: Encryption, Protecting Web server with a Firewall, Firewall and the Security Policy, Network Firewalls and Application Firewalls, Proxy Server. Understanding Ethical, Social and Political issues in E-Commerce: A model for Organizing the issues, Basic Ethical Concepts, Analyzing Ethical Dilemmas, Candidate Ethical principles Privacy and Information Rights: Information collected at E-Commerce Websites, The Concept of Privacy, Legal protections Intellectual Property Rights: Types of Intellectual Property protection, Governance.	
Unit 5 Electronic Data Interchange 7Hrs	Co1 to CO5
EDI Implementaion, MIME, and Value-Added Networks - Standardization and EDI - EDI Software Implementation _ EDI Envelope for Message Transport - VAN - Software Agents Introduction - Chracteristics and Propterties - Technology Behind Software Agents - Telescript Agent Language - Safe TCL - Applets, Browsers and Software Agents - Software Agents in Action.	
Unit 6 Existing E-commerce platforms case studies 7Hrs	CO1 to CO5
Amazon, Flipkart, e-bay, OLX, Indiamart, Alibaba, etc	

Text Books:

1. Electronic Commerc**e:** A Managerial Perspective, Turban, E. et al., Prentice Hall-2008.

2. Frontiers of e-commerce, Ravi Kalakota, Pearson.

3. Electronic Business and Electronic Commerce Management, 2nd edition, Dave Chaffey, Prentice Hall, 2006

4. e-Learning Tools and Technologies, Horton and Horton, Wiley Publishing.

Reference Books:

1. Elias. M. Awad, " Electronic Commerce", Prentice-Hall of India Pvt Ltd.
2. Ravi Kalakota, Andrew B. Whinston, "Electronic Commerce-A Manager's guide", Addison-Wesley.
3. Efraim Turban, Jae Lee, David King, H.Michael Chung, “Electronic Commerce–A ManagerialPerspective", Addison-Wesley.
4. Elias M Award, “Electronic Commerce from Vision to Fulfilment”, 3rd Edition, PHI,
5. Judy Strauss, Adel El-Ansary, Raymond Frost, “E-Marketing”, 3RDEdition, Pearson Education.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-III : Computer Graphics & Animation (2315206B)

Open Elective-I

Teaching Scheme:	Credits	Examination Scheme	
Theory: 3 hrs/week	Th:03	Theory	CIA: 50
			End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Understand and apply concepts of computer graphics, animation, and virtual reality
2. Understand the hardware requirements for graphics and how to use it.
3. Understand and apply light, 2D, 3D, and other rendering effects in graphics and animation

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Identify and apply mathematical basis to generate graphics and animation using computer

CO2: effectively implement 2D graphics by understanding its basics

CO3: Effectively implement 3D graphics by understanding its basics.

CO4: Interpret the aspects of rendering and animation to apply it on 2D and 3D graphic objects

CO5: Implement and design Virtual Reality scenes/applications using Computer graphics

Unit 1: Introduction **7Hrs**	**CO**
Introduction to Image and Objects, Image Representation, Basic Graphics Pipeline, Bitmap and Vector-Based Graphics, Applications of Computer Graphics, Display Devices, Cathode Ray Tubes, Raster-Scan Display, Random-Scan Display, Flat Panel Display, Input Technology, Coordinate System Overview, **Line Drawing:** DDA Line drawing algorithm, Bresenham Line drawing algorithm **Circle Drawing:** Bresenham circle drawing algorithm.**Character Generation:** Stroke principle, starburst principle, bitmap method. Introduction to aliasing and anti-aliasing.	CO1 & CO4
Unit 2 2D Transformations **7Hrs**	CO1 & CO2
Introduction to transformations, Transformation Matrix, Types of Transformations in Two-Dimensional Graphics: Identity Transformation, Scaling, Reflection, Shear Transformations, Rotation, Translation, Rotation about an Arbitrary Point, Combined Transformation, Homogeneous Coordinates, 2D Transformations using Homogeneous Coordinates	
Unit 3 3D Transformations **7Hrs**	CO1

Three-dimensional transformations, Objects in Homogeneous Coordinates; Three-Dimensional Transformations: Scaling, Translation, Rotation, Shear Transformations, Reflection, World Coordinates and Viewing Coordinates, Projection, Parallel Projection, Perspective Projection.	& CO3
Unit 4 Segments, Illumination models, colour models and shading 7Hrs	CO 1 to CO4
Segments: Introduction, Segment table, segment creation, closing, deleting, renaming, and visibility.**Illumination models**: Light sources, ambient light, diffuse light, specular reflection, the Phong model, combined diffuse and specular reflections with multiple light sources.**Color Models:** CIE Chromaticity Diagram, Color Gamut, RGB, CMY, YCbCr,HSVcolor models. **Shading Algorithms:** Constant intensity shading, Halftone, Gourand and Phong Shading.	
Unit 5 Curves, Fractals and Animation 7Hrs	CO 1 to CO4
Curves: Introduction, interpolation and approximation, Spline Interpolation Methods – hermite interpolation, Bezier curves, B-Splines.**Fractals:** Introduction, Classification, fractal Dimension, Fractal dimension and surfaces, Hilbert curve, Koch Curve.**Animation:** Basics of animation, types of animation, principles of animation, design of animation sequences, animation languages, key frame, morphing, motion specification. Methods of controlling animation, frame-by-frame animation techniques, real-time animation techniques.	
Unit 6 Virtual Reality 7Hrs	CO 1 & CO5
Introduction of Virtual Reality: Fundamental Concept, Three I's of virtual reality and Classic Components of VR systems, Applications of VR systems.**Multiple Modals of Input and Output Interface in Virtual Reality:** Input – 3D position Trackers and its types, Navigation and Manipulation Interfaces, Gesture Interfaces, Graphics Displays – HMD and CAVE, Sound Displays, Haptic Feedback**Rendering Pipeline:** Graphics rendering Pipeline, Haptics Rendering Pipeline Modeling in Virtual Reality: Concepts of Geometric Modeling, Kinematic Modeling, Physical modeling and Behavior modeling.	

Text Books:

1. D. Hearn, M. Baker, "Computer Graphics – C Version", 2nd Edition, Pearson Education, 2002,ISBN81 – 7808 – 794 – 42.
2. S. Harrington, "Computer Graphics", 2nd Edition, McGraw-Hill Publications, 1987, ISBN 0 – 07–100472 – 63.
3. Grigore C. Burdea, Philippe Coiffet, "Virtual Reality Technology", second edition, Wiley IndiaEdition, ISBN 81-265-0789-6
4. R. K. Maurya, Computer Graphics, John Wiley.

5. David F. Rogers, J. Alan Adams,, Mathematical elements of Computer Graphics, Tata McGraw-Hill.

6. David F. Rogers, Procedural elements of Computer Graphics, Tata McGraw-Hill.

Reference Books:

1. J. Foley, V. Dam, S. Feiner, J. Hughes, "Computer Graphics Principles and Practice", 2ndEdition, Pearson Education, 2003, ISBN 81 – 7808 – 038 – 9.3.

2. Foley, "Computer Graphics: Principles & Practice in C", 2e, ISBN 9788131705056, PearsonEdu.

3. F.S. Hill JR, "Computer Graphics Using Open GL", Pearson Education

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) *(2023 Pattern)*

Sem-IV

2300201: Principles of Management

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 3 hrs/week	**Th:03**	**Theory**	**CIA: 50**
			End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Comprehend the nature and characteristics of management, its scope, and various functional areas.
2. Recognize the importance of ethical values in managerial decision-making and actions.
3. Explore the concepts of authority, delegation, decentralization, and their impact on organizational structure.
4. Analyze the techniques of coordination in managing complex organizational tasks.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Inculcate The Ability To Apply Multifunctional Approach To Organizational Objective.

CO2: Apply Process Based Thinking And Risk Based Thinking For Managing And Improving The Functioning Of An Organization

CO3: Examine The Inter-Relationships Between The Planning And Organising, Directing And Communicating, Controlling And Coordinating Etc.

CO4: Develop Skills For Corrective Action Management And Continual Improvement Project Management.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S. Y. B. Tech (Common) ***(2023 Pattern)***

Semester: III

2300201: Principles of Management

Unit 1:Introduction to Management **7hrs**	**CO**
Definition and scope of management, Evolution of management theories, Functions of management: planning, organizing, leading, and controlling, Managerial roles and skills, Challenges and opportunities in contemporary management, Management As A Science, Art Or Profession; Management And Administration; Difference Between management And Administration. Significance Of Values And Ethics In Management	CO1
Unit 2: Planning, Organizing and Decision Making **7hrs**	CO2
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, Importance of planning in achieving organizational goals, Types of plans: strategic, tactical, operational, Process of decision making, Decision-making models and techniques, Setting objectives and formulating strategies	
Unit 3:Organizing and Organizational Structure, Leading and Managing Human Resources **7hrs**	CO3
Principles of organizing, Types of organizational structures, Departmentalization and delegation of authority, Coordination and integration of activities, Formal and informal organization, The role of leadership in management, Leadership styles and their impact on organizational culture, Recruitment,Selection,Placement,Promotion,Separation,Performance Appraisal,Meaning And Nature Of Direction, Motivation theories and their application in the workplace, Communication and its importance in effective leadership, Managing diversity and fostering inclusivity.	
Unit 4: Communicating, Controlling And Coordinating **7hrs**	CO4
Communication - Meaning And Importance, Communication Process, Barriers To Communication, Steps To Overcome Communication Barriers, Types Of Communication; Motivation Theories – Maslow's Need Hierarchy Theory, Herzberg's Two Factor Theory. **Leadership** – Meaning, Formal And Informal Leadership, Characteristics Of Leadership; Leadership Styles – Autocratic Style, Democratic Style, Participative Style, Laissez Faire Leadership Styles, Transition Leadership, Charismatic Leadership Style, 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. Principles of Management" by P. C. Tripathi and P. N. Reddy
2. Fundamentals of Management" by R. S. Dwivedi
3. "Management: Theory and Practice" by Kris Cole
4. "Principles of Management" by V. S. Ramaswamy and S. Namakumari
5. Essentials of Management" by Harold Koontz and Heinz Weihrich (Indian adaptation by A. Aryasri)

Reference Books

1. Management: Tasks, Responsibilities, Practices" by Peter F. Drucker
2. The Practice of Management" by Peter F. Drucker
3. "Management: Text and Cases" by V. S. P. Rao
4. Management: Concepts and Practices" by Tim Hannagan
5. Management: Principles and Practice" by S. K. Chakraborty and D. Chatterjee
6. Modern Management: Concepts and Skills" by Samuel C. Certo and S. Trevis Certo
7. Management: A Global and Entrepreneurial Perspective" by Heinz Weihrich, Mark Cannice, and Harold Koontz

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S. Y. B. Tech (Common) ***(2023 Pattern)***

Sem - III

2300202:Industrial Psychology

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2hrs/week	**Th:02**	**Theory**	**CIA: 25**
			End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Develop an awareness of the major perspectives underlying the field of Industrial Psychology.
2. Apply the principles of human psychology to the corporate field and familiarize them with the current practices in the corporate. .
3. Develop an understanding of group dynamics, norms, and cohesiveness, enabling them to build and lead effective teams within the organization.
4. Familiarize with the field of occupational psychology and its applications in selection, placement, counseling, and training of employees.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Learn about theories of motivation and group behavior.

CO2: Understanding of key concepts, theoretical perspectives, and trends in industrial psychology.

CO3: Analyze and interpret the role of motivation & Morale in behavior modification.

CO4: Analyze the impact of human engineering and physical environment on job performance and employee well-being**.**

CO5: Apply psychological principles in addressing work-related challenges...

CO6: Design the role of psychologists in industrial settings and appreciate their impact on employee well-being and organizational performance**.**

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S. Y. B. Tech (Common) *(2023 Pattern)*

Sem - III

2300202:Industrial Psychology

Unit 1:Introduction **6hrs**	**CO**
The role of the psychologist in industry, the field of occupational Psychology: Study of behavior in work situation and applications of Psychological principles to problems of selection, Placement, Counseling and training	CO1
Unit 2: Design of Work Environments **7hrs**	
Human engineering and physical environment techniques of job analysis, Social environment: Group dynamics in Industry Personal psychology, Selection, training, placement, promotion, counseling, job motivations, job satisfaction. Special study of problem of fatigue, boredom and accidents	CO2
Unit 3: Individual and Group Behavior **7 hrs**	
Introduction, Objectives, Individual Behavior, Individual Differences: Meaning, Nature, Dimensions and Values, Factors Influencing Individual Behavior, Group Behavior: Introduction, Objectives, Meaning, Definition and Advantages of Groups, Types of Groups, Group Dynamics, Group Norms Group Cohesiveness	CO3, CO4
Unit 4: Morale, Motivation& Counseling **8hrs**	
Morale: Meaning, Types and Aspects, Characteristics of High and Low Morale and Essential and Psychological Requirements for High Morale, Introduction, Objectives, Meaning, Importance and Types of Motivation in Industry, Monetary and Non-Monetary Incentives, Fatigue, Boredom and Monotony: Meaning, Causes and Remedies, Introduction, Objectives, Counseling: Meaning, Significance, Types and Process, Employee Health, Safety and Security, Industrial Accidents: Accident Proneness and Prevention	CO5, CO6

Text Books

1. Tiffin, J and Mc Cormic E.J., Industrial Psychology, Prentice Hall, 6th Edn., 1975.
2. Mc Cormic E.J., Human Factors Engineering and Design, McGraw Hill, 4th Edn.,1976.
3. Mair, N.R.F., Principles of Human relations
4. Gilmer, Industrial Psychology
5. Ghiselli & Brown, Personnel and Industrial Psychology.
6. Myer, Industrial Psychology.
7. Dunnete, M.D., Handbook of Industrial and Organizational Psychology.
8. Blum & Taylor, Industrial Psychology

Reference books

1. Miner J.B. (1992) Industrial/Organizational Psychology. N Y : McGraw Hill.
2. Blum & Naylor (1982) Industrial Psychology. Its Theoretical & Social Foundations CBSPublication.
3. Aamodt, M.G. (2007) Industrial/Organizational Psychology : An Applied Approach
4. (5 th edition) Wadsworth/Thompson : Belmont, C.A.Blum M.L. Naylor J.C., Horper& Row, IndustrialPsychology, CBS Publisher, 1968
5. Luthans, Organizational Behaviour, McGraw Hill, International, 1997
6. Morgan C.t.,KingR.A.,JohnRweisz & JohnSchoples, Introduction to Psychology, McHraw Hill, 1966
7. Schermerhorn J.R.Jr., Hunt J.G &Osborn R.N., Managing, Organizational Behaviour, John Willy

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) *(2023 Pattern)*

Sem-IV

2300203: Design Thinking

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 1hrs/week	**Th:01**	**Theory**	**CIA: 25**
Practical: 2 hrs/week	**Practical: 01**		**ESE:--**
Prerequisite :		**Pract:**	**25**
		Oral:	**25**
		Termwork	**--**

Course Objectives:

The student should be able to

1. Learn design thinking concepts and principles
2. Use design thinking methods in every stage of the problem
3. Learn the different phases of design thinking
4. Apply various methods in design thinking to different problems

Course Outcomes:

On completion of the course, learner will be able to

CO1. Define key concepts of design thinking

CO2. Practice design thinking in all stages of problem solving

CO3. Apply design thinking approach to real world problems

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) *(2023 Pattern)*

Sem-IV

2300203:Design Thinking

Unit 1 Introduction, Understand, Observe and Define The Problem7hrs	**CO**
Why Design? - Four Questions, Ten Tools - Principles of Design Thinking - The process of Design Thinking - How to plan a Design Thinking project. Search field determination - Problem clarification - Understanding of the problem - Problem analysis - Reformulation of the problem - Observation Phase - Empathetic design - Tips for observing - Methods for Empathetic Design - Point-of-View Phase - Characterization of the target group - Description of customer needs	CO1 CO2 CO3
Unit 2 Ideation, Prototyping, Testing and Implementation 7hrs	
Ideate Phase - The creative process and creative principles - Creativity techniques - Evaluation of ideas - Prototype Phase - Lean Startup Method for Prototype Development - Visualization and presentation techniques. Test Phase - Tips for interviews - Tips for surveys - Kano Model - Desirability Testing - How to conduct workshops - Requirements for the space - Material requirements - Agility for Design Thinking	CO1 CO2 CO3

TEXT BOOKS :

1. Christian Mueller-Roterberg, Handbook of Design Thinking - Tips &Tools for how to design thinking.
2. Designing for Growth: a design thinking tool kit for managers By Jeanne Liedtka and Tim Ogilvie.
3. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation by Tim Brown.

REFERENCES:

1. Johnny Schneider, “Understanding Design Thinking, Lean and Agile”, O'Reilly Media, 2017.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
3. HassoPlattner, ChristophMeinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
4. http://ajjuliani.com/design-thinking-activities/
5. https://venturewell.org/class-exercises

LIST OF EXPERIMENTS:

1. Case study on understanding of the design thinking problems.
2. Case study on observations of the parameters of design thinking problems.
3. Case study on defining design thinking problems.
4. Case study on description of customer needs of the parameters of design thinking problems.
5. Case study of ideation phase of solving design thinking problems
6. Case study of prototyping phase of solving design thinking problems
7. Case study of testing phase of solving design thinking problems
8. Case study of implementation phase of solving design thinking problems

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) *(2023 Pattern)*

Sem-III

2300204 : Community Engagement Project

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Th:02**	**Theory**	**CIA: --**
Practical: 4 hrs/week			**End-Sem:--**
		Pract:	25
		Oral:	25
		Termwork	--

Course Objectives: The student should be able to

1. sensitize the students to the living conditions of the people in the surroundings.
2. bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability.
3. make students aware of their inner strength and help them to find new /out of box solutions to the social problems.
4. make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.
5. help students to initiate developmental activities in the community in coordination with public and government authorities.
6. develop a holistic life perspective among the students by making them to study culture, traditions, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Survey for the development of the community.
CO2: Interpret the social issues that confront the vulnerable / marginalized sections of the society.
CO3: Build team for societal change.
CO4: Create an opportunity to familiarize themselves with urban / rural community they live in.
CO5: plan activities based on the focused groups.
CO6: implement the ways of transforming the society through systematic programme implementation.

PROCEDURE

Students in a group (Maximum 5) can take up a planned community work for minimum of 50 hours. Evaluation of student's work will be based on the planning, execution and documentation of work, and a viva-voce by Departmental panel.

A group of students could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.

The Community Service Project is a twofold one

i. First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. For ex., a student of Arts will focus on socio-economic conditions, social survey and about the Government's social security schemes. This should not be viewed as a duplication of work by the Village or Ward volunteers; rather, it could be another primary source of data.
ii. Secondly, the student/s could take up a project work related to following domains.

a. Agriculture
b. Health
c. Marketing and Cooperation
d. Animal Husbandry
e. Horticulture
f. Fisheries
g. Sericulture
h. Revenue and Survey
i. Natural Disaster Management
j. Irrigation
k. Law & Order
l. Excise and Prohibition
m. Mines and Geology
n. Energy

The assessment is to be conducted for 50 marks. The number of credits assigned is 2. Later as per the present practice the marks are converted into grades and grade points to include finally in the SGPA and CGPA.

The weightings shall be:

Project Report	50%
Presentation	50%

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** Information Technology (2023 Pattern) Sem-III 2315701: PC Repairing Course

Teaching Scheme: **PR : 02 Hrs./Week**	**Credits** **Audit course**	**Examination Scheme:** **CIA :** **ESE :** **TW :**

Course Objectives:-

1. To understand different parts of PC like SMPS, Motherboard, Graphics card , RAM, etc
2. To identify the problems in different spares of PC and troubleshoot them
3. To assemble or dissemble the PC to upgrade the hardware and install OS and Software on PC

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Illustrate and elaborate different spares of PC assembly
CO2: identify and troubleshoot the issues in PC
CO3: assemble or dissemble the Pc
CO4: upgrade PC hardware
CO5: install OS and various software on PC

The student shall complete the following practical activity as a course work.		
Practical List		
Module 1	Introduction to Computer, Hardware, Block Diagram Detail, Parts of Computer.	CO1
	Motherboard Parts : Identification of Ports, Chip, Slot, Connector, etc.	CO1
	SMPS: SMPS Pin Detail, SMPS Voltage, SMPS Checking.	CO1
Module 2	Hard Disk: Types, Identification, CD / DVD Drive: Types Identification UPS : Types, Identification & Testing.	CO2-CO4
	Computer Assembling & Dissembling.	CO3-CO4
	Windows Installation (win 7, 8, & 10) without data lost.	CO5
Module 3	Dual Booting & Multi Booting, Driver Installation (offline / online)	CO5
	Software Installation, Antivirus Installation, Bios Setting	CO3-CO5
	Windows Shortcut key & Run Command, Control Panel setting	CO3-CO5
	Data recovery from Hard Disk, Memory Car & Pen Drive etc., Make Bootable Pen Drive, Password Breaking	CO3-CO5

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-III : Software Testing Certification Course (2315801)

Employability Enhancement Course

Teaching Scheme:	Credits	Examination Scheme	
Theory:	Th:	Theory	CIA:
Practical: 2 hrs/week	Audit Course		End-Sem:
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Apply manual as well as automated testing to software
2. Analyze software requirements and accordingly design the test cases for white box testing.
3. Search and examine software and apply proper test cases and techniques to it.
4. Use and apply various software testing tools and techniques in software testing.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Analyze the SRS & software design can apply white box testing or manual testing to software.

CO2: Analyze software for creation of test cases and apply testing strategies for different software.

CO3: Use various software testing tools and techniques for manual as well as automated software testing

CO4: Prepare the software testing plans and report for software quality assurance

CO5: Apply software testing techniques and tools to various software pre & post development phases.

Module 1: Introduction **4Hrs**	**CO**
What is Software Testing? Why do we test software? What is a Defect? Verification vs Validation Quality Assurance vs Quality Control vs Testing, Principles of Software Testing, Overview on SDLC Different Life Cycle models, Overview on STLC, AGILE Testing	CO1
Module 2 Types of Testing **6Hrs**	CO1 to CO3
Types of testing - manual and automation, Introduction to testing methods - white-box, black-box and grey-box, Introduction to functional testing, Introduction to non-functional testing, Introduction to levels of testing - Unit Testing, Integration Testing, System Testing, User Acceptance Testing, Introduction to types of testing - Regression Testing, Smoke Testing, Database, Testing, Usability Testing, Load Testing, Stress Testing, Performance Testing, Compatibility Testing, Security Testing, Internationalization Testing, Localization Testing	
Module 3 Test Planning and testing techniques **6Hrs**	CO1

Test Strategy, Test Planning, Overview on Budgeting, Scheduling, Configuration Management, risk management, Static Testing Techniques: Importance of reviews in STLC, Review Activities, Roles and Responsibilities during Review, Dynamic Testing Techniques: Specification-based or black-box techniques, Boundary Value Analysis, Decision Table Testing, Equivalence Partitioning Experience-based Testing Techniques: Error Guessing, Exploratory Testing	to CO4
Module 4 Test design and Automation Testing 4Hrs	
Test Scenarios: Test Cases, Test Data, Test Coverage - Traceability Matrix, Test Reporting, Defect Management, Defect Severity and Priority, Defect Life Cycle Basics of automation testing: Why, when and how to perform automation testing, An overview for the major functional testing tools, An overview for the major non-functional testing tools Overview of Test management and defect tracking tools	CO1 to CO4
Module 5 Selenium Web Driver 6Hrs	
Understanding Architecture - JSON wire protocol: Introduction to Selenium Web Driver (use Eclipse IDE), Load Selenium Web Driver, Feature, classes and interfaces, different browser invocation methods, Create Selenese commands: Types of Locators - by ID, name, class, tag name, Xpath, How to identify different types of locators, ○ How to work with multiple attributes, How to create with multiple conditions, Xpath creation, Add Interactions, Text box - how to read any value from textbox: Radio button selection - identification of radio button and current values, Check box selection, Drop down item selection - select and list, Keyboard actions - single key or multiple keys / robot class, Mouse actions, Multi-select selection	CO1 to CO5
Module 6 TestNG and Jmeter 6Hrs	
Introduction to TestNG, Introduction to TestNG annotations, ○ BeforeSuite, AfterSuite, BeforeClass, AfterClass, BeforeTest, AfterTest, BeforeGroups, AfterGroups, BeforeMethod, AfterMethod, DataProvider, Factory, Parameters, Test: How to run tests parallely, How to include or exclude any group of test cases, How to ignore any test cases, How to prioritise any test cases, How to add dependencies on test, How to retry in case of failure, HTML test result reporting Introduction to Jmeter: Basic concepts on automation and load simulation, Introduction to HTTP, Debugging with Fiddler, First look at Jmeter's interface, Main building blocks, Recording a Script with Jmeter, Analyzing the Script, How to use Jmeter? Http Cookie Manager, Assertions in Jmeter, User defined variables in Jmeter, Introduction to Regular Expressions, Regular Expression Extractor, Variable correlation in JMeter	CO1 to CO5

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S Y B. Tech(I.T.) (2023 Pattern)

Sem-III

VAC151 - Advanced Python Programming

Teaching Scheme: TH : PR : 02 hrs./week	Credits Th: Practical: 01	Examination Scheme: CIA : 25 ESE :

Course Objectives:-

1. To learn how to design object-oriented programs with Python classes.
2. To learn about reading, writing and implementing other operation on files in Python.
3. To implement threading concept and multithreading on Python
4. To design GUI Programs and implement database interaction using Python.
5. To know about use of regular expression and handling exceptions for writing robust python programs.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: To implement OOP concepts in Python including Inheritance and Polymorphism

CO2: to work with files and perform operations on it using Python.

CO3: Ability to implement regular expression and concept of threads for developing efficient program

CO4: Ability to implement exception handling in Python applications for error handling.

CO5: Knowledge of working with databases, designing GUI in Python and implement networking in Python

Sr. no.	Practical Title	CO
1	Write a program to Python program to implement concepts of OOP such as a. Types of Methods b. Inheritance c. Polymorphism	CO1
2	Write a program to Python program to implement concepts of OOP such as a. Abstract methods and classes b. Interfaces	CO1
3	Write a program to Python program to implement various file operations.	CO2
4	Write a program to Python program to demonstrate use of regular expression for suitable application.	CO3
5	Write a Program to demonstrate concept of threading and multitasking in Python	CO3
6	Write a Python Program to demonstrate different types of exception handing.	CO4
7	Write Python Program to create application which uses date and time in Python	CO4
8	Write a Python program to create server-client and exchange basic information	CO5
9	Write a Python Program to work with databases in Python to perform operations such as a. Connecting to database b. Creating and dropping tables c. Inserting and updating into tables	CO5
10	Write a GUI Program in Python to design application that demonstrates a. Different fonts and colors b. Different Layout Managers c. Event Handling	CO5
Books & Other Resources		

Text Books:-

1. Paul Gries , Jennifer Campbell, Jason Montojo, Practical Programming: An Introduction to Computer Science Using Python 3, Pragmatic Bookshelf, 3rd Edition, 2018
2. Programming through Python, M. T Savaliya, R. K. Maurya, G M Magar, Revised Edition, Sybgen Learning India, 2020

Reference Books:-

1. Advanced Python Programming, Dr. Gabriele Lanaro, Quan Nguyen, SakisKasampalis, Packt Publishing, 2019
2. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018
3. Python: The Complete Reference, Martin C. Brown, McGraw Hill, 2018
4. Beginning Python: From Novice to Professional, Magnus Lie Hetland, Apress, 2017
5. Programming in Python 3, Mark Summerfield, Pearson Education, 2nd Ed, 2018

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (S.E. – I.T.) (2023 Pattern)

Sem-IV

2315207 - Software Engineering and Project Management

Teaching Scheme: TH : 03 Hrs./Week PR :	Credits Th:03 Practical:	Examination Scheme: CIA : 50 ESE : 50

Course Objectives:-

1. To learn and understand the principles of Software Engineering.
2. To be acquainted with methods of capturing, specifying, visualizing and analyzing software requirements.
3. To understand the fundamentals of Software Project Management
4. To investigate software project planning and management tools
5. To learn software project scheduling and tracking

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Apply software engineering principles to develop software.
CO2: Analyze software requirements and formulate design solution for a software
CO3: Explain concepts of project estimation, planning and scheduling.
CO4: Comprehend Project Management Concepts
CO5: Use various tools of Software Project Management
CO6: Schedule various activities in software projects

Units

Unit 1	Introduction to Software Engineering and Software Process Models (07 Hrs)	CO
Software Engineering Fundamentals: Introduction to software engineering, The Nature of Software, Defining Software, Software Engineering Practice. **Software Process:** A Generic Process Model, defining a Framework Activity, Identifying a Task Set, Process Patterns, Process Assessment and Improvement, Prescriptive Process Models, The Waterfall Model, Incremental Process Models, Evolutionary Process Models, Concurrent Models, A Final Word on Evolutionary Processes. Unified Process, Agile software development: Agile methods, plan driven and agile development.		**CO1**
Unit 2	**Software Requirements Engineering and Analysis (08 Hrs.)**	
Modelling: Requirements Engineering, Establishing the Groundwork, Identifying Stakeholders, Recognizing Multiple Viewpoints, working toward Collaboration, Asking the First Questions, Eliciting Requirements, Collaborative Requirements Gathering, Usage Scenarios, Elicitation Work Products, Developing Use Cases, Building the Requirements Model, Elements of the Requirements Model, Negotiating Requirements, Validating Requirements. **Suggested Free Open Source tools:** StarUML, Modelio, SmartDraw.		**CO2**
Unit 3	**Estimation and Scheduling (08 Hrs.)**	
Estimation for Software Projects: The Project Planning Process, Defining Software Scope and Checking Feasibility, Resources management, Reusable Software Resources, Environmental Resources, Software Project Estimation, Decomposition Techniques, Software Sizing, Problem-Based Estimation, LOC-Based Estimation, FP-Based Estimation, Object Point (OP)-based		**CO3**

estimation, Process-Based Estimation, Process-Based Estimation, Estimation with Use Cases, Use-Case–Based Estimation, Reconciling Estimates, Empirical Estimation Models, The Structure of Estimation Models, The COCOMO II Model, Preparing Requirement Traceability Matrix **Project Scheduling:** Project Scheduling, Defining a Task for the Software Project, Scheduling. **Suggested Free Open Source Tools:** GanttProject, Agantty, ProjectLibre.	
Unit 4 **Introduction to Software Project Management** **(06 Hrs.)**	**CO4**
Project Definition, Project versus Flow type work, Project Lifecycle, Processes and Knowledge Areas in Project Management (PM), Build or Buy decision, Work Breakdown Structure (WBS) and its types, Introduction to PMBOK, Program and Portfolio Management	
Unit 5 **Project Planning and Project Management Tools** **(06 hrs.)**	CO5
Project Planning: Steps for Project Planning, PERT and Gantt Charts, Gantt Project, Microsoft Project and Primavera Project Management Software, Objectives of Activity planning, Project Schedules, Activities, Sequencing and Scheduling, Network Planning Models, Formulating Network Model.	
Unit 6 **Activity based Scheduling** **(07 Hrs.)**	CO6
Introduction, Objectives of Activity Planning, Project Schedules. **Activities**: Sequencing and Scheduling, Network Planning Models, Formulating Network Model, Activity relationships (FS,SF,SS,FF), Forward Pass and Backward Pass techniques, Critical Path concept and remedies.	
Books & Other Resources	

Text Books:-

1. Roger Pressman, ―Software Engineering: A Practitioner‘s Approach‖, McGraw Hill, ISBN 0–07–337597–7
2. Ian Sommerville, ―Software Engineering‖, Addison and Wesley, ISBN 0-13-703515-2
3. Bob Hughes, Mike Cotterell and Rajib Mall, “Software Project Management”, Sixth Edition, Tata McGraw Hill, New Delhi, 2017.
4. Robert K. Wysocki, “Effective Software Project Management”, Wiley Publication, 2011

Reference Books:-

1. Carlo Ghezzi, ―Fundamentals of Software Engineering, Prentice Hall India, ISBN-10: 0133056996
2. Rajib Mall, ―Fundamentals of Software Engineering, Prentice Hall India, ISBN-13: 978-8120348981
3. Pankaj Jalote, ―An Integrated Approach to Software Engineering, Springer, ISBN 13: 9788173192715.
4. S K Chang, ―Handbook of Software Engineering and Knowledge Engineering, World Scientific, Vol I, II, ISBN: 978-981-02-4973-1
5. Tom Halt, ―Handbook of Software Engineering, Clanye International ISBN- 10: 1632402939
6. Walker Royce, “Software Project Management”, Addison-Wesley, 1998.
7. Jalote Pankaj, “Software Project Management in Practice”, Addison-Wesley Professional, 2002
8. PMBOK Guide

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech(Information Technology) (2023 Pattern)

Sem-IV

2315208: Advanced Database Management

Teaching Scheme: TH : 03 Hrs./Week	Credits Th:03	Examination Scheme: CIA : 50 ESE : 50

Course Objectives:-

1. The objective of the course is to present an introduction to database management system as a subject in its own right.
2. To understand the fundamental concepts of Relational Database management system.
3. To present SQL and procedural interfaces to SQL comprehensively.
4. To provide a strong formal foundation in Relational Database Concepts, database concepts, technology and practice &to introduce the concepts of Query Processing.
5. To introduce the concepts of Transaction Processing and to present the issues and techniques relating to concurrency and recovery in multi-user database environments.
6. To introduce the recent trends in database technology.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Apply fundamental elements of database management systems.
CO2: Design ER-models to represent simple database application scenarios.
CO3: Formulate SQL queries on data for relational databases.
CO4: Improve the database design by normalization & to incorporate query processing.
CO5: Apply ACID properties for transaction management and concurrency control.
CO6: Analyze various database architectures and technologies.

Units		
Unit 1	**Introduction to Database Management Systems (07 Hrs.)**	**CO**
Introduction : Introduction,Purpose of Database Systems,Advantages of DBMS over file processing systems, Data abstraction,Database languages, Data models, Data independence, Components of a DBMS, Overall structure of DBMS, Multi-user DBMS architecture, System catalogs, **Data Modeling:** Basic concepts, Entity, attributes,relationships, constraints, keys.		**CO1**
Unit 2	**ER Model (07 Hrs.)**	**CO2**
ER and EER diagrams: Components of ER model, Conventions,Extended E-R Features, Converting ER diagrams into tables **Relational Model:** Basic concepts, Attributes and Domains, Codd's rules. **Relational Integrity:** Nulls, Entity, Referential integrities, Enterprise constraints, Views, Schema diagram		
Unit 3	**SQL and PL/SQL (7 Hrs.)**	**CO3**
SQL Basics: Characteristics and Advantages, SQL Data Types and Literals, DDL, DML, DCL, TCL, SQL Operators. **Tables:** Creating, Modifying, Deleting, Updating **Views:** Creating, Dropping, Updation using Views, Indexes, Nulls. **SQL DML Queries:** SELECT query and clauses, Set operations, Tuple Variables, Set comparison, Ordering of Tuples , Aggregate Functions, Nested Queries, Database Modification using SQL Insert, Update, Delete Queries, Stored Procedure, Triggers, Programmatic SQL : Embedded SQL, Dynamic SQL, ODBC		
Unit 4	**Relational Database Design & Query Processing (07 Hrs.)**	**CO4**
Relational Databases Design: Purpose of Normalization, Data Redundancy and Update Anomalies, Functional Dependencies. The process of Normalization: 1NF, 2NF, 3NF, BCNF. **Introduction to Query Processing:** Overview, Measures of Query cost, Selection and Join operations, Evaluation of Expressions **Introduction to Query optimization:** Estimation, Transformation of Relational Expression		
Unit 5	**Database Transaction Management (07 Hrs.)**	**CO5**
Transaction Management: Basic concept of a Transaction, Properties of Transactions, Database Architecture, Concept of Schedule, Serial Schedule.		

Serializability: Conflict and View, Cascaded aborts Recoverable and Non-recoverable Schedules. **Concurrency Control:** Need Locking methods Dead locks, Time stamping Methods. Optimistic Techniques, Multi-version Concurrency Control. **Different crash recovery methods:** Shadow-Paging, Log-based Recovery: Deferred and Immediate, Check Points		
Unit 6	**Database Architectures and Emerging Technologies (07 Hrs.)**	**CO6**
Database Architectures: Centralized and Client-Server Architectures, 2 Tier and 3 Tier Architecture,Introduction to Parallel Databases, Key elements of Parallel Database Processing, Architecture of Parallel Databases, Introduction to Distributed Databases, Architecture of Distributed Databases, Distributed Database Design. **Emerging Database Technologies:** Introduction, No SQL Databases- Internet Databases, Cloud databases, Mobile Databases, SQLite database, XML databases		
Books & Other Resources		

Text Books:-

1. Silberschatz A., Korth H., Sudarshan S. “Database System Concepts”, 6 th edition, Tata McGraw Hill Publishers
2. G. K. Gupta “Database Management Systems” , Tata McGraw Hill

Reference Books:-

1. Rab P., Coronel C. “Database Systems Design, Implementation and Management”, 5 th edition, Thomson Course Technology, 2002
2. Elmasri R., Navathe S. “ Fundamentals of Database Systems”, 4 th edition, Pearson Education, 2003
3. Date C. “ An Introduction to Database Systems”, 7 th edition, Pearson Education, 2002
4. Ramkrishna R., Gehrke J. “ Database Management Systems”, 3rd edition, McGraw Hill

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

Information Technology (2023 Pattern)

Sem-IV

2315209: Microprocessor & Interfacing

Teaching Scheme: TH : 02 Hrs./Week	Credits: 02	Examination Scheme: CIA : 25 ESE : 50 TW :

Course Objectives:-

1. To understand to learn and distinguish the architecture and programmer's model of advanced processor.
2. To identify the system level features and processes of advanced processors.
3. To acquaint the learner with application instruction set and logic to build assembly language Programs.

Course Outcomes:-

On completion of the course, learner will be able to

- CO1: Exhibit skill of assembly language programming for the application.
- CO2: Classify Processor architectures.
- CO3: Illustrate advanced features of 80386 Microprocessor.
- CO4: Compare and contrast different processor modes.
- CO5: Identify and analyze the tools and techniques used to design, implement, and debug Microprocessor-based systems.

Units		
Unit 1	**Introduction to 80386 (07 Hrs.)**	**CO**
Brief History of Intel Processors, 80386 DX Features and Architecture, Programmers Model, Operating modes, Addressing modes and data types. Applications Instruction Set: Data Movement Instructions, Binary Arithmetic Instructions, Decimal, Arithmetic Instructions, Logical Instructions, Control Transfer Instructions, String and Character Transfer Instructions, Instructions for Block Structured Language, Flag Control Instructions, Coprocessor Interface Instructions, Segment Register Instructions		**CO1, CO2**
Unit 2	**Bus Cycles and System Architecture (07 Hrs.)**	**CO3**
Initialization- Processor State after Reset. Functional pin Diagram, functionality of various pins, I/O Organization, Memory Organization (Memory banks), Basic memory read and writes cycles with timing diagram. Systems Architecture- Systems Registers (Systems flags, Memory Management registers, Control registers, Debug registers, Test registers), System Instructions.		
Unit 3	**Memory Management (07 Hrs.)**	**CO1, CO2**
Global Descriptor Table, Local Descriptor Table, Interrupt Descriptor Table, GDTR, LDTR, IDTR. Formats of Descriptors and Selector, Segment Translation, Page Translation, Combining Segment and Page Translation.		
Unit 4	**Interrupts, Exceptions, and Introduction to Microcontrollers (07 Hrs.)**	**CO4**
Interrupts and Exceptions: Identifying Interrupts, Enabling and Disabling Interrupts, Priority among Simultaneous Interrupts and Exceptions, Interrupt Descriptor Table (IDT), IDT Descriptors, Interrupt Tasks and Interrupt Procedures, Error Code, and Exception Conditions. Introduction to Microcontrollers: Architecture of typical Microcontroller, Difference between Microprocessor and Microcontroller, Characteristics of microcontrollers, Application of Microcontrollers		
Books & Other Resources		

Text Books:-

1. Douglas Hall, “Microprocessors & Interfacing”, McGraw Hill, Revised 2 Edition, 2006 ISBN 0-07-100462-9
2. A. Ray, K. Bhurchandi, ”Advanced Microprocessors and peripherals: Arch, Programming & Interfacing”, Tata McGraw Hill,2004 ISBN 0-07-463841-6
3. Intel 80386 Programmer's Reference Manual 1986, Intel Corporation, Order no.: 231630-011, December 1995.
4. James Turley- “Advanced 80386 Programming Techniques”, McGraw-Hill, ISBN: 10:0078813425, 13: 978-0078813429.

Reference Books:-

1. Chris H. Pappas, William H. Murray, “80386 Microprocessor Handbooks”, McGraw-Hill

Osborne Media, ISBN-10: 0078812429, 13: 978-0078812422.
2. Walter A. Triebel, “The 80386Dx Microprocessor: Hardware”, Software, and Interfacing, Pearson Education, ISBN: 0137877307, 9780137877300.
3. Brey, Barry B, “8086/8088, 80286, 80386 and 80486 Assembly Language Programming”, Prentice Hall, ISBN: 13: 9780023142475.
4. Mohammad Rafiquzzaman, "Microprocessors: Theory and Applications: Intel and Motorola", Prentice Hall, ISBN:-10:0966498011, 13:978:0966498011.
5. Introduction to 64 bit Intel Assembly Language Programming for Linux, 2nd Edition, Ray Seyfarth, ISBN10: 1478119209, ISBN-13: 9781478119203, 2012.
6. Assembly Language Step-by-step: Programming with Linux, 3rd Edition, Jeff Duntemann, Wiley ISBN:-10 0470497025, ISBN-13: 978-0470497029, 2009.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

Information Technology (2023 Pattern)

Sem-IV

2315210: Wireless Sensor Network

Teaching Scheme: TH : 02 Hrs./Week	Credits: 02	Examination Scheme: CIA : 25
	Theory: 02	ESE : 50
		TW :

Course Objectives:-

1. To make students understand the basics of Wireless sensor Networks.
2. To familiarize with learning of the Architecture of WSN.
3. To understand the concepts of Networking and Networking in WSN.
4. To study the design consideration of topology control and solution to the various problems

Course Outcomes:-

On completion of the course, learner will be able to

- CO1: Understand challenges and technologies for wireless networks
- CO2: Understand architecture and sensors
- CO3: Describe the communication, energy efficiency, computing, storage and transmission
- CO4: Explain the concept of programming the in WSN environment

Units

Unit 1	Introduction of WSN	(07 Hrs.)	CO
Introduction: Fundamentals of wireless communication technology, the electromagnetic spectrum radio propagation, characteristics of wireless channels, modulation techniques, multiple access techniques, wireless LANs, PANs, WANs, and MANs, Wireless Internet.			CO1
Unit 2	**Architectures**	**(07 Hrs.)**	CO2
Introduction to adhoc/sensor networks: Key definitions of adhoc/ sensor networks, unique constraints and challenges, advantages of ad-hoc/sensor network, driving applications, issues in adhoc wireless networks, issues in design of sensor network, sensor network architecture			
Unit 3	**MAC Protocols**	**(07 Hrs.)**	CO3
Issues in designing MAC protocols for adhoc wireless networks, design goals, classification of MAC protocols, MAC protocols for sensor network, location discovery, quality, other issues, S-MAC, IEEE 802.15.4.			
Unit 4	**Routing Protocols**	**(07 Hrs.)**	CO4
Issues in designing a routing protocol, classification of routing protocols, table-driven, on-demand, hybrid, flooding, hierarchical, and power aware routing protocols.			

Text Books:-

1. C. Siva Ram Murthy, and B. S. Manoj, "AdHoc Wireless networks ", Pearson Education.
2. Waltenegus Dargie , Christian Poellabauer, “Fundamentals Of Wireless Sensor Networks - Theory And Practice”, John Wiley & Sons Publications, 2011

Reference Books:-

1. Feng Zhao and Leonides Guibas, "Wireless sensor networks ", Elsevier publication - 2004.
2. Jochen Schiller, "Mobile Communications", Pearson Education, 2nd Edition, 2003.
3. William Stallings, "Wireless Communications & Networks ", Pearson Education - 2004.
4. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (S.E. – I.T.) (2023 Pattern)
Sem-IV

2315211 - Software Engineering and Project Management Lab

Teaching Scheme: TH : PR : 02 hrs./week	Credits Th: Practical: 01	Examination Scheme: ESE (PR) : 25

Course Objectives:-

1. To learn and understand the principles of Software Engineering & Project Management
2. To investigate software project planning and management tools

Course Outcomes:-

On completion of the course, learner will be able to

CO1: draw different types of UML diagrams

CO2: Schedule various activities in software projects

Sr. no.	Practical Title	CO
1	Draw a Use Case Diagram of Ticket vending machine	CO1
2	Draw a communication diagram of online bookshop	CO1
3	Draw a Class Diagram for mall management system	CO1
4	Draw a package diagram of online shopping system	CO1
5	Draw a sequence diagram of online bookshop	CO1
6	Draw an Activity Diagram of flight reservation system	CO1
7	**Create Project Plan** ▪ Specify project name and start (or finish) date. ▪ Identify and define project tasks. ▪ Define duration for each project task. ▪ Define milestones in the plan ▪ Define dependency between tasks ▪ Define project calendar. ▪ Define project resources and specify resource type ▪ Assign resources against each task and baseline the project plan	CO2
8	**Execute and Monitor Project Plan** ▪ Update % Complete with current task status. ▪ Review the status of each task. ▪ Compare Planned vs Actual Status ▪ Review the status of Critical Path ▪ Review resources assignation status	CO2
Books & Other Resources		

Text Books:-

1. Roger Pressman, ―Software Engineering: A Practitioner‘s Approach‖, McGraw Hill, ISBN 0–07–337597–7

2. Ian Sommerville, ―Software Engineering‖, Addison and Wesley, ISBN 0-13-703515-2

3. Bob Hughes, Mike Cotterell and Rajib Mall, “Software Project Management”, Sixth Edition, Tata McGraw Hill, New Delhi, 2017.

4. Robert K. Wysocki, "Effective Software Project Management", Wiley Publication, 2011

Reference Books:-

1. Carlo Ghezzi, —Fundamentals of Software Engineering, Prentice Hall India, ISBN-10: 0133056996
2. Rajib Mall, —Fundamentals of Software Engineering, Prentice Hall India, ISBN-13: 978-8120348981
3. Pankaj Jalote, —An Integrated Approach to Software Engineering, Springer, ISBN 13: 9788173192715.
4. S K Chang, —Handbook of Software Engineering and Knowledge Engineering, World Scientific, Vol I, II, ISBN: 978-981-02-4973-1
5. Tom Halt, —Handbook of Software Engineering, Clanye International ISBN- 10: 1632402939
6. Walker Royce, "Software Project Management", Addison-Wesley, 1998.
7. Jalote Pankaj, "Software Project Management in Practice", Addison-Wesley Professional, 2002

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech(Information Technology) (2023 Pattern)
Sem-IV

2315212: Advanced Database Management Lab

Teaching Scheme:	Credits	Examination Scheme:
PR : 02 Hrs./Week	Practical:01	ESE : 25b

Course Objectives:-

1. Understand the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
2. To provide a strong formal foundation in database concepts, recent technologies and best industry practices.
3. To give systematic database design approaches covering conceptual design, logical design and an overview of physical design.
4. To learn the SQL database system.
5. To learn and understand various Database Architectures and its use for application development.
6. To program PL/SQL including stored procedures, stored functions, cursors and packages.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B.Tech(Information Technology) (2023 Pattern)
Sem-IV

2315212: Advanced Database Management Lab

Course Outcomes:-

On completion of the course, learner will be able to

- CO1: Install and configure database systems.
- CO2: Analyze database models & entity relationship models.
- CO3 : Design and implement a database schema for a given problem-domain
- CO4: Implement relational database systems.
- CO5: Populate and query a database using SQL DDL / DML / DCL commands.
- CO6 :Design a backend database of any one organization

Suggested List of Laboratory Experiments/Assignments

Sr.No.	Title	CO
1	Install and configure client and server of MySQL.(Show all commands and necessary steps for installation and configuration)	CO1
2	Study of SQLite: What is SQLite? Uses of Sqlite. Building and installing SQLite.	CO1
3	Design any database with at least 3 entities and relationships between them. Draw suitable ER/EER diagram for the system.	CO2, CO3
4	Design and implement a database (for assignment no 1) using DDL statements and apply normalization on them	CO2, CO3
5	Create Table with primary key and foreign key constraints. a. Alter table with add n modify b. Drop table	CO4, CO5

6	Perform following SQL queries on the database created in assignment 1. • Implementation of relational operators in SQL • Boolean operators and pattern matching • Arithmetic operations and built in functions • Group functions • Processing Date and Time functions • Complex queries and set operators	CO4, CO5
7	Write and execute PL/SQL stored procedure and function to perform a suitable task on the database. Demonstrate its use.	CO6
8	Write and execute suitable database triggers .Consider row level and statement level triggers.	CO6
9	Write a PL/SQL block to implement all types of cursor.	CO6
Books & Other Resources		

Text Books:-

1. Silberschatz A., Korth H., Sudarshan S. “Database System Concepts”, 6 th edition, Tata McGraw Hill Publishers

2. G. K. Gupta “Database Management Systems” , Tata McGraw Hill

Reference Books:-

Dr. P. S. Deshpande, "SQL and PL/SQL for Oracle 10g Black Book", DreamTech

Ivan Bayross, "SQL, PL/SQL: The Programming Language of Oracle", BPB Publication

Reese G., Yarger R., King T., Williums H, "Managing and Using MySQL", Shroff Publishers and

Distributors Pvt. Ltd., ISBN: 81 - 7366 - 465 – X, 2nd Edition

Eric Redmond, Jim Wilson, "Seven databases in seven weeks", SPD, ISBN: 978-93-5023-91

Jay Kreibich, Using SQLite, SPD, ISBN: 978-93-5110-934-1, 1st edition

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-IV : Web Design Using HTML & CSS (2315213A)

Open Elective-II

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2 hrs/week	**Th:02**	**Theory**	**CIA: 25**
Practical:			**End-Sem:50**
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Understand and apply the principles of web design, domain registration, web publishing
2. Implement a website using HTML
3. Beautify the website using CSS

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Understand and use the principles and concepts of website design to implement websites

CO2: Comprehend basic components of HTML in designing the static website

CO3: Comprehend basic components of HTML in designing the framework for complex websites.

CO4: Comprehend basic components of CSS in beautifying the websites

CO5: Design, implement, and launch their own website

Unit 1: Introduction to web design 7Hrs	**CO**
Web Design Principles : Basic principles involved in developing a web site ,Planning process , Five Golden rules of web designing ,Designing navigation bar ,Page design , Home Page Layout , Design Concept. Basics in Web Design: Brief History of Internet , What is World Wide Web , Why create a web site , Web Standards , User requirement.	CO1
Unit 2 Introduction to HTML 7Hrs	CO1 , CO2, CO3
What is HTML , HTML Documents ,Basic structure of an HTML document , Creating an HTML document , Mark up Tags , Heading-Paragraphs , Line Breaks , HTML Tags. Elements of HTML : Introduction to elements of HTML , Working with Text , Working with Lists, Tables and Frames ,Working with Hyperlinks, Images and Multimedia , Working with Forms and controls.	
Unit 3 Introduction to CSS 7Hrs	CO4

Concept of CSS , Creating Style Sheet , CSS Properties , CSS Styling(Background, Text Format, Controlling Fonts) , Working with block elements and objects , Working with Lists and Tables , CSS Id and Class , Box Model(Introduction, Border properties, Padding Properties, Margin properties) , CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align,Pseudo class, Navigation Bar, Image Sprites, Attribute sector) , CSS Color , Creating page Layout and Site Designs	
Unit 4 Introduction to Web Publishing or Hosting 7Hrs	CO1 & CO5
Registering domain name, finding web hosting services, Creating the Web Site , Saving the site ,Working on the web site , Creating web site structure , Creating Titles for web pages , Themes-Publishing web sites.	

Text Books:

1. Willard. "HTML: A Beginner's Guide", Tata-McGraw –Hill Education, 2009
2. Winton. P. "Beginning Java Script (2nd Edition), John Wiley & Sons, 2004
3. Young. L. M. " Internet, The Complete Reference", 2nd Edition, McGraw-Hill, 2000.

Reference books:

1. Shelly,B.G., Woods, M.D., "HTML – Complete Concepts and Techniques", 5th Edition, Cengage Learning, 2008
2. Powell, A.T., "HTML: The complete reference", 3rd Edition, Osborne / McGraw- Hill, 2001
3. Levine,R.J., Young, L.M., "The Internet for Dummies", 13th Edition, John Wiley & Sons, 2011.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (S.E. – I.T.) (2023 Pattern)

Sem-IV

2315213B - Intellectual Property Rights & Laws

Teaching Scheme: TH : 02 Hrs./Week PR :	Credits Th:02 Practical:	Examination Scheme: CIA : 25 ESE : 50

Course Objectives:-

1. TO make the students aware of their rights for the protection of their invention done in their project work.
2. To get registration in our country and foreign countries of their invention, designs and thesis or theory written by the students during their project work and for this they must have knowledge of patents, copy right, trademarks, designs and information Technology Act.
3. To get awareness of acquiring the patent
4. To have copyright for their innovative works.
5. To get the knowledge of plagiarism in their innovations which can be questioned legally

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Gain knowledge about IPR

CO2: understand basic concepts of patent rights and copyrights

CO3: Know about trademark basics

CO4: Understand about IT act 2000

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B. Tech (S.E. – I.T.) (2023 Pattern)
Sem-IV
2315213B - Intellectual Property Rights & Laws

Units		
Unit 1	**Introduction To IPR** **(07 Hrs)**	**CO**
Introduction To IPR: Meaning of property, Origin, Nature, Meaning of Intellectual Property Rights , Kinds of Intellectual property rights—Copy Right, Patent, Trade Mark, Trade Secret		**CO1**
Unit 2	**Patent Rights And Copy Rights** **(08 Hrs.)**	**CO2**
Origin, Meaning of Patent, Types, Inventions which are not patentable, Registration Procedure, Rights and Duties of Patentee, Assignment and licence , Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties. Copy Right—Origin, Definition &Types of Copy Right, Registration procedure, Assignment & licence, Terms of Copy Right, Piracy, Infringement, Remedies		
Unit 3	**Trade Marks** **(07 Hrs.)**	**CO3**
Origin, Meaning & Nature of Trade Marks, Types, Registration of Trade Marks, Infringement & Remedies, Offences relating to Trade Marks, Passing Off, Penalties. Domain Names on cyber space		
Unit 4	**Basic Tenents Of Information Technology Act-2000** **(06 Hrs.)**	**CO4**
IT Act - Introduction ,E-Commerce and legal provisions, E- Governance and legal provisions , Digital signature and Electronic Signature.		
Books & Other Resources		

Text Books:-

1. Intellectual Property Rights and the Law, Gogia Law Agency, by Dr. G.B. Reddy
2. Law relating to Intellectual Property, Universal Law Publishing Co, by Dr. B.L.Wadehra
3. IPR by P. Narayanan
4. Law of Intellectual Property, Asian Law House, Dr.S.R. Myneni.

Reference Books:-

1. D.P. Mittal (Taxman Publication), Indian Patents Law and Procedure
2. B.L. Wadera, Patents, trademarks, copyright, Designs and Geographical Judications.
3. P. Narayanan (Eastern Law House), Intellectual Property Law
4. N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property (2009), Eastern Book Company, Lucknow

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) *(2023 Pattern)*

Sem-IV

2300205A : German Language

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2 hrs/week	**Th:02**	**Theory**	**CIA: 25**
Practical: Nil			**End-Sem:50**
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Understand grammar & structure of the German language and use it in daily basic conversations and communication
2. Speak and write German language
3. Critically think in German

Course Outcomes:

On completion of the course, learner will be able to–

CO1: do the proper pronunciation of the sounds of the German language

CO2: understand a basic vocabulary

CO3: comprehend the basic grammatical structures.

CO4: understand German that is spoken at a moderate conversational speed andthat deals with everyday topics and will be able to engage in simple conversations in everydaysituations.

CO5: demonstrate that they can think critically, read& write with a basic knowledge of non-technical German

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) *(2023 Pattern)*

Sem-IV

2300205A : German Language

Module 1: Introduction **7Hrs**	**CO**
Greetings , Introduction To Basic Phonetics; Writing System; Tones; Spelling Rules ,Introducing Oneself And Others , Talk About Family and Family Members, Expresslikes and dislikes , Hobbies, Asking For Personal Information ,Talking About Date,Month, Year, Talking About Time ,Talking About Age	CO1
Module 2: Grammar **7Hrs**	CO1 , CO2, CO3
Alphabet- Numerals - Nominal Classifiers – Sentences with Adjectival Predicate – Names ofCountries and places- Personal Pronoun- Interrogative Sentences - Structural Particle - Verbs andVerb Conjugation – Articles- Singular and Plural- Prepositions – Negative articles – Ja/Nein andW-Fragen (Yes/No and W- Questions) - Negation – Adjective- Possessive Article – Nominativeand Accusative cases – Writing notes, SMS and filling up forms- Listen and UnderstandTelephonic Conversation and Conversations at specific places- Songs and Quiz	
Module3: Oral Communication **7Hrs**	CO4, CO5
Stellungnahme (Taking a particular stance on a given topic)/ Debate/Discussions/ Interview/ Role play/ group discussion/ Narration,interview skills etc.	
Module4:Writing Communication **7Hrs**	CO1 & CO5
Writing skills: Formal and Informal letters, Email, SMS blogs, Essays,Report, Article, statistical Analysis, book/Film review etc	

Text Books:

1. Kraft, Wolfgang S. Deutsch Aktuell 1, 7th edition (2017). St. Paul: EMC/ParadigmPublishing. ISBN 978-0-8219-8076-7
2. Kraft, Wolfgang S. Deutsch Aktuell 1 Workbook, 7th edition (2017). St. Paul:EMC/Paradigm Publishing. ISBN 978-0-8219-8078-1

Reference books:

1. Funk, Hermann u.a. (hrsg.): Studio D A1. Deutsch AlsFremdsprache. Kurs Und Übungsbuch.Cornelsen and GOYAL SaaB. , 2009.
2. Funk, Hermann, u.a. (hrsg.): Studio D A1. Deutsch AlsFremdsprache. Sprachtraining. Cornelsenand GOYAL SaaB. , 2009.
3. Hirschfeld, Ursula, Reinke, Kerstin, Stock, Eberhard (hrsg.): Phonothekintensiv. München.Langenscheidt, 2007.
4. Studio 21 A1 Glossardeutsch-englisch, CornelsenVerlag, Berlin, 2013.
5. Tangram aktuell 1, Max HueberVerlag, Ismaning 2005 and GOYAL Publishers, Delhi2005.
6. Swick, Ed: Complete German Grammar.Mcgraw-Hill Publ. Comp. New York City, 2012.
7. Evans, Richard J.: Rereading German History, 1800-1996. From Unification to
8. Reunification.Routledge.London& New York, 1997.
9. Fraser, Catherine C. & Hoffmann, Dierk O. (hrsg.): Pop Culture in Germany! Media, Art andLifestyle.ABC-CLIO.England, 2006.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) *(2023 Pattern)*

Sem-IV

2300205B : French Language

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2 hrs/week	**Th:02**	**Theory**	**CIA: 25**
Practical: Nil			**End-Sem:50**
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Understand grammar & structure of the French language and use it in daily basic conversations and communication
2. Speak and write French language
3. Critically think in French

Course Outcomes:

On completion of the course, learner will be able to–

CO1: do the proper pronunciation of the sounds of the French language
CO2: understand a basic vocabulary
CO3: comprehend the basic grammatical structures.
CO4: understand French that is spoken at a moderate conversational speed andthat deals with everyday topics and will be able to engage in simple conversations in everydaysituations.
CO5: demonstrate that they can think critically, read& write with a basic knowledge of non-technical French

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) ***(2023 Pattern)***

Sem-IV

2300205B : French Language

Module 1: Introduction **7Hrs**	**CO**
Greetings , Introduction To Basic Phonetics; Writing System; Tones; Spelling Rules , Introducing Oneself And Others , Talk About Family and Family Members, Express likes and dislikes, Hobbies, Asking For Personal Information ,Talking About Date, Month, Year, Talking About Time, Talking About Age	CO1
Module 2: Grammar **7Hrs**	CO1, CO2, CO3
Alphabet- Numerals - Nominal Classifiers – Sentences with Adjectival Predicate – Names of Countries and places- Personal Pronoun- Interrogative Sentences - Structural Particle - Verbs and Verb Conjugation – Articles- Singular and Plural- Prepositions – Negative articles –- Negation – Adjective- Possessive Article – Nominative and Accusative cases – Writing notes, SMS and filling up forms- Listen and Understand Telephonic Conversation and Conversations at specific places- Songs and Quiz	
Module3:Oral Communication **7Hrs**	CO4, CO5
Stellungnahme (Taking a particular stance on a given topic)/ Debate/ Discussions/ Interview/ Role play/ group discussion/ Narration, interview skills etc.	
Module4:Writing Communication **7Hrs**	CO1, CO5
Writing skills: Formal and Informal letters, Email, SMS blogs, Essays, Report, Article, statistical Analysis, book/Film review etc	

Text Books:

1. Alter Ego, A1 (ISBN: 9782011554208); Publisher: Hachette; Author: Annie Berthet, Catherine Hugot et al.; Published: 2006;
2. Alter Ego, A1 – Cahier d'activités - A1 (ISBN: 9782011558114); Publisher: Hachette; Author:Annie Berthet, Catherine Hugot et al.; Published: 2006

Reference books:

1. Écho (2e edition), A1 (ISBN: 9782090385885); Publisher: CLE International; Authors: Jacky Girardet, Jacques Pecheur; Published: 2013
2. Écho (2e edition), A1 - Cahier personnel d'apprentissage (ISBN: 9782090385892); Publisher: CLE International; Authors: Jacky Girardet, Jacques Pecheur; Published: 2013.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S. Y. B.Tech. (Common) *(2023 Pattern)*

Sem - IV

2300206:Industrial Economics

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2hrs/week	**Th:02**	**Theory**	**CIA: 25**
			End-Sem:50
		Pract:	**--**
		Oral:	**--**
		Term work	**--**

Course Objectives: The student should be able to

1. Upon completion of the course, students will gain comprehensive knowledge of industrial organization, serving as a cornerstone for exploring various interconnected fields within the industry.
2. Students will develop a profound understanding of how firms interact within the economy, encompassing areas such as business strategy, corporate finance, marketing, international trade, banking, and organizational economics.
3. The course will offer insights into the historical progression of industrial economies, with a primary focus on contemporary advancements in studying firms' behavior.
4. By the end of the curriculum, learners will be equipped with a holistic perspective on industrial organization, paving the way for exploration into numerous other disciplines linked to the industrial sector.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Including its definition, scope, and economic significance in various sectors.

CO2: recognize the importance of studying Industrial Economics and its role in economic analysis, decision-making, and influencing diverse fields such as marketing, finance, and international trade.

CO3: analyze the interplay between economic development and industrialization, as well as the impact of industrialization on the agricultural sector.

CO4: identify and assess key factors influencing industrial development, considering socioeconomic and political influences on industrial growth.

CO5: comprehend the dynamics of competition and cooperation among firms, their implications on industrial outcomes, and the strategies like mergers, takeovers, and acquisitions.

CO6: analyze industrial location decisions, determine the determinants of industrial location, and evaluate theories like Weber's and Florence's to understand industrial location patterns.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) (*2023 Pattern)*

Sem-IV

2300206:Industrial Economics

Unit 1 - Introduction to Industrial Economics **7Hrs**	**CO**
Definition of Industrial Economics and its scope of study, Understanding the industrial sector's economic significance, Importance of Industrial Economics, Need and Significance of Studying Industrial Economics, Role of Industrial Economics in Economic Analysis, Economic Development, Agricultural Development, and Industrialization, Interplay between Economic Development and Industrialization, Impact of Industrialization on Agricultural Sector, Factors Influencing Industrial Development, Analysis of Key Factors Affecting Industrial Growth, Socioeconomic and Political Factors in Industrial Development.	CO1, CO2
Unit 2- Industrial Decisions and Market Structure **7Hrs**	CO3, CO4
Competition and Cooperation in Industries, The concept of Competition and Cooperation among Firms, Implications of Different Approaches on Industrial Outcomes, Firm Behavior and Market Outcomes, Understanding Firm Behavior under Different Market Structures, Relationship between Firm Behavior and Market Outcomes, Cartels, Collusion, Mergers, Takeovers, and Acquisitions, Overview of Cartels and Collusion in Industries, Merger, Takeover, and Acquisition Strategies.	
Unit 3- Price Competition and Pricing Strategies **7Hrs**	CO5
Factors Influencing Pricing Decisions, General Considerations for Pricing Decisions in Various Industries, Market Conditions and Pricing Strategies, Pricing under Perfect & Imperfect Competition: Theoretical Perspectives, Pricing Strategies in Perfectly Competitive Markets, Pricing Challenges in Imperfectly Competitive Markets, Pricing Procedures and Methods in Practice, Practical Approaches to Pricing Decisions, Comparative Analysis of Pricing Methods, Pricing in Public Enterprises, Pricing Policies and Practices in Public Sector Enterprise, Economic and Social Implications of Public Enterprise Pricing, Price Wars: Theories and Empirical Evidence, Theoretical Explanations of Price Wars, Empirical Evidence and Impact on Industries	
Unit 4 - Non-Price Competition and Product Differentiation **7Hrs**	CO6
Non-Price Competition and Product Differentiation, Understanding Non-Price Competition and Product Differentiation, Importance of Product Differentiation in Competitive Markets, Horizontal Product Differentiation, Analysis of Horizontal Product Differentiation and Consumer Behavior, Case Studies and Examples, Brand Proliferation as an Entry Deterrence Strategy, The Role of Brand Proliferation in Deterring New Entrants, Evaluation of Effectiveness and Challenges, Vertical Product Differentiation, Explanation of Vertical Product Differentiation and its Implications, Comparison with Horizontal Differentiation, Price Discrimination: First-, Second-, and Third-Degree Price Discrimination.	

Text Books:

1. “Modern Small Industry in India" -R. K. Vepa
2. “Problems of Accountability of Public Enterprises in India" -M. P. Srivastava
3. “Economic Development Perspectives, Vol. 3, Public Enterprises and Performance" -Binode Mohanty
4. “Public Enterprises in India - Principles and Performance" - V. K. L. Srivastava

Reference Books / Reading:

1. “Industrial Economics - Issues and Perspectives"- Paul R. Ferguson and Glenys J. Ferguson
2. “The Economics of Industrial Organization" - William G. Shepherd
3. “Modern Small Industry for Developing Countries"- E. Staley and R. Morse
4. “Indian Growth and Stagnation - The Debate in India" - A. V. Desai

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** **S.E. B. Tech(Common) *(2023 Pattern)*** Sem-IV 2318702 : Motherboard Repairing

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:	**Th:**	**Theory**	**CIA:**
Practical: 2 hrs/Week			**End-Sem:**
		Pract:	--
		Oral:	--
		Termwork	--25

Course Objectives: The student should be able to

1. Understand the fundamental components and architecture of a computer motherboard.
2. Develop the ability to diagnose common motherboard-related problems.
3. Gain hands-on experience in repairing and troubleshooting various motherboard issues.
4. Learn best practices for handling sensitive electronic components to avoid damage.
5. Familiarize with essential tools and equipment used in motherboard repairing.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Knowledge of Motherboard Components .

CO2: Diagnosis and Troubleshooting Skills.

CO3: Understand and Practical Repairing Skills

CO4: Handling BIOS and Firmware Advanced Repair Techniques

Module 1:	**7Hrs**	**CO**
i. Introduction to Computer Motherboards ● Understanding the role of a motherboard in a computer system. ● Overview of motherboard components and their functions. ● Different motherboard form factors and their significance. **ii. Basic Electronics and Component Identification** ● Basics of electronics and circuitry relevant to motherboard repairing. ● Identifying essential electronic components on a motherboard. ● Introduction to the use of multimeters and other diagnostic tools. **iii. Common Motherboard Problems and Troubleshooting** ● Identifying common motherboard issues: power failure, boot failure, and more.		CO1 to CO2

● Troubleshooting techniques for diagnosing motherboard problems. ● Reading motherboard diagnostic indicators and error codes.	
Module 2: **7Hrs**	
i. Motherboard Repairing Techniques ● Repairing and replacing defective capacitors and resistors. ● Replacing damaged or faulty connectors (RAM slots, CPU sockets, etc.). ● Soldering and desoldering techniques for motherboard components. **ii. BIOS and Firmware Management** ● Understanding the Basic Input Output System (BIOS). ● Updating and flashing the BIOS firmware safely. ● Troubleshooting BIOS-related issues. **iii. Advanced Motherboard Repairs** ● Repairing motherboard traces and damaged PCBs. ● Fixing liquid damage on motherboards. ● Handling other complex motherboard issues (e.g., VRM, chipset, etc.)	CO3 to CO4

Text Books:

1. "Upgrading and Repairing PCs" Author: Scott Mueller Publisher: Que Publishing
2. "CompTIA A+ Certification All-in-One Exam Guide" Author: Mike Meyers Publisher: McGraw-Hill Education
3. "The Complete Idiot's Guide to PC Repair" Author: Joe Kraynak Publisher: Alpha
4. "How Computers Work" Author: Ron White Publisher: Que Publishing
5. "Electronics for Dummies" Author: Cathleen Shamieh Publisher: For Dummies

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-IV : System Analyst Certification Course (2315802)

Employability Enhancement Course

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:	**Th:**	**Theory**	**CIA:**
Practicals: 2 Hrs/week	**Audit Course**		**End-Sem:**
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and describe the role of drone in present, past and future society

CO2: Comprehend basic components of drone.

CO3: Explain the impact of various payloads of drone.

CO4: Interpret the aspects of legal issues

CO5: Implement and design application oriented drone.

Module 1: Introduction 7Hrs	**CO**
System Analysis Fundamentals: Introducing SA&D concepts, Roles of system analyst. The system development life cycle, Using CASE tools. Depicting system graphically, determining feasibility, activity planning and control. Information requirements analysis: Sampling and investigating data, interviewing.	CO1 to CO4
Module 2 Analysis Process 7Hrs	CO1 to CO5
Prototyping Tutorial ,The analysis process Using data flow diagram; Using data dictionaries Assignment , Describing process specifications and structured decisions; The system proposal.	
Module 3 System Design 7Hrs	CO1 to CO5
The essentials of design designing output; designing input ,Designing the file or database Designing the user interface ,Second Exam Designing data , Documenting the design phase	
Module 4 7Hrs	CO1 to CO5
Software engineering and implementation Quality assurance through software engineering; Implementing the information system	

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) *(2023 Pattern)*

Sem-IV

2300207:Industrial Work Study

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 2hrs/week	**Th:02**	**Theory**	**CIA: 25**
Practical: --	**Practical: --**		**End-Sem:50**
Prerequisite : Nil		**Pract:**	**--**
		Oral:	**--**
		Termwork	**--**

Course Objectives:

1. To teach students about how to measure work, optimize methods and fix pay accordingly.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Explain different method study procedures and can implement them for optimizing work approaches.

CO2: Evaluate the work content and can fix standard time for performing work.

CO3: Analyze the data through work sampling.

CO4: Design the plans for fixing incentive and wages based on performance.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech (Common) *(2023 Pattern)*

Sem-IV

2300207:Industrial Work Study

Units		
Unit 1	**Method Study** **7 Hrs**	**CO**
Purpose of work study, its objectives, procedure and applications; method study definition and basic procedure, selection of job, various recording techniques like outline process charts, flow process charts, man machine charts, two handed process charts, string diagram, flow diagram, multiple activity chart, simo, cyclographs and chrono-cyclographs; critical examination, development, installation and maintenance of improved method; principles of motion economy and their application in work design; micro motion study, memo motion study and their use in methods study.		**CO1**
Unit 2	**Work Measurement** **7 Hrs**	**CO2**
Introduction & definition, objectives and basic procedure of work measurement; application of work measurement in industries; time study: basic procedure, equipment needed, methods of measuring time, selection of jobs, breaking a job into elements; numbers of cycles to be timed; rating and methods of rating, allowances, calculation of standard time.		
Unit 3	**Work Sampling** **7 Hrs**	**CO3**
Basic procedure, design of work sampling study, conducting work sampling study and establishment of standard-time.		
Unit 4	**Job Evaluation and Incentive Schemes** **7 Hrs**	**CO4**
Starlight line, Tailor, Merrick and Gantt incentive plans, Standard data system; elemental and non-elemental predetermined motion systems, work factors system; Methods, Time Measurement (MTM), MOST		

Text Books

1. Barrnes RM; Motion and Time Study; Wiley Publications.
2. Currie RM; Work study; BIM publications.

Reference Books

1. Mynard; Hand book of Industrial Engineering.
2. Telsang, M.; Industrial Engineering and Production Management, S. Chand Publishers.
3. ILO; work-study; International Labour Organization.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-IV : Block Chain & Crypto System (VAC152)

Value Added Course

Teaching Scheme:	Credits	Examination Scheme	
Theory:	Th:	Theory	CIA:
Practical 2hrs/week	Pr: 01		End-Sem:
		Pract:	--
		Oral:	--
		Termwork	--25

Course Objectives: The student should be able to

1. Recognize and describe the principles and concept of blockchain, its basic components
2. Recognize and describe the different platforms and applications of blockchain
3. Recognize and describe the advantages and limitations of blockchain

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and describe the principles and concept of blockchain

CO2: Comprehend and use basic components of blockchain

CO3: Recognize and use different blockchain platforms

CO4: Recognize and understand different Blockchain applications

CO5: Recognize and understand different Blockchain limitations and benefits.

Module 1: Introduction to Blockchain technology 7Hrs	**CO**
Why Do We Need a Decentralised Ledger System? Why Do We Need a Decentralised Ledger System? Having a Centralised Trusted Party - Advantages and Disadvantages, Security, Integrity and Privacy Issues of a Decentralized System, Blockchain - A Technology that Makes Sense with Trust and Coordination What Are the Main Barriers to Blockchain Adoption? Why Use Blockchain Technology?	CO1
Module 2 Technological and Cryptographic Elements in Blockchain 7Hrs	CO1 &CO2
Cryptographic Elements: Public Key & Private Key, Digital Signature & Hash Value, Real-life Scenario Challenges Cryptographic Technology: Key Questions for Blockchain Cryptographic Technology: Who can Modify Transactions? Who will Maintain Transactions? How to Protect Our Privacy? Public-key Cryptography	
Module 3 Blockchain Platforms 7Hrs	CO3
Classification of Blockchain Platforms, Highlights of Major Blockchain Platforms ,What is Ethereum? Trustlessness and Immutability of Blockchain Technology , Proof of Work and Proof of Stake,	

Tokenizing What is a Token?, Tokenizing Shares and Fund Raising ,What is Hyperledger?	
Module 4 Blockchain Applications 7Hrs	CO4
6 Selection Criteria for Blockchain Applications, Blockchain and Enterprise – A Technology of Coordination, Why Permissioned Blockchains Are Used in Enterprise Network?, How to Deploy an Application on the Ethereum Blockchain? Blockchain Use Cases on General Government Services & Sustainable Livelihood	
Module 5 Limitations, Opportunities and Challenges of Blockchain 7Hrs	CO5
5 modules in Blockchain system, Limitations of Blockchains , Risks and Limitations of Blockchain: Privacy, Security, The Five Security Risks of Blockchain , Applied Smart Contracts: Opportunities, Risks, and Applications for Enterprise , Use Case: Blockchain for Health Insurance ,Use Case: Blockchain & PropTech , What Are the Benefits of Blockchain in Banking?, How Can Blockchain Technology Benefit the Healthcare Industry?	

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) *(2023 Pattern)*

Sem-IV

Minor Project (Exit Course)

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	Practical:02	**Theory**	**CIA: --**
Practical: --			**End-Sem:--**
		Pract:	**50**
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. develop ability for the application of fundamental principles and elementary techniques which have been learnt, in developing solutions for real life engineering problems.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Identify an open ended problem in area of engineering.
CO2: Identify the methods and materials required for the project work.
CO3: Formulate and implement innovative ideas for social and environmental benefits.
CO4: Analyze the results to come out with concrete solutions.
CO5: Write technical report of the project apart from developing a presentation.

PROCEDURE

This subject will be offered to the students who are will to exit second year engineering and opt for UG Diploma after the 4th semester.

Minor Project is an exit course requirement wherein under the guidance of a faculty member, a student is required to do an innovative work with application of knowledge earned while undergoing various courses and laboratories in the course of study.

Minor Project envisages that a student will acquire the ability to use a wide range of the skills learned during their course of study. A student is required to carry out the project work related to Engineering, under the guidance of a faculty member and/or the supervisor of the concerned industry/institute/organization.

The individual student has to undertake the project.

Duration: Minor Project to be completed within one month duration for the respective semester/Exit Course. It is to be assessed and evaluated at the end of 4th semester.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) *(2023 Pattern)*

Sem-VII

2300401: Industry Internship / Internship (Exit Course)

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Practical:08**	**Theory**	**CIA: --**
Practical: --			**End-Sem:--**
		Pract:	--
		Oral:	50
		Termwork	100

Course Objectives: The student should be able to

1. encourage and provide opportunities for students to get professional / personal experience through internships.
2. learn to apply the technical knowledge gained from academics / c1assroom learning in real life/industrial situations.
3. get familiar with various tools and technologies used in industries and their applications.
4. enable students to develop professional skills and expand their professional network with the development of employer-valued skills like teamwork, communication.
5. apply the experience gained from industrial internship to the academic course completion project.
6. nurture professional and societal ethics in students.
7. understand the social, economic and administrative considerations that influence the working environment of industrial organizations.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: develop professional competence through industry internship
CO2: apply academic knowledge in a personal and professional environment
CO3: build the professional network and expose students to future employees
CO4: Apply professional and societal ethics in their day to day life
CO5: become a responsible professional having social, economic and administrative considerations
CO6: make own career goals and personal aspirations.

PROCEDURE

Internships are educational and career development opportunities, providing practical experience in a field or discipline. Internships are far more important as the employers are looking for employees who are properly skilled and having awareness about industry environment, practices and culture. Internship is structured, short-term, supervised training often focused around particular tasks or projects with defined time scales.

Core objective is to expose technical students to the industrial environment, which cannot be simulated/experienced in the classroom and hence creating competent professionals in the industry and to understand the social, economic and administrative considerations that influence the working environment of industrial organizations.

Engineering internships are intended to provide students with an opportunity to apply theoretical knowledge from academics to the realities of the field work/training. The following guidelines are proposed to give academic credit for the internship undergone as a part of the Engineering curriculum.

Guidelines of 4th Semester Internship for Exit Course (2 weeks)

Duration: Internship to be completed within 2 weeks as mentioned in the structure of curriculum for the respective semester / Exit Course. It is to be assessed and evaluated in 4th semester.

Guidelines of 6th Semester Internship (4 weeks)

Duration: Internship to be completed within 4 weeks after the end of 6th Semester and before the commencement of 7th semester. It is to be assessed and evaluated in 7th semester.

Internship work Identification: Student may choose to undergo Internship at Industry / Govt. / NGO / MSME / Rural Internship/ Startup to make themselves ready for the industry.

Contacting various companies for Internship and Internship work identification process should be initiated by the students with support of training and placement cell / industry institute cell /internship cell. This will help students to start their internship work on time. Also, it will allow students to work in vacation period.

Student can take internship work in the form of online/onsite work from any of the following but not limited to:

a. Working for consultancy/ research project
b. Contribution in incubation/innovation/entrepreneurship cell/institutional innovation council/startups cells of institute
c. Development of new product/business plan/registration of start-up
d. Industry/government organization internship

e. Internship through Internshala
f. In-house product development, intercollegiate, inter department research internship under research lab/group, micro/small/medium enterprise/online internship
g. Research internship under professors, IISC, IIT's, research organizations
h. Registered NGOs or social internships, rural internship
i. Participate in open source development
j. Development of Physical and/or numerical, mathematical, soft computing model
k. Company Registration Number / Startup registration number must be produced in case of company internship.

Internship Diary/ Internship Workbook: Students must maintain Internship Diary/ Internship Workbook. The main purpose of maintaining diary/workbook is to cultivate the habit of documenting. The students should record in the daily training diary the day-to-day account of the observations, impressions, information gathered and suggestions given, if any. The training diary/workbook should be signed after every day by the supervisor/ in charge of the section where the student has been working.

Internship diary/workbook and internship report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the institute immediately after the completion of the training. Internship diary/workbook may be evaluated on the basis of the following criteria.

i. Proper and timely documented entries
ii. Adequacy & quality of information recorded
iii. Organization of the information

Internship Work Evaluation: Every student is required to prepare and maintain documentary proofs of the activities done by him as internship diary or as workbook. The evaluation of these activities will be done by programme head/cell in-charge/project head/ faculty mentor or Industry Supervisor based on overall compilation of internship activities, sub-activities, level of achievement expected, evidence needed to assign the points and the duration for certain activities.

Assessment and evaluation is to be done in consultation with internship supervisor (internal and external) and a supervisor from place of internship.

Recommended evaluation parameters: Post internship internal evaluation 100 Marks and internship diary / workbook and internship report 50 Marks. Evaluation through Seminar Presentation / Viva - Voce at the Institute.

The student will present a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria.

Depth of knowledge, communication skills, presentation skills, team work, creativity, planning & organizational skills, adaptability, analytical skills, attitude and behavior at work, societal understanding, ethics, regularity and punctuality, attendance record, log book, student's feedback from external internship supervisor

After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact industrial supervisor/faculty mentor/TPO for assigning special topics and problems and should prepare the final report on the student's presence physically, if the student is found absent without prior intimation to the department/institute/concern authority/T & P Cell, entire training can be cancelled.

The report shall be presented covering following recommended fields but not limited to:

i. Title/cover Page
ii. Internship completion certificate
iii. Internship place details: Company background-organization and activities/scope and object of the study/personal observations
iv. Index/table of contents
v. Introduction
vi. Title/problem statement/objectives
vii. Motivation/scope and rationale of the study
viii. Methodological details
ix. Results/analysis/inferences and conclusion
x. Suggestions/recommendations for improvement to industry, if any
xi. Attendance record
xii. Acknowledgement
xiii. List of reference (books, magazines and other sources)

Feedback from internship supervisor (external and internal): Post internship, faculty coordinator should collect feedback about student with following recommended parameters.
Technical knowledge, discipline, punctuality, commitment, willingness to do the work, communication skill, individual work, team work and leadership

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(T.E. – I.T.) (2023 Pattern)

Sem-V

2315301 - Interactive Web Application Development

Teaching Scheme: TH : 03 Hrs./Week PR :	Credits Th:03 Practical:	Examination Scheme: CIA : 50 ESE : 50

Course Objectives:-

1. To familiarize students with Web Programming basic concepts
2. To learn and understand Web scripting languages.
3. To explore the Front end& Back end web programming skills.
4. To understand and learn Mobile web development.
5. To understand and learn Web application deployment.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Develop Static and Dynamic website using technologies like HTML, CSS, Bootstrap.
CO2: Demonstrate the use of web scripting languages.
CO3: Develop web application with Front End & Back End Technologies.
CO4: Develop mobile website using JQuery Mobile.
CO5: Deploy web application on cloud using AWS.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(T.E. – I.T.) (2023 Pattern)
Sem-V
2315301 - Interactive Web Application Development

Units		
Unit 1	**INTRODUCTION TO WEB TECHNOLOGIES (07 Hrs.)**	**CO**
HTML: Getting started with HTML, Why HTML, Tags and Elements, Attributes, Properties, Headings list, Links, Tables, Images, HTML Form, Media (Audio, Video), Semantic HTML5 Elements. **CSS:** Why CSS, Types of CSS, How to use CSS, Properties, Classes, Child-Class (Nested CSS), Colors, Text, Background, Border, Margin, Padding, Positioning (flex, grid, inline, block), Animation, Transition. **BOOTSTRAP:** Why Bootstrap, CSS over Bootstrap, How to Use Bootstrap, Bootstrap Grid System, Bootstrap Responsive, Bootstrap Classes, Bootstrap Components (i.e., Button, Table, List, etc.),Bootstrap as a Cross Platform. **W3C:** What is W3C , How W3C handles/Supports Web Technologies		**CO1**
Unit 2	**WEB SCRIPTING LANGUAGES (07 Hrs.)**	**CO2**
JavaScript: Introduction to Scripting languages, Introduction to JavaScript (JS), JS Variables and Constants, JS Variable Scopes, JS Data Types, JS Functions, JS Array, JS Object, JS Events. **Advanced JavaScript:** JSON - JSON Create, Key-Value Pair, JSON Access, JSON Array, JS Arrow Functions, JS Callback Functions, JS Promises, JS Async-Await Functions, JS Error Handling. **AJAX:** Why AJAX, Call HTTP Methods Using AJAX, Data Sending, Data Receiving, AJAX Error Handling. **JQUERY :**Why JQuery, How to Use, DOM Manipulation with JQuery, Dynamic Content Change with JQuery, UI Design Using JQuery.		
Unit 3	**FRONT END TECHNOLOGIES (07 Hrs.)**	**CO3**
Front-End Frameworks: What is web framework? Why Web Framework? Web Framework Types. **MVC:** What is MVC, MVC Architecture, MVC in Practical, MVC in Web Frameworks. **TypeScript:** Introduction to TypeScript (TS), Variables and Constants, Modules in TS. **AngularVersion 10+:** Angular CLI, Angular Architecture, Angular Project Structure, Angular Lifecycle, Angular Modules, Angular Components, Angular Data Binding, Directives and Pipes, Angular Services and Dependency Injections (DI), Angular Routers, Angular Forms. **ReactJS:** Introduction to ReactJS, React Components, Inter Components Communication, Components Styling, Routing, Redux- Architecture, Hooks- Basic hooks, useState() hook, useEffect() hook, useContext() hook.		
Unit 4	**BACK END TECHNOLOGIES (07 Hrs.)**	**CO3**
Node.JS: Introduction to Node.JS, Environment Setup, Node.JS Events, Node.JS Functions, Node.JS Built-in Modules, File System, NPM, Install External Modules, Handling Data I/O in Node.JS, Create HTTP Server, Create Socket Server, Microservices- PM2. **ExpressJS:** Introduction to ExpressJS, Configure Routes, Template Engines, ExpressJS as Middleware, Serving Static Files, REST HTTP Method APIs, Applying Basic HTTP Authentication, Implement Session Authentication. **MongoDB:** NoSQL and MongoDB Basics, MongoDB-Node.JS Communication, CURD		

Operations using Node.JS, Mongoose ODM for Middleware, Advanced MongoDB.		
Unit 5	**MOBILE WEB DEVELOPMENT (07 hrs.)**	CO4
Mobile-First: What is Mobile-First? What is Mobile Web? Understanding Mobile Devices and Desktop. **JQuery Mobile:** Introduction to the jQuery Mobile Framework, Set-up jQuery Mobile, Pages, Icons, Transitions, Layouts Widgets, Events, Forms, Themes, Formatting Lists, Header and Footer, CSS Classes, Data Attributes, Building a Simple Mobile Webpage.		
Unit 6	**WEB APPLICATION DEVELOPMENT (07 Hrs.)**	CO5
Cloud: AWS Cloud, AWS Elastic Compute, AWS Elastic Load Balancer and its types, AWS VPC and Component of VPC, AWS storage, Deploy Website or Web Application on AWS, Launch an Application with AWS Elastic Beanstalk		
Books & Other Resources		

Text Books:-

1. Kogent Learning Solutions Inc, Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, XML and AJAX, Blackbook, Dreamtech Press, Second Edition, ISBN: 9788177228496.
2. Raymond Camden, Andy Matthews, JQuery Mobile Web Development Essentials, Packt Publishing, Second Edition, 9781782167891

Reference Books:-

1. Steven M. Schafer, “HTML, XHTML and CSS”, Wiley India Edition, Fourth Edition,978- 81- 265-1635-3
2. Dr.HirenJoshi, Web Technology and Application Development, DreamTech, First,ISBN:978-93- 5004-088-1
3. Steven M. Schafer, “HTML, XHTML and CSS”, Wiley India Edition, Fourth Edition,978- 81-265-1635-3
4. Ivan Bayross,”Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP,BPB Publications,4th Edition,ISBN:978-8183330084.
5. Brain Fling, Mobile Design and Development, O'REILLY, First Edition, ISBN: 13:978-81- 8404-817-9
6. Adam Bretz& Colin J Ihrig, Full Stack Javascript Development with MEAN, SPD, First Edition, ISBN:978-0992461256.
7. JavaScript: The Definitive Guide - Master The World's Most-Used Programming Language, Seventh Edition
8. Java Script, D.Flanagan, O’Reilly, SPD.
9. Programming Typescript: Making Your JavaScript Applications Scale, Boris Cherny

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B.Tech(Information Technology) (2023 Pattern)

Sem-V

2315302: Data Science and Big Data Analytics

Teaching Scheme: TH : 03 Hrs./Week	Credits Th:03	Examination Scheme: CIA : 50 ESE : 50

Course Objectives:-

1. To introduce basic need of Big Data and Data science to handle huge amount of data.
2. To understand the basic mathematics behind the Big data.
3. To understand the different Big data processing technologies.
4. To understand and apply the Analytical concept of Big data using Python.
5. To visualize the Big Data using different tools.
6. To understand the application and impact of Big Data.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Understand Big Data primitives.

CO2: Learn and apply different mathematical models for Big Data.

CO3: Demonstrate Big Data learning skills by developing industry or research applications.

CO4: Analyze and apply each learning model comes from a different algorithmic approach and it will perform differently under different datasets.

CO5: Understand, apply and analyze needs, challenges and techniques for big data visualization.

CO6: Learn different programming platforms for big data analytics.

Units		
Unit 1	**INTRODUCTION: DATA SCIENCE AND BIG DATA (07 Hrs.)**	**CO**
Basics and need of Data Science and Big Data, Applications of Data Science, Defining Data science and Big Data, Big Data examples, Data **Explosion:** Data Volume, Data Variety, Data Velocity and Veracity. Big data infrastructure and challenges **Big Data Processing Architectures:** Data Warehouse, Re-Engineering the Data Warehouse, shared everything and shared nothing architecture, Big data learning approaches. **Data Science** – The Big Picture: Relation between AI, Statistical Learning, Machine Learning, Data Mining and Big Data Analytics		**CO1**
Unit 2	**PROBABILITY AND STATISTICS IN BIG DATA (07 Hrs.)**	**CO2**
Probability: Random Variables and Joint Probability, Conditional Probability and concept of Markov chains, Tail bounds, Markov chains and random walks, Pair-wise independence and universal hashing Approximate counting, Approximate median. Data Streaming Models and **Statistical Methods:** Flajole Martin algorithm, Distance Sampling and Random Projections, Bloom filters, Mode, Variance, standard deviation, Correlation analysis and Analysis of Variance.		
Unit 3	**BIG DATA PROCESSING (7 Hrs.)**	**CO3**
Big Data Analytics- Ecosystem and Technologies, Introduction to Google file system, Hadoop Architecture, **Hadoop Storage:** HDFS, Common Hadoop Shell commands, Anatomy of File Write and Read, NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration, Introduction to NOSQL, Textual ETL processing.		
Unit 4	**BIG DATA ANALYTICS (07 Hrs.)**	**CO4**
Big Data Analytics- Architecture and Life Cycle, Types of analysis, Analytical approaches, Data Analytics with Mathematical manipulations, Data Ingestion from different sources (CSV, JSON, html, Excel, mongoDB, mysql, sqlite), Data cleaning, Handling missing values, data imputation, Data transformation, Data Standardization, handling categorical data with 2 and more categories, statistical and graphical analysis methods, Hive Data Analytics.		
Unit 5	**BIG DATA VISUALIZATION (07 Hrs.)**	CO5
Introduction to Data visualization, Challenges to Big data visualization, Conventional data visualization tools, Techniques for visual data representations, Types of data visualization, Visualizing Big Data, Tools used in data visualization, Propriety Data Visualization tools,		

Open – source data visualization tools, **Case Study:** Analysis of a business problem of Zomato using visualization, Analytical techniques used in Big data visualization, Data Visualization using Tableau Introduction to: Candela, D3.js, Google Chart API		
Unit 6	**BIG DATA TECHNOLOGIES APPLICATION AND IMPACT (07 Hrs.)**	CO6
Social media analytics, Text mining, Mobile analytics, Data analytics life cycle of case studies, Organizational impact, understanding decision theory, creating big data strategy, big data value creation drivers, Michael Porter's valuation creation models, Big data user experience ramifications, Identifying big data use cases, Big Data Analytics Challenges and Research directions.		
Books & Other Resources		

Text Books:-

1. Krish Krishnan, Data warehousing in the age of Big Data, Elsevier, ISBN: 9780124058910, 1 st Edition.
2. DT Editorial Services, Big Data, Black Book, DT Editorial Services, ISBN: 9789351197577, 2016Edition.

Reference Books:-

1. Mitzenmacher and Upfal, Probability and Computing: Randomized Algorithms and ProbabilisticAnalysis, Cambridge University press, ISBN : 521835402 .
2. Dana Ron, Algorithmic and Analysis Techniques in Property Testing, School of EE.
3. Graham Cormode, Minos Garofalakis, Peter J. Haas and Chris Jermaine, Synopses for Massive Data: Samples, Histograms, Wavelets, Sketches, Foundation and trends in databases, ISBN:10.1561/1900000004.
4. Alex Holmes, Hadoop in practice, Dreamtech press, ISBN:9781617292224.
5. AmbigaDhiraj, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends forToday's Business, Wiely CIO Series.
6 ArvindSathi, Big Data Analytics: Disruptive Technologies for Changing the Game, IBMCorporation, ISBN:978-1-58347-380-1.
7 EMC Education Services, Data Science and Big Data Analytics, Wiley India, ISBN:9788126556533
8. Benoy Antony, Konstantin Boudnik, Cheryl Adams, Professional Hadoop, Wiley India,ISBN :9788126563029
9. Judith Hurwitz, Alan Nugent, Big Data For Dummies, Wiley India, ISBN : 9788126543281

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (T.E. – I.T.) (2023 Pattern)

Sem-V

2315303 - Computer Network

Teaching Scheme: TH : 02 Hrs./Week PR :	Credits Th:02 Practical:	Examination Scheme: CIA : 25 ESE : 50

Course Objectives:-

To familiarize students with-

1. The application layer services, responsibilities and protocol.

2. Fathom wireless network and different wireless standards

3. Differences in different wireless networks and to learn different mechanism used at layers of wireless network.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Know Responsibilities, services offered and protocol used at application layer of network

CO2: Understand wireless network and different wireless standards.

CO3: Recognize the Adhoc Network's MAC layer, routing protocol.

CO4: Understand about Sensor network architecture

Units		
Unit 1	**APPLICATION LAYER (07 Hrs.)**	**CO**
Client Server Paradigm: Communication using TCP and UDP, Peer to Peer Paradigm, Application Layer Protocols: DNS, FTP, TFTP, HTTP, SMTP, POP, IMAP, MIME, DHCP, TELNET.		**CO1**
Unit 2	**WIRELESS STANDARDS (07 Hrs.)**	**CO2**
Wireless LANs: Fundamentals of WLAN, Design goals, Characteristics, Network Architecture, IEEE 802.11: components in IEEE 802.11 network, Physical Layer, **MAC Sub Layers :** DCF, PCF, Hidden and exposed station problem, Frame format, Addressing Mechanism, IEEE 802.15.1 **Bluetooth:** Architecture, Layers, operational states, **IEEE 802.16 WiMax:** Services, Architecture, Layers, comparison between Bluetooth, IEEE 802.11 and IEEE 802.16.		
Unit 3	**ADHOC AND WSN (07 Hrs.)**	**CO3**
Infrastructure Network and Infrastructure-less Wireless Networks, Issues in Adhoc Wireless Network, Adhoc Network MAC Layer: Design Issues, Design Goal, Classification, MACAW, **Adhoc Network Routing Layer:** Issues in Designing a Routing Protocol for Ad-hoc Wireless Networks – Classifications of Routing Protocols, DSDV, AODV, DSR		
Unit 4	**SENSOR NETWORK (07 HRS.)**	**CO4**
Comparison of sensor network with Ad Hoc Wireless Network, Sensor node architecture Issues and Challenges in Designing a Sensor Network, Classification of sensor network protocols, Sensor Network Architecture: Layered Architecture, Clustered Architecture		
Books & Other Resources		
Text Books:- 1. Behrouz A. Forouzan, TCP/IP Protocol Suite, McGraw Hill Education, ISBN: 978-0-07-070652-1, 4th Edition. **2.** C. Siva Ram Murthy, B. S. Manoj, Adhoc Wireless Networks: Architecture and Protocols,Pearson Education, ISBN: 978-81-317-0688-6, 1st Edition.		
Reference Books:- 1. Kazem Sohraby, Daniel Minoli, TaiebZnati, Wireless Sensor Networks: Technology, Protocols and Applications, Wiley India, ISBN: 9788126527304 **2.** Charles E. Perkins, Adhoc Networking, Pearson Education, 978-81-317-2096-7 **3.** Andrew S. Tanenbaum, David J. Wethrall, Computer Network, Pearson Education, ISBN: 978-0-13-212695-3. **4.** Kurose Ross, Computer Networking: A Top Down Approach Featuring the Internet, Pearson Education, ISBN: 978-81-7758-878		

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** T.Y. B.Tech(Information Technology) (2023 Pattern) Sem-V 2315304: Data Science and Big Data Analytics Lab

Teaching Scheme: **PR : 04 Hrs./Week**	**Credits** **Practical:02**	**Examination Scheme:** **CIA:25** **ESE : 25a**

Course Objectives:-

1. To understand Big data primitives and fundamentals.
2. To understand the different Big data processing techniques.
3. To understand and apply the Analytical concept of Big data using Python.
4. To understand different data visualization techniques for Big Data.
5. To understand the application and impact of Big Data.
6. To understand emerging trends in Big data analytics.

Course Outcomes:-

On completion of the course, learner will be able to

- CO1: Apply Big data primitives and fundamentals for application development.
- CO2: Explore different Big data processing techniques with use cases.
- CO3: Apply the Analytical concept of Big data using Python.
- CO4: Visualize the Big Data using Tableau.
- CO5: Design algorithms and techniques for Big data analytics.
- CO6: Design and develop Big data analytic application for emerging trends.

Suggested List of Laboratory Experiments/Assignments		
Sr.No.	Title	**CO**
1	Single node/Multiple node Hadoop Installation.	CO1
2	Design a distributed application using MapReduce(Using Java) which processes a log file of a system. List out the users who have logged for maximum period on the system. Use simple log file from the Internet and process it using a pseudo distribution mode on Hadoop platform.	CO1
3	Write an application using HiveQL for flight information system which will include a. Creating, Dropping, and altering Database tables. b. Creating an external Hive table. c. Load table with data, insert new values and field in the table, Join tables with Hive d. Create index on Flight Information Table e. Find the average departure delay per day in 2008.	CO2
4	Perform the following operations using Python on the Facebook metrics data sets a. Create data subsets b. Merge Data c. Sort Data d. Transposing Data e. Shape and reshape Data	CO2
5	Perform the following operations using Python on the Air quality and Heart Diseases data sets a. Data cleaning b. Data integration c. Data transformation d. Error correcting e. Data model building	CO3
6	Integrate Python and Hadoop and perform the following operations on forest fire dataset a. Data analysis using the Map Reduce in PyHadoop b. Data mining in Hive	CO3
7	Visualize the data using Python libraries matplotlib, seaborn by plotting the graphs for assignment no. 5.	CO3

8	Visualize the data using Python libraries matplotlib, seaborn by plotting the graphs for assignment no. 6 .	CO3
9	Perform the following data visualization operations using Tableau on Adult and Iris datasets. a. 1D (Linear) Data visualization b. 2D (Planar) Data Visualization c. 3D (Volumetric) Data Visualization	CO4
10	Perform the following data visualization operations using Tableau on Adult and Iris datasets. a. Temporal Data Visualization b. Multidimensional Data Visualization c. Tree/ Hierarchical Data visualization d. Network Data visualization	CO4
11	Create a review scrapper for any ecommerce website to fetch real time comments, reviews, ratings, comment tags, customer name using Python.	CO5
12	Develop a mini project in a group using different predictive models techniques to solve any real life problem. (Refer link dataset- https://www.kaggle.com/tanmoyie/us-graduate-schools- admission-parameters)	CO6
Books & Other Resources		

Text Books:-

1. Krish Krishnan, Data warehousing in the age of Big Data, Elsevier, ISBN: 9780124058910, 1 st Edition.
2. DT Editorial Services, Big Data, Black Book, DT Editorial Services, ISBN: 9789351197577, 2016Edition.

Reference Books:-

1. Big Data, Black Book, DT Editorial services, 2015 edition.
2. Data Analytics with Hadoop, Jenny Kim, Benjamin Bengfort, OReilly Media, Inc.
3. Python for Data Analysis by Wes McKinney published by O' Reilly media, ISBN : 978-1-449-31979-3.
4. Python Data Science Handbook by Jake VanderPlas
https://tanthiamhuat.files.wordpress.com/2018/04/pythondatasciencehandbook.pdf
5. Alex Holmes, Hadoop in practice, Dreamtech press.
6. Online References for data set
http://archive.ics.uci.edu/ml/
https://www.kaggle.com/tanmoyie/us-graduate-schools-admission-parameters
https://www.kaggle.com

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (T.E. – I.T.) (2023 Pattern)

Sem-V

2315305 Internet & Web Programming Lab

Teaching Scheme: TH : PR : 02 hrs./week	Credits Th: Practical: 01	Examination Scheme: CIA : ESE PR: 50

Course Objectives:-

1. To understand basic concepts of web programming and scripting languages.
2. To learn Version Control Environment.
3. To learn front end technologies and back end technologies.
4. To understand mobile web development.
5. To comprehend web application deployment.

Course Outcomes:-

On completion of the course, learner will be able to -

CO1: Develop Static and Dynamic responsive website using technologies HTML, CSS, Bootstrap and AJAX.

CO2: Create Version Control Environment.

CO3: Develop an application using front end and backend technologies.

CO4: Develop mobile website using JQuery Mobile.

CO5: Deploy web application on cloud using AWS.

Sr. no.	Practical Title	CO
1	Create a responsive web page which shows the ecommerce/college/exam admin dashboard with sidebar and statistics in cards using HTML, CSS and Bootstrap	CO1
2	Write a JavaScript Program to get the user registration data and push to array/local storage with AJAX POST method and data list in new page	CO1
3	Create version control account on GitHub and using Git commands to create repository and push your code to GitHub.	CO2
4	Create Docker Container Environment (NVIDEIA Docker or any other).	CO2
5	Create an Angular application which will do following actions: Register User, Login User, Show User Data on Profile Component	CO3
6	Create a Node.JS Application which serves a static website.	CO3
7	Create four API using Node.JS, ExpressJS and MongoDB for CURD Operations on assignment 5	CO3
8	Create a simple Mobile Website using jQuery Mobile. **b.** Deploy/Host Your web application on AWS VPC or AWS Elastic Beanstalk. Mini Project	CO4
9	Develop a web application using full stack development technologies in any of the following domains: 1. Social Media , 2. ecommerce , 3. Restaurant 4. Medical , 5. Finance , 6. Education , 7. Any other	CO5
Books & Other Resources		

Text Books:-

1. Kogent Learning Solutions Inc, Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, XML and AJAX, Blackbook, Dreamtech Press, Second Edition, ISBN: 9788177228496.
2. Raymond Camden, Andy Matthews, JQuery Mobile Web Development Essentials, Packt Publishing, Second Edition, 9781782167891

Reference Books:-

1. Steven M. Schafer, "HTML, XHTML and CSS", Wiley India Edition, Fourth Edition, 978- 81-265-1635-3
2. Dr.HirenJoshi, Web Technology and Application Development, DreamTech, First,ISBN:978-93- 5004-088-1
3. Steven M. Schafer, "HTML, XHTML and CSS", Wiley India Edition, Fourth Edition, 978- 81-265-1635-3
4. Ivan Bayross,"Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP,BPB Publications,4th Edition,ISBN:978-8183330084.
5. Brain Fling, Mobile Design and Development, O'REILLY, First Edition, ISBN: 13:978-81- 8404-817-
6. Adam Bretz & Colin J Ihrig, Full Stack Javascript Development with MEAN, SPD, First Edition, ISBN:978-0992461256.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-V : Web Technology (2315307A)

Program Elective-I

Teaching Scheme:	Credits	Examination Scheme	
Theory: 4	Th:4	Theory	CIA: 50
Practicals: 2 Hrs/week	Audit Course		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Apply basics of server side scripting using PHP
2. Create Web application using servlet technology
4. connect to databases using JDBC or other connectors with websites
5. Use PHP, JS, ASP, JSP, XML, JDBC, etc web technologies

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Implement a complete dynamic website using principles of web design and web technologies

CO2: Comprehend basic components of database management for utilizing them in Web

CO3: Know and apply various web technologies like HTML,PHP,JS,JDBC,XML,AJAX,

CO4: Interpret the aspects of legal issues

CO5: Implement and design application oriented drone.

Unit 1: Introduction to WWW 7Hrs	**CO**
Introduction to WWW : Protocols and programs, secure connections, application and development tools, the web browser, What is server, choices, setting up UNIX and Linux web servers, Logging users, dynamic IP Web Design: Web site design principles, planning the site and navigation,	CO1 to CO4
Unit 2 PHP 7Hrs	CO1 to CO5
Introduction to WWW : Protocols and programs, secure connections, application and development tools, the web browser, What is server, choices, setting up UNIX and Linux web servers, Logging users, dynamic IP Web Design: Web site design principles, planning the site and navigation,	
Unit 3 Client side scripting 7Hrs	
Client side Scripting: Introduction to JavaScript: JavaScript language – declaring variables, scope of variables functions, event handlers (on click, on submit etc.), Document Object Model, Form validations. Simple AJAX applications.	

Unit 4 XML **7Hrs**	
XML : Introduction to XML, uses of XML, simple XML, XML key components, DTD and Schemas, Well formed, using XML with application.XML, XSL and XSLT. Introduction to XSL, XML transformed simple example, XSL elements, transforming with XSLT	
Unit 5 Servlets **7Hrs**	
Introduction to Servlets: Common Gateway Interface (CGI), Lifecycle of a Servlets, deploying a Servlets, The Servlets API, Reading Servlets parameters, Reading initialization parameters, Handling Http Request & Responses, Using Cookies and sessions, connecting to a database using JDBC.	
Unit 6 JSP **7Hrs**	
Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session tracking, connecting to database in JSP.	

TEXT BOOKS:

1. Web Technologies, Uttam K Roy, Oxford University Press 2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill

REFERENCE BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech

2. Java Server Pages – Hans Bergsten, SPD O'Reilly

3. Java Script, D.Flanagan, O'Reilly, SPD.

4. Beginning Web Programming-Jon Duckett WROX.

5. Programming world wide web, R.W. Sebesta. Fourth Edition, Pearson.

6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-V : AI&Robotics (2315307**B**)

Program Elective-I

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:4	**Th:4**	**Theory**	**CIA: 50**
Practicals:	**Audit Course**		**End-Sem:50**
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. understand concept of robots, how they work, and their anatomy
2. design, think, and develop their own robotics
3. deal with mobile robots

Course Outcomes:

On completion of the course, learner will be able to–

CO1: recognize and classify anatomy, specifications and types of Robots

CO 2: Obtain forward and inverse kinematic models of robotic manipulators

CO 3: Plan trajectories in joint space & Cartesian space and avoid obstacles while robots are in motion

CO 4: Develop dynamic model and design the controller for robotic manipulators

CO 5 : Choose appropriate Robotic configuration and list the technical specifications for robots used in different applications

CO 6: deal with different types of mobile robots, kinematic models, motion control and sensors for mobile robots

Unit 1: Introduction **7Hrs**	**CO**
Introduction to WWW : Protocols and programs, secure connections, application and development tools, the web browser, What is server, choices, setting up UNIX and Linux web servers, Logging users, dynamic IP Web Design: Web site design principles, planning the site and navigation,Definitions- Robots, Robotics; Types of Robots- Manipulators, Mobile Robots-wheeled & Legged Robots, Aerial Robots; Anatomy of a robotic manipulator-links, joints, actuators, sensors, controller; open kinematic vs	CO1 to CO4

closed kinematic chain; degrees of freedom; Robot configurations-PPP, RPP, RRP, RRR; features of SCARA, PUMA Robots;	
Unit 2 Classification 7Hrs	CO1 to CO5
Classification of robots based on motion control methods and drive technologies; 3R concurrent wrist; Classification of End effectors - mechanical grippers, special tools, Magnetic grippers, Vacuum grippers, adhesive grippers, Active and passive grippers, selection and design considerations of grippers in robot.	
Unit 3 Kinemetics 7Hrs	
Direct Kinematics- Rotations-Fundamental and composite Rotations, Homogeneous co-ordinates, Translations and rotations, Composite homogeneous transformations, Screw transformations, Kinematic parameters, The Denavit-Hartenberg (D-H) representation, The arm equation, direct kinematics problems (upto 3DOF) Inverse kinematics- general properties of solutions, Problems (upto 3DOF) Inverse kinematics of 3DOF manipulator with concurrent wrist (demo/assignment only) Tool configuration Jacobian, relation between joint and end effector velocities.	
Unit 4 Trajectory Planning 7Hrs	
Tasks,Path planning, Trajectory Planning. Joint space trajectory planning- cubic polynomial, linear trajectory with parabolic blends, trajectory planning with via points; Cartesian space planning, Point to point vs continuous path planning. Obstacle avoidance methods- Artificial Potential field, A* algorithms.	
Unit 5 Manipulator dynamics 7Hrs	
Lagrange'sformulation – Kinetic Energy expression, velocity Jacobian and Potential Energy expression, Generalised force, Euler-Lagrange equation, Dynamic model of planar and spatial serial robots upto 2 DOF, modelling including motor and gearbox.	
Unit 6 Applications and Mobile robots 7Hrs	
IIndustrial Applications-Material handling, welding, Spray painting, Machining.Applications in the medical, mining, space, defence, security, domestic, entertainment. Locomotion, Key issues for locomotion, Legged Mobile Robots, Wheeled Mobile Robots. Aerial Mobile Robots. Mobile Robot Kinematics, Robot kinematic models and constraints, Mobile Robot Workspace- Degrees of freedom, Holonomic and nonholonomic robots.	

TEXT BOOKS:

1. Robert. J. Schilling , "Fundamentals of robotics – Analysis and control", Prentice Hall of India 1996.

2. Introduction to Robotics (Mechanics and control), John. J. Craig, Pearson Education Asia 2002.

3. Introduction to Robotics by S K Saha, Mc Graw Hill Education

4. R K Mittal and I J Nagrath, "Robotics and Control", Tata McGraw Hill, New Delhi,2003.

5. AshitavaGhosal, “Robotics-Fundamental concepts and analysis”, Oxford University press.

6. Robotics Technology and Flexible Automation, Second Edition, S. R. Deb

7. Introduction to Autonomous Mobile Robots, Siegwart, Roland, Cambridge, Mass. : MIT Press, 2nd ed.

REFERENCE BOOKS:

1. Sicilliano, Khatib , “Handbook of Robotics”, Springer

2. John J. Craig, Introduction to Robotics – Mechanics and Control

3. Kevin M. Lynch, Frank C. Park, Modern Robotics Mechanics, Planning and Control

4. Bruno Siciliano, Lorenzo Sciavicco, Luigi Villani, Giuseppe OrioloRobotics Modelling, Planning and Control, Springer

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

Information Technology (2023 Pattern)
Sem-V
2315308A: Data Mining

Teaching Scheme: TH : 03 Hrs./Week	Credits Theory: 03	Examination Scheme: CIA : 50 ESE : 50 TW :

Course Objectives:-

1. To teach principles, concepts and applications of data warehousing and data mining
2. To introduce the task of data mining as an important phase of knowledge recovery process
3. To inculcate Conceptual, Logical, and Physical design of Data Warehouses OLAP applications and OLAP deployment
4. To inculcate fundamental concepts that provides the foundation of data mining.

Course Outcomes:-

On completion of the course, learner will be able to

- CO1: Design a data mart or data warehouse for any organization.
- CO2: Extract Knowledge using data mining techniques
- CO3: Identify Adapt to new data mining tools
- CO4: Classify Explore recent trends in data mining such as web mining, spatial-temporal mining

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

Information Technology (2023 Pattern)
Sem-V
2315308A: Data Mining

Units		
Unit 1	**Elements of Basics of data warehousing (06 Hrs.)**	**CO**
Introduction − Data warehouse − Multidimensional data model − Data warehouse architecture Implementation − Further development − Data warehousing to data mining.		**CO1**
Unit 2	**Data preprocessing, language, Architectures (08 Hrs.)**	**CO2**
Why pre-processing − Cleaning − Integration − Transformation − Reduction − Discretization – Concept hierarchy generation − Data mining primitives − Query language − Graphical user interfaces −Architectures − Concept description − Data generalization − Characterizations − Class comparisons −Descriptive statistical measures.		
Unit 3	**Association Rules (06 Hrs.)**	**CO3**
Association rule mining − Single-dimensional Boolean association rules from transactional databases −Multi level association rules from transaction databases.		
Unit 4	**Classification And Clustering (06 Hrs.)**	**CO4**
Classification and prediction − Issues − Decision tree induction − Bayesian classification – Association rule based − Other classification methods − Prediction − Classifier accuracy − Cluster analysis − Types of data − Categorization of methods − Partitioning methods − Outlier analysis.		
Unit 5	**Recent Trends (06 Hrs.)**	**CO5**
Multidimensional analysis and descriptive mining of complex data objects − Spatial databases −Multimedia databases − Time series and sequence data − Text databases − World Wide Web −Applications and trends in data mining.		
Unit 6	**Advanced techniques, Data Mining software and applications (06 Hrs.)**	**CO6**
Meta data Management in Data Warehouse, Meta data collection strategies: Meta Data Management in Oracle and SAS: Tools for Meta data management, Data Mining Using NN: A Case Study, Genetic Algorithms, Rough Sets, Support Vector Machines, Web Mining: Web Content Mining, Web Structure Mining, Web Usage Mining, Text Mining.		

Text Books:-

1. Han, J. and Kamber, M., “Data Mining: Concepts and Techniques”, Harcourt India / Morgan Kauffman, 2001.
2. Margaret H. Dunham, “Data Mining: Introductory and Advanced Topics”, Pearson Education 2004.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-V : Foundation of Data Analytics (2315308**B**)

Open Elective-III

Teaching Scheme:	Credits	Examination Scheme	
Theory:3	Th:3	Theory	CIA: 50
Practicals:	Audit Course		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. collect, classify, clean, and analyze the data
2. comprehend basic statistics required for data anlytics
3. Use different tools like Excel, Tableau, PowerBI for data analysis
4. write computer programs in python for basic data anlysis

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize the types of data, can collect, classify, clean, and analyze it for further processing

CO2: use various software tools and statistical techniques for data analytics

CO3: classify and apply various data analytics techniques on various data

CO4: prepare algorithms and computer programs for basic data analytics

CO5: Implement and design applications for data analytics at foundation level.

Unit 1: Introduction **7Hrs**	**CO**
Data, Information, Knowledge, Buzzwords of Data Science, Info-graphic representation of terminologies: Introduction to data visualization and various graphical ways of data representation , Difference between Analysis and Analytics, Applications	CO1 to CO3
Unit 2 Descriptive and Inferential Analysis **7Hrs**	CO1 to CO5
Descriptive Statistics: Population and Sample, Types of Data, Measurement Levels, Representation of categorical variables, Measures of Central Tendency (Mean, Median, Mode), Skewness, Variance, Standard Deviation, Coefficient of Variation, Covariance, Correlation.Histogram Analysis. **Inferential Statistics:** Distribution, Normal Distribution, Standard Normal Distribution, Central Limit Theorem, Standard Error, Estimators and Estimates, Confidence Interval, Students T Distribution, Margin of Error	

Unit 3 Regression **7Hrs**	
Linear Regression: Introduction to Regression, Simple and Multiple Linear Regression, Correlation vs. Regression, SST (Sum of Squares Total), SSR (Sum of Squares Regression), SSE (Sum of Squares Error) R-Square, Adjusted R-Squared. Multiple Linear Regression, Significance of p-value **Logistic Regression:** Logistic regression, Logitvs logistic, Applications of logistic regression	
Unit 4 Data Anlytics using Excel and Power BI **7Hrs**	
Spread sheets, pivot tables, different graphs and charts, Data Analytics toolbox, Interactive Dashboards	
Unit 5 Data Analytics using Tableau **7Hrs**	
Installation, User Interface, Dimensions, Measures, Pages, Filters, Marks, Dataset Connections, visualization, Various graphs in Tableau, Integration of Map and geo-locations, Creating Interactive Dashboard, Publishing your Dashboard to Tableau Public Site	
Unit 6 Data analytics using Python **7Hrs**	
Introduction to python, variables, loops, decision controls, packages for data analysis, performing descriptive statistical programs, performing inferential programs, performing regression programs	

TEXT BOOKS:

1. John A. Rice - Mathematical Statistics and Data Analysis 3ed
2. Practical Tableau_ 100 Tips, Tutorials, and Strategies from a Tableau Zen Master
3. Python for Data Analysis, Oreilly publication
4. Statistical Analysis with Excel® For Dummies®, 3rd Edition

REFERENCE BOOKS:

1. Statistics 101: From Data Analysis and Predictive Modeling to Measuring Distribution and Determining Probability, Your Essential Guide to StatisticsBy David Borman, Adams Media
2. Information Dashboard Design: Displaying Data for At-a-glance Monitoring by Stephen Few, Analytics Press
3. Python for Probability, Statistics, and Machine Learning (José Unpingco) Springer
4. Pro Tableau_ A Step-by-Step Guide (APress)

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTER

T.Y. B.Tech(Information Technology) (2023 Pattern)
Sem-V

2315703 : Network & Troubleshooting Course

Teaching Scheme:	Credits	Examination Scheme:
PR : 02 Hrs./Week	Practical:01	CIA : 25

Course Objectives:-

1. Setup a Local Area Network (LAN) using Ethernet cables and switches.
2. Configure IP addresses and subnetting for devices in the LAN.
3. Create a Virtual LAN (VLAN).
4. Set up a Wireless Local Area Network (WLAN) with a router and access points.

Course Outcomes:-

On completion of the course, learner will be able to

- **CO1:** Set up a Local Area Network (LAN) using Ethernet cables and switches.
- **CO2:** Configure IP addresses and subnetting for devices in the LAN
- **CO3:** Create a Virtual LAN (VLAN) and set up a Wireless Local Area Network (WLAN) with a router and access points.
- **CO4:** Implementing troubleshooting for common network connectivity issues

Suggested List of Laboratory Experiments/Assignments(Any 8)		
Sr.No.	Title	**CO**
1	Setting up a Local Area Network (LAN) using Ethernet cables and switches.	CO1
2	Configuring IP addresses and subnetting for devices in the LAN.	CO2
3	Implementing Dynamic Host Configuration Protocol (DHCP) to assign IP addresses automatically.	CO2
4	Creating a Virtual LAN (VLAN) to segment the network into logical groups.	CO3
5	Setting up a Wireless Local Area Network (WLAN) with a router and access points.	CO3
6	Configuring basic firewall rules to control network traffic.	CO3
7	Implementing Network Address Translation (NAT) to enable internet access for LAN devices.	CO3
8	Configuring port forwarding to allow external access to specific services within the LAN.	CO3
9	Setting up a Simple Network Management Protocol (SNMP) to monitor network devices.	CO4
10	Troubleshooting common network connectivity issues using various command-line tools like ping, tracert, and ipconfig.	CO4
11	Analyzing network performance using tools like Wireshark to capture and analyze network packets.	CO4
12	Configuring a Virtual Private Network (VPN) for secure remote access to the LAN.	CO4

Books & Other Resources	

Text Books:-

1. Network+ Guide to Networks" by Jill West, Tamara Dean, and Jean Andrews.
2. "CompTIA Network+ Certification All-in-One Exam Guide" by Mike Meyers.

Reference Books:-

1. "TCP/IP Illustrated, Volume 1: The Protocols" by W. Richard Stevens.
2. "Troubleshooting with the Windows Sysinternals Tools" by Mark Russinovich and Aaron Margosis.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTER

T.Y. B. Tech(IT) *(2023 Pattern)*

Sem-V

2315803:Advanced Excel Course

Teaching Scheme: **PR : 02 Hrs./Week**	**Credits=01**	**Examination Scheme:** **CIA :** **ESE : 50** **TW :**

Course Objectives: The student should be able to

1. To know a range of lookup and reference functions.
2. To understand modifying excel options.
3. To learn protecting data in worksheets and workbooks.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Understand the formatting of charts in Excel.

CO2: Construct summaries in spread sheets using sub totals.

Unit 1: General Ledger **7hrs**	**CO**
Formulas,VLOOKUP,COUNTIFS,COUNT,IF,COUNTIF,COUNTIFS,Filters,Ribbon Tour,Quick Filtering, Filtering by Multiple Criteria, Saving the Filtered Data ,Performing Calculations on Filtered Data ,PivotTables,Defined.,Basic PivotTable Data ,Inserting a Pivot Table,PivotTable Geography ,Building a PivotTable Report – Part One, Adding row labels, adding Column data, changing formulas in columns, changing headers & numberformats, Building a PivotTable Report – Part Two,	CO1
Unit 2: Non-Financial Data **7hrs**	CO2
Adding multiple row labels, collapsing and expanding, drill down to data, sorting, & refreshing , Building a PivotTable Report – Part Three ,Grouping by dates, grouping by ranges, show items with no detail, show values in empty cells,grouping across columns, Building a PivotTable Report – Part Four ,User defined groups, adding/removing subtotals ,Building a PivotTable Report – Part Five, Using formulas on pivoted data,Building a PivotTable Report – Part Six,Displaying multiple row labels in columns, or tabular form,Other Cool Things to do with a Pivot Table – Part Seven,Report Filters,Report Slicers, Expanding Filter Results to Individual Tabs, Formatting as a Table - Part Eight ,	

Text Books

1. Curtis DFrye, Microsoft Excel 2010.
2. St George's University of London, Excel Fundamentals.

Reference Books

1.MaizaMaini, Advanced spreadsheets-Microsoft Excel 2010.
2. University of York, InformationServices, Essential Spreadsheets.
3. Microsoft Application Series, Excel 2010 Advanced.
4. Carnegie Mellon University, Advanced Excel-VLOOKUP, HLOOKUP AND PIVOT TABLES-Excel 2010.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(IT) *(2023 Pattern)*

Sem-V

VAC153:Human Computer Interaction

Teaching Scheme: TH : 01 Hrs./Week	Credits=02	Examination Scheme: CIA : 50 ESE : TW :

Course Objectives: The student should be able to

1. To introduce to the field of human-computer-interaction study.
2. To gain an understanding of the human part of human-computer-interactions.
3. To learn to do design and evaluate effective human-computer-interactions.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Explain importance of HCI study and principles of user-centered design (UCD) approach.

CO2: Develop understanding of human factors in HCI design

Module 1: Part I Design Issues **7 hrs**	**CO**
Interactive Critical Systems and How to Build Them, Semiotics and Human- Computer Interaction, Benefiting from ISO Standards, Gender and Human- Computer Interaction, Usability and Digital Typography.	CO1
Unit 2: Part II Design Process **7 hrs**	CO2
Agile User- Centered Design, Ethnographic Approach to Design, User Modeling, Kids and Design.	

Text Books

1. The Wiley Handbook of Human Computer Interaction.
2. Ben Shneiderman; Catherine Plaisant; Maxine Cohen; Steven Jacobs (29 August 2013).

Reference Books

1. Gerard Jounghyun Kim (20 March 2015). Human–Computer Interaction: Fundamentals andPractice.CRC Press. ISBN 978-1-4822-3390-2.
2. Donald A. Norman (2013). The Design of Everyday Things Basic Books. ISBN 978-0-465-07299-6.
3. Jeff Johnson (17 December 2013). Designing with the Mind in Mind: Simple Guide to
   Understanding User Interface Design Guidelines. Elsevier. ISBN 978-0-12-411556-9.
4. Alan Cooper; Robert Reimann; David Cronin; Christopher Noessel (13 August 2014).
   About Face:The Essentials of Interaction Design. Wiley. ISBN 978-1-118-76658-3

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-V : Advance Web Designing and Deployment (2315391)

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:4	**Th:4**	**Theory**	**CIA: 50**
Practicals:	**Audit Course**		**End-Sem:50**
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Understand the necessity of web design and advanced technology
2. Apply various advanced web tech like React, Node, Express JS, mongodb etc
3. Implement their own web site and applications

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and describe the role of advance d web design in web 3,0

CO2: Comprehend basic components of web design

CO3: apply and understand the impact of various technologies like Mongodb, JS, etc.

CO4: Interpret and troubleshoot issues in web design

CO5: Implement and design web application

Unit 1: Introduction **7Hrs**	**CO**
Technical Orientation, Intro to MERN Stack, System Setup, How Internet Works, Client and Server Architecture, Classification of IP Addresses and Concept of Port Numbers, How DNS works?, MVC Architecture. Terminologies : WebPages, Web Applications, Websites, Client Side & Server Side. Programming,URL,URI,URN,APIs, Desktop Applications, Mobile Applications, Software Vs Application, Compiler Vs Interpreter, Using Basic Web Servers(Nginx,Apache,Python HTTP,HTTPS,FTP)	CO1 to CO4
Unit 2 Setting up Ubuntu web server 7Hrs	
Intro to HTML5, Intro Cloud Computing, Browsing Anonymous using Tor, VPN, Scraping Tools, Installing Linux and Web Development Environment Setup, Linux File System, man pages, Working with Directories, Working with Files, Working with file contents, Basic Unix tools, Working with 'nano' and 'vi' command line editors Unix file permissions chmod, Writing automated and scheduled Unix Scripts (cron jobs), Ubuntu Networking, Ubuntu user management, Configuring local virtual machines (Vmware/Oracle Virtual Box)	CO1 to CO5
Unit 3 Boot Strap and JS **7Hrs**	

Intro to Bootstrap4, Bootstrap Typography, Tables, Images, Alerts, Buttons, Progress bars, cards, Collapse, Navbar, Forms, Carousel, Bootstrap Modal and popovers Media objects, Bootstrap grid system, Working with Bootstrap Templates, JS operators and Primitive Types, Type Coercions JS DOM, Advance JS DOM, Regular Expressions Algorithms with JS, Working with Time and Space complexity Intro to Object Oriented Programming, Working with JSON,XML, Building JS Objects and Nested objects, OOPS with Function Prototypes, Inheritance with Function Prototypes, Advanced CSS, CSS Grids, CSS flexbox, Advanced CSS and SASS, CSS Variables,CSS Parallax, CSS Sidebars, Tabs, CSS Slideshows, Working with HTML5 and CSS Templates	
Unit 4 Node JS and MongoDB 7Hrs	
Intro to core Node JS, Understanding Node Modules and Require, Module Exports, Node Events and Event Emitters, Understanding C++ execution behind Node callbacks, Difference between Sync and Async programming in NodeJS, Node with local File System, Understanding Buffers, Streams, PipeLines, File Operations with Node, Debugging Node JS, Introduction to Node as Web Server with http module Intro to Node package manager(NPM), Node Project setup with npm, understanding package.json and npm scripts, Semantic Versioning Intro to UX Design and Prototyping, Wireframing, Product Ideation Phase Intro to Python, Intro to MongoDB and Mongo Atlas, Installation of MongoDB Server, working with RoboT tool, MongoDB CRUD Operations,Object IDs in MongoDB, Aggregation Framework in Mongodb, Relationships in MongoDB, User Role Management MongoDB, Map Reducing Techniques with MongoDB, Problem solving with Python, HTTP Parsers with Node, Working with Nodemon	
Unit 5 Express JS 7Hrs	
Intro to Express JS, Static Files and Middleware, working with Express Generator, Routes with Express, Writing Express Middleware, Using Middleware, Templates and Template Engines, Working with Geospatial Data and locations Mongodb Intro to DataStructures with Python, Introduction to Mongoose, Mongoose DB Schemas, Mongoose DB Embedded Relations, Mongoose DB Reference Relations, Implementing RESTful APIs with ExpressJS, MongooseJS, working with Multer, Working with NodeMailer,Heroku, Server Level Validation with express-validator, Database Schema Level Validation with regex, Implementing RESTFUL APIs with Image Upload, Implementing RESTFUL APIs with Relational Embedded, Reference and performing Populating Queries, Implementing Stacks and Queues in Python	
Unit 6 JSP 7Hrs	
Problem Solving with Python, Implementing Authentication with JWT, Working with Access protected routes, Authentication vs Authorization, Hashing passwords with Bcrypt, working with gravatar, Login/Logout, Role based authentication with JWT, Performing RESTful APIs with authentication, Deploying with Heroku, Oauth Login with Social Media Accounts, Intro to React js, Problem solving python Data Structures, Problem Solving with Python, Sorting Algorithms : Bubble sort, Insertion Sort and Selection Sort, Merge sort, Quick sort, Radix sort, Intro to JSX, React Project setup, Setting up the React Development Environment , Babel, Webpack (Installing Global packages, adding dependencies & plugins), Create React App, React Props, Functional and Class Based Components, React State and explicit mutations, React component Lifecycle Events, React Controlled and Uncontrolled Forms, React Form Validation, React Router Intro, Protected Routes with React Router,Higher Order Components, Converting Web templates into React components, React Proxy, Creating the registration and Login form with state, Styled Components in React js, Problem Solving with Python,	

TEXT BOOKS:

1. Fundamentals of React & Angular JS with MongoDB

2. Kogent Learning Solutions Inc, Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, XML and AJAX, Blackbook, Dreamtech Press, Second Edition, ISBN: 9788177228496.
3. Raymond Camden, Andy Matthews, JQuery Mobile Web Development Essentials, Packt Publishing, Second Edition, 9781782167891

REFERENCE BOOKS:

1. Web Programming, building internet applications, Chris Bates 2nd edition, Wiley Dremtech

2. Java Server Pages – Hans Bergsten, SPD O'Reilly

3. Java Script, D.Flanagan, O'Reilly, SPD.

4. Beginning Web Programming-Jon Duckett WROX.

5. Programming world wide web, R.W. Sebesta. Fourth Edition, Pearson.

6. Internet and World Wide Web – How to program, Dietel and Nieto, Pearson.

7. Steven M. Schafer, "HTML, XHTML and CSS", Wiley India Edition, Fourth Edition,978- 81- 265-1635-3

8. Dr.HirenJoshi, Web Technology and Application Development, DreamTech, First,ISBN:978-93-5004-088-1

9. Steven M. Schafer, "HTML, XHTML and CSS", Wiley India Edition, Fourth Edition,978- 81-265-1635-3

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-V : Advanced Web Designing and Deployment Lab(2315392)

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:	**Pr:1**	**Theory**	**CIA:**
Practicals: 2hrs/week			**End-Sem:**
		Pract:	**--**
		Oral:	**25**
		Termwork	**25**

Course Objectives: The student should be able to

1. Understand the necessity of web design and advanced technology
2. Apply various advanced web tech like React, Node, Express JS, mongodb etc
3. Implement their own web site and applications

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and describe the role of advance d web design in web 3,0

CO2: Comprehend basic components of web design

CO3: apply and understand the impact of various technologies like Mongodb, JS, etc.

CO4: Interpret and troubleshoot issues in web design

CO5: Implement and design web application

Sl.no	**Name of the Unit**	**COs**
1.	Understanding of programming concept & evolution of programming/coding	CO1.CO2
2.	Building with Js and Node	CO3-CO5
3.	Data Structures with JS, API and React	CO3-CO5
4.	Data Structures with Python and OOP	CO3-CO5
5.	Redux, Databases and Deployment	CO3-CO5
6.	Website linked with MongoDB database	CO3-CO5
7.	Web design Using Node JS	CO3-CO5
8.	Web Design using Bootstrap	CO3-CO5
9.	Applying Express JS to web design	CO3-CO5

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (T.E. – I.T.) (2023 Pattern)

Sem-VI

2315309 - Design and Analysis of Algorithm

Teaching Scheme: TH : 03 Hrs./Week PR :	Credits Th:03 Practical:	Examination Scheme: CIA : 50 ESE : 50

Course Objectives:-

1. To develop problem solving abilities using mathematical theories.
2. To apply algorithmic strategies while solving problems.
3. To analyze performance of different algorithmic strategies in terms of time and space.
4. To develop time and space efficient algorithms.
5. To study algorithmic examples in distributed and concurrent environments
6. To Understand Multithreaded and Distributed Algorithms

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Formulate the problem

CO2: Analyze the asymptotic performance of algorithms

CO3: Decide and apply algorithmic strategies to solve given problem

CO4: Find optimal solution by applying various methods

CO5: Analyze and Apply Scheduling and Sorting Algorithms.

CO6: Solve problems for multi-core or distributed or concurrent environments

Units		
Unit 1	**Algorithms and Problem Solving (07 Hrs.)**	**CO**
Algorithm: The Role of Algorithms in Computing - What are algorithms, Algorithms as technology, Evolution of Algorithms, Design of Algorithm, Need of Correctness of Algorithm, Confirming correctness of Algorithm – sample examples, Iterative algorithm design issues. Problem solving Principles: Classification of problem, problem solving strategies, classification of time complexities (linear, logarithmic etc.)		CO1
Unit 2	**Analysis of Algorithms and Complexity Theory (07 Hrs.)**	CO2
Analysis: Input size, best case, worst case, average case Counting Dominant operators, Growth rate, upper bounds, asymptotic growth, O, Ω, Θ, o and ω notations, polynomial and non-polynomial problems, deterministic and non-deterministic algorithms, P- class problems, NP-class of problems, Polynomial problem reduction NP complete problems- vertex cover and 3-SAT and NP hard problem - Hamiltonian cycle		
Unit 3	**Greedy And Dynamic Programming algorithmic Strategies (07 Hrs.)**	CO3
Greedy strategy: Principle, control abstraction, time analysis of control abstraction, knapsack problem, scheduling algorithms-Job scheduling and activity selection problem. Dynamic Programming: Principle, control abstraction, time analysis of control abstraction, binomial coefficients, OBST, 0/1 knapsack, Chain Matrix multiplication.		
Unit 4	**Backtracking and Branch-n-Bound (07 Hrs.)**	CO4
Backtracking: Principle, control abstraction, time analysis of control abstraction, 8-queen problem, graph coloring problem, sum of subsets problem. Branch-n-Bound: Principle, control abstraction, time analysis of control abstraction, strategies-FIFO, LIFO and LC approaches, TSP, knapsack problem.		
Unit 5	**Amortized Analysis (07 hrs.)**	CO5
Amortized Analysis: Aggregate Analysis, Accounting Method, Potential Function method, Amortized analysis-binary counter, stack Time-Space tradeoff, Introduction to Tractable and Non-tractable Problems, Introduction to Randomized and Approximate algorithms, Embedded Algorithms: Embedded system scheduling (power optimized scheduling algorithm), sorting algorithm for embedded systems.		
Unit 6	**Multithreaded And Distributed Algorithms (07 Hrs.)**	CO6
Multithreaded Algorithms - Introduction, Performance measures, Analyzing multithreaded algorithms, Parallel loops, Race conditions. Problem Solving using Multithreaded Algorithms - Multithreaded matrix multiplication, Multithreaded merge sort. Distributed Algorithms - Introduction, Distributed breadth first search, Distributed Minimum Spanning Tree. String Matching- Introduction, The Naive string matching algorithm, The Rabin-Karp algorithm		

Books & Other Resources

Text Books:-

1. Parag Himanshu Dave, Himanshu Bhalchandra Dave, ―Design And Analysis of Algorithms, Pearson Education, ISBN 81-7758-595-9
2. Gilles Brassard, Paul Bratley, ―Fundamentals of Algorithmics‖, PHI, ISBN 978-81-203-1131-2

Reference Books:-

1. Michael T. Goodrich, Roberto Tamassia, ―Algorithm Design: Foundations,‖ Analysis and Internet Examples‖, Wiley, ISBN 978-81-265-0986-7
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, ―Introduction to Algorithms‖, MIT Press; ISBN 978-0-262-03384-8
3. Horowitz and Sahani, "Fundamentals of Computer Algorithms", University Press, ISBN: 978 81 7371 6126, 81 7371 61262
4. Rajeev Motwani and Prabhakar Raghavan, ―Randomized Algorithms‖ Cambridge University Press, ISBN: 978-0-521-61390-3
5. Dan Gusfield, ―Algorithms on Strings, Trees and Sequences‖, Cambridge University Press,ISBN:0- 521-67035-7

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-V : Introduction to Machine Learning (2315310)

Teaching Scheme:	Credits	Examination Scheme	
Theory:2hr/week	Th:2	Theory	CIA: 25
Practicals:	Audit Course		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. understand the basic concepts of machine learning and apply them for the various problems.
2. learn various machine learning types and use it for the various machine learning tasks.
3. optimize the machine learning model and generalize it.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Apply basic concepts of machine learning and different types of machine learning algorithms.

CO2: Differentiate various regression techniques and evaluate their performance.

CO3: Compare different types of classification models and their relevant application.

CO4: Illustrate the tree-based and probabilistic machine learning algorithms.

CO5: Identify different unsupervised learning algorithms for the related real-world problems.

CO6: Apply fundamental concepts of ANN.

Unit 1: Introduction **7Hrs**	**CO**
Introduction: What is Machine Learning, Definition, Real life applications, Learning Tasks- Descriptive and Predictive Tasks, Types of Learning: Supervised Learning Unsupervised Learning, Semi-Supervised Learning, Reinforcement Learning.Features: Types of Data (Qualitative and Quantitative), Scales of Measurement (Nominal, Ordinal, Interval, Ratio), Concept of Feature, Feature construction, Feature Selection and Transformation, Curse of Dimensionality.Dataset Preparation: Training Vs. Testing Dataset, Dataset Validation Techniques – Hold-out, k-fold Cross validation, Leave-One-Out Cross-Validation (LOOCV).	CO1 to CO4
Unit 2 Classification **7Hrs**	CO1 to CO5
Binary Classification: Linear Classification model, Performance Evaluation- Confusion Matrix, Accuracy, Precision, Recall, ROC Curves, F-Measure Multi-class Classification: Model, Performance Evaluation Metrics – Per-class Precision and Per-Class Recall, weighted average precision and recall -with example, Handling more than two classes, Multiclass Classification techniques -One vs One, One vs RestLinear	

Models: Introduction, Linear Support Vector Machines (SVM) – Introduction, Soft Margin SVM, Introduction to various SVM Kernel to handle non-linear data – RBF, Gaussian, Polynomial, Sigmoid. Logistic Regression – Model, Cost Function.	
Unit 3 Regression 7Hrs	CO1 to CO5
Regression: Introduction, Univariate Regression – Least-Square Method, Model Representation, CostFunctions: MSE, MAE, R-Square, Performance Evaluation, Optimization of Simple Linear Regression with Gradient Descent - Example. Estimating the values of the regression coefficients Multivariate Regression: Model Representation Introduction to Polynomial Regression: Generalization-Overfitting Vs. Underfitting, Bias Vs. Variance.	
Unit 4 ANN and Deep Learning 7Hrs	CO6
Perceptron Learning– Biological Neuron, Introduction to ANN, McCulloch Pitts Neuron, Perceptron and its Learning Algorithm, Sigmoid Neuron, Activation Functions: Tanh, ReLuMulti-layer Perceptron Model – Introduction, Learning parameters: Weight and Bias, Loss function: Mean Square ErrorIntroduction to Deep Learning	

TEXT BOOKS:

1. Ethem Alpaydin, Introduction to Machine Learning, PHI 2nd Edition-2013

2. Peter Flach: Machine Learning: The Art and Science of Algorithms that Make Sense of Data,

Cambridge University Press, Edition 2012.

3. Hastie, Tibshirani, Friedman: Introduction to Statistical Machine Learning with Applications in R,

Springer, 2nd Edition 2012

4. Tom M. Mitchell, Machine Learning, 1997, McGraw-Hill, First Edition

REFERENCE BOOKS:

1. Introduction to Machine Learning: https://nptel.ac.in/courses/106/106/106106139/

2. Machine Learning: https://nptel.ac.in/courses/106/106/106106202/

3. Machine Learning for Science and Engineering applications:

https://nptel.ac.in/courses/106/106/106106198/

4. Introduction to Machine Learning: https://nptel.ac.in/courses/106/105/106105152/

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

Information Technology (2023 Pattern)

Sem-VI

2315311: System Programming

Teaching Scheme:	Credits	Examination Scheme	
Theory:2hr/week	Th:2	Theory	CIA: 25
Practicals:			End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives:-

1. To get acquainted with the basics of System Programming.
2. To acquire knowledge of data structures used in the design of System Software.
3. To be familiar with the format of object modules, functions of linking, relocation, and loading.
4. To comprehend the structures and functions of Operating Systems and process management.
5. To deal with concurrency and deadlock in the Operating System.
6. To learn and understand memory management of Operating System.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Analyze and synthesize basic System Software and its functionality.

CO2: Identify suitable data structures and Design & Implement various System Software.

CO3: Compare different loading schemes and analyze the performance of linker and loader.

CO4: Implement and Analyze the performance of process scheduling algorithms.

CO5: Identify the mechanism to deal with deadlock and concurrency issues.

Units		
Unit 1	**Introduction to Systems Programming** **(07 Hrs.)**	**CO**
Need of Systems Programming, Software Hierarchy, Types of software, Machine structure. Components of Systems Programming: Text Editors, Assembler, Macros, Compiler, Interpreter, Loader, Linker, Debugger, Device Drivers, O.S. Elements of Assembly Language Programming: Assembly Language statements, Benefits of Assembly Language, A simple Assembly scheme, Pass Structure of Assembler. Design of two pass Assembler: Processing of declaration statements, Assembler Directives and imperative statements, Advanced Assembler Directives, Intermediate code forms, Pass I and Pass II of two pass Assembler.		**CO1**
Unit 2	**Macro Processor and Compilers** **(07 Hrs.)**	**CO2**
Introduction, Features of a Macro facility: Macro instruction arguments, Conditional Macro expansion, Macro calls within Macros, Macro instructions, Defining Macro, Design of two pass, Macro processor, Concept of single pass Macro processor. Introduction to Compilers: Phases of Compiler with one example, Comparison of Compiler and Interpreter.		
Unit 3	**Linkers and Loaders** **(07 Hrs.)**	**CO3**
Loader schemes: Compile and Go, General Loader Scheme, Absolute Loaders, Subroutine Linkages, Relocating Loaders, Direct linking Loaders, Overlay structure, Design of an Absolute Loader, Design of Direct linking Loader, Self-relocating programs, Static and Dynamic linking.		
Unit 4	**Operating System (OS)** **(07 Hrs.)**	**CO4-CO5**
Evolution, Operating System Services, Functions of O. S., Process Management: Process States, Process control block, Threads & lifecycle, Multithreading Model, Process control system calls. Process Scheduling, Scheduling: Preemptive, Non-preemptive, Long-term, Medium-term, Short term scheduling. Scheduling Algorithms: FCFS, SJF, RR, and Priority.		

Text Books:-

1. 1. John Donovan, “Systems Programming”, McGraw Hill, ISBN 978-0--07-460482-3
2. 2. Dhamdhere D., "Systems Programming and Operating Systems", McGraw Hill, ISBN 0 - 07 - 463579 – 4.
3. 3. Silberschatz, Galvin, Gagne, "Operating System Principles", 9th Edition, Wiley, ISBN 978- 1-118-06333-0.

Reference Books:-

1. Leland Beck, “System Software: An Introduction to Systems Programming”, Pearson
2. System Software – An Introduction to Systems Programming by Leland L. Beck, 3rd Edition, Pearson Education Asia, 2000
3. System Software by Santanu Chattopadhyay, Prentice-Hall India, 2007.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B.Tech (Information Technology) *(2023 Pattern)*

Sem-VI

2315312: System Programming Lab

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:	**Pr:1**	**Theory**	**CIA:**
Practicals: 2hr/week			**End-Sem:**
		Pract:	**50**
		Oral:	--
		Termwork	

Course Objectives:-

a) To get acquainted with the basics of System Programming.
b) To acquire knowledge of data structures used in the design of System Software.
c) To be familiar with the format of object modules, functions of linking, relocation, and loading.
d) To comprehend the structures and functions of Operating Systems and process management.
e) To deal with concurrency and deadlock in the Operating System.
f) To learn and understand memory management of Operating System.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Analyze and synthesize basic System Software and its functionality.
CO2: Identify suitable data structures and Design & Implement various System Software.
CO3: Compare different loading schemes and analyze the performance of linker and loader.
CO4: Implement and Analyze the performance of process scheduling algorithms.
CO5: Identify the mechanism to deal with deadlock and concurrency issues.

Experiment-1	
Design suitable data structures and implement pass-I of a two-pass assembler for a pseudo-machine using object-oriented features. Implementation should consist of a few instructions from each category and few directives.	
Experiment-2	
Design suitable data structures and implement pass-I of a two-pass macro-processor using OOP features.	
Experiment-3	
Write a program using Lex specifications to implement lexical analysis phase of compiler to generate tokens of subset of 'C' program.	
Experiment-4	
Write a program using YACC specifications to implement syntax analysis phase of compiler to validate type and syntax of variable declaration in C program.	
Experiment-5	
Write a program using YACC specifications to implement the syntax analysis phase of the compiler to recognize simple and compound sentences given in the input file.	

Experiment-6	
Write a program to implement following CPU scheduling algorithms: FCFS, SJF (Non Preemptive), Priority (Non-Preemptive) and Round Robin (Preemptive)	
Experiment-7	
Implement UNIX system calls like PS, Fork, Join, Exec family, and Wait for process management (use shell script/ Java/ C programming).	
Experiment-8	
Write a program to implement following CPU scheduling algorithms: Priority (Non-Preemptive) and Round Robin (Preemptive)	

Text Books

1. John Donovan, “System Programming”, McGraw Hill, ISBN 978-0--07-460482-3
2. Dhamdhere D, Systems Programming and Operating Systems; McGraw Hill, ISBN 0 - 07 - 463579 – 4
3. Silberschatz, Galvin, Gagne, "Operating System Principles", 9th Edition, Wiley, ISBN 978- 1-118-06333-0.

Reference Books

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers Principles, Techniques and Tools”, Pearson,ISBN:978-81-317-2101-8
2. John R. Levine, Tony Mason, Doug Brown, “Lex and Yacc”, O’Reilly; Associates, Inc, ISBN:1-56592-000-7.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTER

B. Tech (T.E. – I.T.) (2023 Pattern)
Sem- VI
2315313 - Design and Analysis of Algorithm Lab

Teaching Scheme: TH : PR : 02 hrs./week	Credits Th: Practical: 01	Examination Scheme: CIA : 25 ESE :

Course Objectives:-

1. Analyze performance of an algorithm.
2. Learn how to implement algorithms that follow algorithm design strategies namely divide and conquer, greedy, dynamic programming, backtracking, branch and bound.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Analyze performance of an algorithm.

CO2: Implement an algorithm that follows one of the following algorithm design strategies: divide and conquer, greedy, dynamic programming, backtracking, branch and bound.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTER

B. Tech (T.E. – I.T.) (2023 Pattern)

Sem- VI

2315313 - Design and Analysis of Algorithm Lab

Sr. no.	Practical Title	CO
1	Write a program non-recursive and recursive program to calculate Fibonacci numbers and analyze their time and space complexity.	CO1
2	Write a program to implement Huffman Encoding using a greedy strategy.	CO2
3	Write a program to solve a fractional Knapsack problem using a greedy method.	CO2
4	Write a program to solve a 0-1 Knapsack problem using dynamic programming or branch and bound strategy.	CO2
5	Design n-Queens matrix having first Queen placed. Use backtracking to place remaining Queens to generate the final n-queen‘s matrix	CO2
6	Write a program for analysis of quick sort by using deterministic and randomized variant.	CO1
7	**Mini Project** - Write a program to implement matrix multiplication. Also implement multithreaded matrix multiplication with either one thread per row or one thread per cell. Analyze and compare their performance	CO1
8	**Mini Project** - Implement merge sort and multithreaded merge sort. Compare time required by both the algorithms. Also analyze the performance of each algorithm for the best case and the worst case.	CO1
9	**Mini Project** - Implement the Naive string matching algorithm and Rabin-Karp algorithm for string matching. Observe difference in working of both the algorithms for the same input.	CO1
10	**Mini Project** - Different exact and approximation algorithms for Travelling-Sales-Person Problem	CO1

Books & Other Resources

Text Books:-

1. Parag Himanshu Dave, Himanshu Bhalchandra Dave, ―Design And Analysis of Algorithms, Pearson Education, ISBN 81-7758-595-9

2. Gilles Brassard, Paul Bratley, ―Fundamentals of Algorithmics‖, PHI, ISBN 978-81-203-1131-2

Reference Books:-

1. Michael T. Goodrich, Roberto Tamassia, ―Algorithm Design: Foundations,‖ Analysis and Internet Examples‖, Wiley, ISBN 978-81-265-0986-7

2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, ―Introduction to Algorithms‖, MIT Press; ISBN 978-0-262-03384-8

3. Horowitz and Sahani, "Fundamentals of Computer Algorithms", University Press, ISBN: 978 81 7371 6126, 81 7371 61262

4. Rajeev Motwani and Prabhakar Raghavan, ―Randomized Algorithms‖ Cambridge University Press, ISBN: 978-0-521-61390-3

5. Dan Gusfield, ―Algorithms on Strings, Trees and Sequences‖, Cambridge University Press,ISBN:0- 521-67035-7

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-V : Introduction to Machine Learning (2315310)

Teaching Scheme:	Credits	Examination Scheme	
Theory:2hr/week	Th:2	Theory	CIA: 25
Practicals:	Audit Course		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. understand the basic concepts of machine learning and apply them for the various problems.
2. learn various machine learning types and use it for the various machine learning tasks.
3. optimize the machine learning model and generalize it.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Apply basic concepts of machine learning and different types of machine learning algorithms.

CO2: Differentiate various regression techniques and evaluate their performance.

CO3: Compare different types of classification models and their relevant application.

CO4: Illustrate the tree-based and probabilistic machine learning algorithms.

CO5: Identify different unsupervised learning algorithms for the related real-world problems.

CO6: Apply fundamental concepts of ANN.

Unit 1: Introduction **7Hrs**	**CO**
Introduction: What is Machine Learning, Definition, Real life applications, Learning Tasks- Descriptive and Predictive Tasks, Types of Learning: Supervised Learning Unsupervised Learning, Semi-Supervised Learning, Reinforcement Learning.Features: Types of Data (Qualitative and Quantitative), Scales of Measurement (Nominal, Ordinal, Interval, Ratio), Concept of Feature, Feature construction, Feature Selection and Transformation, Curse of Dimensionality.Dataset Preparation: Training Vs. Testing Dataset, Dataset Validation Techniques – Hold-out, k-fold Cross validation, Leave-One-Out Cross-Validation (LOOCV).	CO1 to CO4
Unit 2 Classification **7Hrs**	CO1 to CO5
Binary Classification: Linear Classification model, Performance Evaluation- Confusion Matrix, Accuracy, Precision, Recall, ROC Curves, F-Measure Multi-class Classification: Model, Performance Evaluation Metrics – Per-class Precision and Per-Class Recall, weighted average precision and recall -with example, Handling more than two classes, Multiclass Classification techniques -One vs One, One vs RestLinear	

Models: Introduction, Linear Support Vector Machines (SVM) – Introduction, Soft Margin SVM, Introduction to various SVM Kernel to handle non-linear data – RBF, Gaussian, Polynomial, Sigmoid. Logistic Regression – Model, Cost Function.	
Unit 3 Regression 7Hrs	CO1 to CO5
Regression: Introduction, Univariate Regression – Least-Square Method, Model Representation, CostFunctions: MSE, MAE, R-Square, Performance Evaluation, Optimization of Simple Linear Regression with Gradient Descent - Example. Estimating the values of the regression coefficients Multivariate Regression: Model Representation Introduction to Polynomial Regression: Generalization-Overfitting Vs. Underfitting, Bias Vs. Variance.	
Unit 4 ANN and Deep Learning 7Hrs	CO6
Perceptron Learning– Biological Neuron, Introduction to ANN, McCulloch Pitts Neuron, Perceptron and its Learning Algorithm, Sigmoid Neuron, Activation Functions: Tanh, ReLuMulti-layer Perceptron Model – Introduction, Learning parameters: Weight and Bias, Loss function: Mean Square ErrorIntroduction to Deep Learning	

TEXT BOOKS:

1. Ethem Alpaydin, Introduction to Machine Learning, PHI 2nd Edition-2013

2. Peter Flach: Machine Learning: The Art and Science of Algorithms that Make Sense of Data,

Cambridge University Press, Edition 2012.

3. Hastie, Tibshirani, Friedman: Introduction to Statistical Machine Learning with Applications in R,

Springer, 2nd Edition 2012

4. Tom M. Mitchell, Machine Learning, 1997, McGraw-Hill, First Edition

REFERENCE BOOKS:

1. Introduction to Machine Learning: https://nptel.ac.in/courses/106/106/106106139/

2. Machine Learning: https://nptel.ac.in/courses/106/106/106106202/

3. Machine Learning for Science and Engineering applications:

https://nptel.ac.in/courses/106/106/106106198/

4. Introduction to Machine Learning: https://nptel.ac.in/courses/106/105/106105152/

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B.Tech(Information Technology) (2023 Pattern)
Sem-VI
2315315A:Business Analytics and Intelligence

Teaching Scheme: TH : 04 Hrs./Week	Credits Th:04	Examination Scheme: CIA : 50 ESE : 50

Course Objectives:-

1. Apply conceptual knowledge on how Business Intelligence is used within organizations.
2. Explore various systems and software for Business Intelligence
3. Understand several business scenarios where business analytics and intelligence can be useful
4. Understand the mathematical and analytical models behind Business Intelligence

Course Outcomes:-

On completion of the course, learner will be able to

CO1. Apply conceptual knowledge on how Business Intelligence is used in decision making process

CO2. Use modelling concepts in Business Intelligence

CO3. Understand and apply the concepts of business reports and analytics with the help of visualization for business performance management

CO4. Comprehend the model-based decision making using prescriptive analytics

CO5. Analyze the role of analytics and intelligence in Business

CO6. Comprehend different Business Intelligence trends and its future impacts

Units		
Unit 1	**Introduction to Decision Making and Business Intelligence (09 Hrs.)**	**CO**
Changing Business Environments, Decision Making & Simon's Decision-Making Process, Managerial roles in Decision Making, Information Systems Support for Decision Making, framework for Computerized Decision Support: The Gorry and Scott-Morton Classical Framework, Decision support systems (DSS). Capabilities of DSS, DSS Classification, DSS Components. Business Intelligence (BI), Framework for BI, BI architecture, DSS - BI Connection, Goals of BusinessIntelligence, Business Intelligence: Tasks and Analysis Formats, BI use cases: Application in Patient Treatment, Application in Higher Education, Application in Logistics		**CO1**
Unit 2	**Modeling in BI (09 Hrs.)**	**CO2**
Models and Modeling in BI, Model Presentation, Model Building, Model Assessment and Quality of Models, Modeling using Logical Structures: Ontologies &Frames, Modeling using Graph Structures:Business Process Model and Notation (BPMN) & Petri Nets, Modeling using Probabilistic Structures,Modeling Using Analytical Structures. Models and Data: Data Generation, The Role of Time, Data Quality		
Unit 3	**Business reporting, Visual analytics, and Performance management (9 Hrs.)**	**CO3**
What Is a Business Report, Components of Business Reporting Systems, Data and Information Visualization, Types of Charts and Graphs, Visual Analytics, Performance Dashboards, Business Performance Management, Closed Loop BPM Cycle, Performance Measurement, Key Performance Indicators, Balanced Scorecards, The Four Perspectives of BSC? BI Tools: Tableau, Qlik, power BI, Dundas BI, Sisense, Webfocus, Oracle BI		
Unit 4	**Model-Based Decision Making (09 Hrs.)**	**CO4**
What are Descriptive analytics, predictive analytics, and prescriptive analytics, Decision Support Systems Modeling, Structure of Mathematical Models for Decision Support, Certainty, Uncertainty, and Risk, Decision Modeling with Spreadsheets, Mathematical Programming Optimization, Multiple Goals, Sensitivity Analysis, What-If Analysis, and Goal Seeking, Decision Analysis with Decision Tables and Decision Trees, Multi-criteria Decision Making with Pairwise Comparisons		
Unit 5	**Role and Applications of Analytics and Intelligence in Business (09 Hrs.)**	**CO5**
The role of visual and business analytics (BA) in BI and how various forms of BA are		

supported in practice. ERP and Business Intelligence, BI Applications in CRM, BI Applications in Marketing, BI Applications in Logistics and Production, Role of BI in Finance, BI Applications in Banking, BI Applications in Telecommunications, BI Applications in Fraud Detection, BI Applications in Retail Industry		
Unit 6	**Business Analytics: Emerging Technologies (09 Hrs.)**	**CO6**
Emerging Technologies, the critical success factors for implementing a BI strategy, Predicting the Future with the help of Data Analysis, BI Search & Text Analytics – Advanced Visualization – Rich Report, cloud computing and BI, Future beyond Technology. Impacts of Analytics in Organizations, Issues of Legality, Privacy, and Ethics, Location-Based Analytics for Organizations, Analytics Applications for Consumers.		
Books & Other Resources		

Text Books:-

1. Wilfried Grossmann & Stefanie Rinderle-Ma "Fundamentals of Business Intelligence", Springer, ISBN 978-
3-662-46531-8 (eBook)
2. 2. Business Intelligence and Analytics: Systems for Decision Support, 10th edition, ISBN 978-0-133-05090-
5, by Ramesh Sharda, DursunDelen, and Efraim Turban, published by Pearson Education © 2014.

Reference Books:-

1. Sabherwal, R. and Becerra-Fernandez, I. (2011). Business Intelligence: Practices, Technologies, and Management. John Wiley.
2. Turban,E. and Volonino, L.(2011). Information Technology for Management: Improving Strategic and Operational Performance. 8th edn.Wiley.

SANDIP FOUNDATION

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Information Technology) *(2023 Pattern)*

Sem-VI

2315315B: Neural Network

Teaching Scheme:	Credits	Examination Scheme	
Theory:4hr/week	Th:4	Theory	CIA: 50
Practicals:			End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. how human brain, particularly neurons work, and how that can be adapted in Machine Learning
2. Review, understand, and describe the role and importance of neural network components
3. Design, innovate, and implement their own neural networks to solve the complex problems

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and describe the role and importance of Neural Network in machine learning

CO2: Comprehend basic components of neural network.

CO3: design and develop the working neural networks for complex problem solving

CO4: Interpret the aspects of deep learning in forming the innovative neural networks

CO5: Implement and design application oriented ANN, CNN, and other types of neural networks.

Unit 1:Introduction **7 Hrs**	**CO**
Introduction: Humans and Computers, the structure of the brain, Learning in machines, The differences. Pattern Recognition: Introduction Pattern Recognition in perspective, Pattern recognition – a definition, Feature vectors and feature space, discriminant Functions, classifications Techniques, pattern recognition – a summary.	CO1
Unit 2:Learning Process **7 Hrs**	CO1 - CO2
Introduction: A Neural Network, Human Brain, Models of a Neuron, Neural Networks viewed as Directed Graphs, Network Architectures, Knowledge Representation, Artificial Intelligence and Neural Networks. Learning Process: Error Correction Learning, Memory Based Learning, Hebbian Learning, Competitive, Boltzmann Learning, Credit Assignment Problem, Memory, Adaption, Statistical Nature of the Learning Process	
Unit 3: Artificial Neural Networks **7 Hrs**	CO2 - CO3
Artificial Neural Networks Introduction, Basic models of ANN, important terminologies, Supervised Learning Networks, Perceptron Networks, Adaptive Linear Neuron, Back-propagation Network. Associative Memory Networks. Training Algorithms for pattern association, BAM and Hopfield Networks. Unsupervised Learning Network- Introduction, Fixed Weight Competitive Nets, Maxnet, Hamming Network, Kohonen Self-Organizing Feature Maps	
Unit 4: Single Layer & Multilayer Perceptrons: **7 Hrs**	CO2 - CO4
Single Layer Perceptron: Adaptive Filtering Problem, Unconstrained Organization Techniques, Linear Least Square Filters, Least Mean Square Algorithm, Learning Curves, Learning Rate Annealing Techniques, Perceptron –Convergence Theorem, Relation Between Perceptron and Bayes Classifier for a Gaussian Environment Multilayer Perceptron: Back Propagation Algorithm XOR Problem, Heuristics, Output Representation and Decision Rule, Computer Experiment, Feature Detection	
Unit 5: Kohenen Self- Organizing Networks **7hrs**	CO4
Kohenen Self- Organizing Networks : Introduction , The Kohenen Algorithm , Weight training , Neighborhood ,Reducing the neighborhood , Learning vector Quantisation, The Phonetic type writer.	
Unit 6: Neuro Dynamics Hopfields Networks **7hrs**	CO5
Hopfields Networks : The Hopfield model , The energy landscape , The Boltzman Machine , constraint satisfaction . ADAPTIVE RESONANCE MEMORY : Adaptive resonance theory, Architecture and operation , ART network , Clarification Conclusion , Summary of ART. Neuro Dynamics: Dynamical Systems, Stability of Equilibrium States, Attractors, Neuro Dynamical Models, Manipulation of Attractors as a Recurrent Network Paradigm	

Text Books

1. Deep Learning: An MIT Press Book By Ian Goodfellow and Yoshua Bengio and Aaron Courville
2. Neural Networks and Learning Machines, Simon Haykin, 3rd Edition, Pearson Prentice Hall.
3. Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House Ed. 2006.
4. R.Beale & T.Jackson , Neural Computing , An Introduction , Adam Hilger , 1990.

Reference Books

1. Pao Y.H Adaptive Pattern Recognition and Neural Networks, Addison Wesley, 1989.
2. Neural Networks in Computer Intelligence, Li Min Fu TMH 2003.
3. Neural Networks -James A Freeman David M S Kapura Pearson Ed., 2004.
4. Artificial Neural Networks - B. Vegnanarayana Prentice Hall of India P Ltd 2005.
5. B.D. Ripley, “Pattern Recognition and Neural Networks”, Cambridge University Press. ISBN 0 521 460867

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B.Tech(Information Technology) (2023 Pattern)

Sem-VI

2315316A:Mobile Computing

Teaching Scheme: TH : 04 Hrs./Week	Credits Th:04	Examination Scheme: CIA : 50 ESE : 50

Course Objectives:-

1. To understand the basic concepts of mobile computing.
2. To learn the basics of mobile telecommunication system.
3. To understand the Generations of Mobile Communication Technologies.
4. To be familiar with the network layer protocols and Ad-Hoc networks.
5. To know the basis of transport and application layer protocols.
6. To gain knowledge about different mobile platforms and application development.

Course Outcomes:-

On completion of the course, learner will be able to

CO1. understand the basic concepts of mobile computing, MAC and different multiplexing technics.

CO2. understand Protocols, Connection Establishment, Frequency Allocation, Routing of mobile telecommunication system like GSM, GPRS, UMTS.

CO3. understand the Generations of Mobile Communication Technologies

CO4. learn mobile IP , Adhoc – Network, Reactive Routing protocols, Multicast Routing.

CO5. obtaining knowledge of transport layer protocol TCP, File System, and different application layer protocols.

CO6. gain knowledge about different mobile platforms , operating Systems, Software Development Kit, Security Issues.

Units		
Unit 1	**Introduction** **(09 Hrs.)**	**CO**
Introduction to Mobile Computing: Applications of Mobile Computing, A short history of wireless communication, **Medium Access Control:** Motivation for a specialized MAC: Hidden and Exposed terminals. Near and Far terminals. **SDMA, FDMA, TDMA:** Fixed TDM, Classical Aloha, Slotted Aloha, Carrier sense multiple access, Demand assigned multiple access, PRMA packet reservation multiple access, Reservation TDMA, Multiple access with collision avoidance, Polling, Inhibit sense multiple access. **CDMA:** Spread Aloha multiple access.		**CO1**
Unit 2	**Mobile Telecommunication System** **(09 Hrs.)**	**CO2**
Introduction to Cellular Systems, **GSM:** Services & Architecture, Protocols, Connection Establishment, Frequency Allocation, Routing, Mobility Management, Security, GPRS, **UMTS:** Architecture, Handover,Security.		
Unit 3	**Generations of Mobile Communication Technologies.** **(9 Hrs.)**	**CO3**
First Generation Wireless Networks, Second Generation (2G) Wireless Cellular Networks, Major 2G standards, 2.5G Wireless Networks, Third Generation 3G Wireless Networks, Fourth Generation 4G wireless networks, Fifth Generation 5G wireless networks		
Unit 4	**Mobile Network Layer** **(09 Hrs.)**	**CO4**
Mobile IP: Goals, assumptions and requirements, Entities and Terminology, IP packet delivery, Agent advertisement and discovery, Registration, Tunnelling and Encapsulation, Optimizations, Reverse tunnelling, **IPv6:**DHCP, AdHoc networks: Routing, Proactive protocol-DSDV, Reactive Routing Protocols: DSR, AODV, Hybrid routing –ZRP, Multicast Routing: ODMRP, Vehicular Ad Hoc networks (VANET) MANET Vs VANET Security.		
Unit 5	**Mobile Transport Layer** **(09 Hrs.)**	CO5
Traditional TCP: Congestion control, Slow start, Fast retransmit/fast recovery, Implications on mobility; Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission/time-out freezing, Selective retransmission, Transaction oriented TCP. **Support for Mobility:** File systems: Consistency, Examples.		

World Wide Web: Hypertext transfer protocol, Hypertext markup language, some approaches that might help wireless access, System architectures **Wireless application protocol:** Architecture, Wireless datagram protocol, Wireless transport layer security, Wireless transaction protocol, Wireless session protocol, Wireless application environment,Wireless markup language, WML script, Wireless telephony application, Examples Stacks with WAP, Mobile databases, Mobile agents.		
Unit 6	**Mobile Platforms and Applications (09 Hrs.)**	CO6
Mobile Device Operating Systems, Special Constrains & Requirements, Commercial Mobile Operating Systems. Software Development Kit: Ios, Android, Blackberry, Windows Phone,M Commerce, Structure, Pros &Cons, Mobile Payment System, Security Issues.		
Books & Other Resources		

Text Books:-

1. Yi Bang lin : “Wireless and mobile Network Architectures" Wiley publications
2.William c.y. Lee: "Mobile Communications and Design Fundamentals" Wiley publications

Reference Books:-

1. Jochen Schiller, ―Mobile Communications, PHI, Second Edition, 2003.
2. Prasant Kumar Pattnaik, Rajib Mall, ―Fundamentals of Mobile Computing‖, PHI Learning Pvt.Ltd, New Delhi – 2012
3. C.K.Toh, ―AdHoc Mobile Wireless Networks‖, First Edition, Pearson Education, 2002.
4. Principles of Mobile Computing, 2nd Edition, Uwe Hansmann, LotharMerk, Martin Nicklous, Thomas Stober, Springer
5. Mobile Computing, Tomasz Imielinski, Springer

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-VI : Ubiquitous Computing(2315316B)

Program Elective-III

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:4hr/week	**Th:4**	**Theory**	**CIA: 50**
Practicals:			**End-Sem:50**
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. understand the characteristics and principles of Ubiquitous or Pervasive computing
2. comprehend the enabling technologies of pervasive computing
3. know the performance requirements of pervasive computing
4. Predict future trends of pervasive or Ubiquitous computing

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and describe the different aspects and requirements of ubiquitous computing

CO2: Comprehend basic components of pervasive computing

CO3: Explain the impact of ubiquitous computing on the future of ICT technology.

CO4: Implement and design applications of pervasive computing.

Unit 1: Introduction 7Hrs	**CO**
Pervasive Computing, Applications, Pervasive Computing devices and Interfaces, Device technology trends, Connecting issues and protocols. Pervasive Computing- Principles, Characteristics, interaction transparency, context aware, automated experience capture. Architecture for pervasive computing. Charting Past, Present, and Future Research in Ubiquitous Computing.	CO1 to CO3
Unit 2 Open protocols 7Hrs	CO1 to CO3
Open protocols, Service discovery technologies- SDP, Jini, SLP, UpnP protocols, data Synchronization, SyncML framework, Context aware mobile services, Context aware sensor networks, addressing and communications- Context aware security. Pervasive Computing and web based Applications - XML and its role in Pervasive Computing, Wireless Application Protocol (WAP) Architecture and Security, Wireless Mark-Up language (WML) – Introduction. Moving on from Weiser's Vision of Calm Computing: Engaging UbiComp Experiences	
Unit 3 Voice and pervasive Computing 7Hrs	
Voice Enabling Pervasive Computing, Voice Standards , Speech Applications in Pervasive Computing and security. Device Connectivity, Web application Concepts, WAP and Beyond. Voice Technology	

– Basis of speech Recognition, Voice Standards, Speech Applications, Speech and Pervasive Computing, Security, The Hitchhiker's Guide to UbiComp: Using techniques from Literary and Critical Theory to Reframe Scientific Agendas.	
Unit 4 Ubiquitous computing and PDA 7Hrs	CO1 to CO3
Personal Digital Assistant – History, Device Categories, Device Characteristics, Software Components, Standards. Server side programming in Java, Pervasive Web application Architecture, Example application, Access via PCs, Access via WAP, Access via PDA, and Access via Voice., PinchWatch: A Wearable Device for One-Handed Micro interactions., Interfaces - Enabling mobile micro-interactions with physiological computing.	
Unit 5 Pervasive UI 7Hrs	CO2,CO4
User Interface Issues in Pervasive Computing, Architecture, Smart Card- based Authentication Mechanisms , Wearable computing Architecture. Touche: Enhancing Touch Interaction on Humans, Screens, Liquids, and Everyday Objects	
Unit 6 Applications 7Hrs	CO4
Smart Tokens, Heating Ventilation and Air Conditioning, Set Top Boxes, Appliances and Home Networking, Residential Gateway, Automotive Computing, On Board Computing Systems, In Vehicle networks, Entertainment Systems, Emerging Sites of HCI Innovation: Hacker spaces, Hardware Startups & Incubators	

TEXT BOOKS:

1. Mohammads, Obaidait, Denko, Woungang, " Pervasive Computing and Networking", Wiley, ISBN:978-0-470-74772-8
2. John Krumm, "Ubiquitous Computing Fundamentals", Shroff Publishers, ISBN: 9781420093605 .

REFERENCE BOOKS:

1. Seng Loke, "Context-Aware Computing Pervasive Systems", Auerbach Pub., New York, 2007, ISBN: 978-1-4471-5006-0
2. Uwe Hansmann etl , "Pervasive Computing", Springer, New York,2001., ISBN: 10: 3540002189
3. Jochen Burkhardt, , Stefan Hepper, Klaus Rindtorff, Thomas Schaeck "Pervasive Computing-Technology and Architecture of Mobile Internet Application", Pearson Education, Sixth Edition 2009, ISBN:

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

Information Technology (2023 Pattern)

Sem-VI

2301301 : Computer Oriented Numerical Methods

Teaching Scheme:	Credits	Examination Scheme	
Theory:2hr/week	Th:2	Theory	CIA: 25
Practicals:			End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives:-

1. To get acquainted with the basics of Number System Programming.
2. To acquire knowledge of data structures used in the design of Numerical Methods.
3. To comprehend the structures and functions of CONM.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Analyze and synthesize basic Number System Software and its functionality.
CO2: Identify suitable data structures to Design & Implement various Numerical Method Software.
CO3: Compare different Numerical Method schemes and analyze the performance of each.
CO4: Implement and Analyze the performance of numerical method algorithms.
CO5: Identify the mechanism to deal with numerical method issues.

Units			
Unit 1	**Computer Arithmetic Number System**	**(07 Hrs.)**	**CO**

Computer Arithmetic Number System, Conversion of Numbers, Representation of numbers, Floating point representation, Arithmetic operations with Normalized Floating point Numbers, consequences of normalization, pitfalls in computing. Approximation and Errors Significant digits, Types of errors, absolute and relative error.		**CO1**
Unit 2	**Nonlinear Equations (07 Hrs.)**	**CO2**
Roots of Nonlinear Equations Introduction, Methods of Solution, Iterative Methods, Bisection method, False position method, Netwon-Raphson method, Secant method, Rate of convergence of iterative methods.		
Unit 3	**Simultaneous Equations (07 Hrs.)**	**CO3**
Solution of simultaneous algebraic Equations Gauss elimination method, Pivoting, ill-conditioned systems, Gauss-Seidel iterative method, Convergence of Iteration methods.		
Unit 4	**Polynomial Interpolation (07 Hrs.)**	**CO4-CO5**
Polynomial Interpolation Introduction, Polynomial Forms, Linear interpolation, Lagrange interpolation, Newton interpolation, Difference table, Forward and backward difference table.		

Text Books:-

1. Balagurusamy, E., Numerical Methods, Tata McGraw Hill, 1999.
2. Rajaraman V., Computer Oriented Numerical Methods, 3rd Edition, Prentice Hall India, New Delhi, 1998

Reference Books:-

1. Stoor, Bullrich, Computer Oriented Numericals Methods, Springer-Verlag, 1998.
2. Krishnamurthy, E.V., Sen, S.K., Computer Based Numerical Algorihms, East West Press, 1998.
3. Jain, M.K., Iyengar, S.R.K., Jain R.K., Numerical Methods : Problems and Solutions, New Age Int.(P) Ltd., New Delhi, 1997.
4. Jain, M.K., Iyengar, S.R.K., Jain R.J., Numerical Methods for Scientific and Engineering
5. Competition, New Age Int. (P)Ltd., New Delhi, 1997.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B.Tech (Information Technology) *(2023 Pattern)*

Sem-VI

2315704: Printer Repairing Course

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:	**Pr:1**	**Theory**	**CIA:**
Practicals: 2hr/week			**End-Sem:**
		Pract:	**25**
		Oral:	--
		Termwork	

Course Objectives:-

a) To get acquainted with the printer hardware.
b) To acquire knowledge of printers working and its basic components.
c) To be familiar with the different common problems of printer.
d) To comprehend the structures and functions of different printers and their drivers.
e) To troubleshoot and repair the hardware of printer

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Analyze and synthesize basic System of printers and its functionality.
CO2: Identify and troubleshoot various issue of printers.
CO3: Compare different paper and pigments loading schemes and analyze the performance of printer.
CO4: troubleshoot device driver problems.
CO5: Identify and correct the issues related with printer.

Module 1	
Basic Electronics, Soldering & disordering, Switching power supply for printer, Dot matrix printer mechanism, Print head working system, DMP Logic card working & trouble shooting	CO1-CO2-CO3
Module 2	
Inkjet printer Technology, Inkjet printer mechanism, Fault finding in Inkjet printer, All in one & office jet printer	CO2-CO5
Module 3	
Scanner working & trouble shooting, Laser printer technology, Laser printer Mechanism, Laser printer fault finding	CO3-CO5
Module 4	
How to repair multi-function printer, Toner cartridge refilling printer	CO3, CO5

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** B. Tech(T.E. – I.T.) (2023 Pattern) Sem-VI 2315304 - Advanced Web Designing Course

Teaching Scheme: **TH : PR :**	**Credits** **Th:** **Audit Course**	**Examination Scheme:** **CIA :**

Course Objectives:-

1. To familiarize students with Web Programming basic concepts
2. To learn and understand Web scripting languages.
3. To explore the Front end& Back end web programming skills.
4. To understand and learn Mobile web development.
5. To understand and learn Web application deployment.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Develop Static and Dynamic website using technologies like HTML, CSS, Bootstrap.
CO2: Demonstrate the use of web scripting languages.
CO3: Develop web application with Front End & Back End Technologies.
CO4: Develop mobile website using JQuery Mobile.
CO5: Deploy web application on cloud using AWS.

Modules

Module 1	**INTRODUCTION TO WEB TECHNOLOGIES**	**(07 Hrs.)**	**CO**
HTML: Getting started with HTML, Why HTML, Tags and Elements, Attributes, Properties, Headings list, Links, Tables, Images, HTML Form, Media (Audio, Video), Semantic HTML5 Elements. **CSS:** Why CSS, Types of CSS, How to use CSS, Properties, Classes, Child-Class (Nested CSS), Colors, Text, Background, Border, Margin, Padding, Positioning (flex, grid, inline, block), Animation, Transition. **BOOTSTRAP:** Why Bootstrap, CSS over Bootstrap, How to Use Bootstrap, Bootstrap Grid System, Bootstrap Responsive, Bootstrap Classes, Bootstrap Components (i.e., Button, Table, List, etc.),Bootstrap as a Cross Platform. **W3C:** What is W3C , How W3C handles/Supports Web Technologies			**CO1**
Module 2	**WEB SCRIPTING LANGUAGES**	**(07 Hrs.)**	
JavaScript: Introduction to Scripting languages, Introduction to JavaScript (JS), JS Variables and Constants, JS Variable Scopes, JS Data Types, JS Functions, JS Array, JS Object, JS Events. **Advanced JavaScript:** JSON - JSON Create, Key-Value Pair, JSON Access, JSON Array, JS Arrow Functions, JS Callback Functions, JS Promises, JS Async-Await Functions, JS Error Handling. **AJAX:** Why AJAX, Call HTTP Methods Using AJAX, Data Sending, Data Receiving, AJAX Error Handling. **JQUERY :**Why JQuery, How to Use, DOM Manipulation with JQuery, Dynamic Content Change with JQuery, UI Design Using JQuery.			**CO2**

Module 3	**MOBILE WEB DEVELOPMENT**	**(07 hrs.)**	
Mobile-First: What is Mobile-First? What is Mobile Web? Understanding Mobile Devices and Desktop. **JQuery Mobile:** Introduction to the jQuery Mobile Framework, Set-up jQuery Mobile, Pages, Icons, Transitions, Layouts Widgets, Events, Forms, Themes, Formatting Lists, Header and Footer, CSS Classes, Data Attributes, Building a Simple Mobile Webpage.			CO4
Books & Other Resources			
Text Books:- 1. Kogent Learning Solutions Inc, Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, XML and AJAX, Blackbook, Dreamtech Press, Second Edition, ISBN: 9788177228496. **2.** Raymond Camden, Andy Matthews, JQuery Mobile Web Development Essentials, Packt Publishing, Second Edition, 9781782167891			
Reference Books:- 1. Steven M. Schafer, "HTML, XHTML and CSS", Wiley India Edition, Fourth Edition,978- 81- 265-1635-3 **2.** Dr.HirenJoshi, Web Technology and Application Development, DreamTech, First,ISBN:978-93- 5004-088-1 **3.** Steven M. Schafer, "HTML, XHTML and CSS", Wiley India Edition, Fourth Edition,978- 81-265- 1635-3 **4.** Ivan Bayross,"Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP,BPB Publications,4th Edition,ISBN:978-8183330084. **5.** Brain Fling, Mobile Design and Development, O'REILLY, First Edition, ISBN: 13:978-81- 8404-817-9 **6.** Adam Bretz& Colin J Ihrig, Full Stack Javascript Development with MEAN, SPD, First Edition, ISBN:978-0992461256. **7.** JavaScript: The Definitive Guide - Master The World's Most-Used Programming Language, Seventh Edition **8.** Java Script, D.Flanagan, O'Reilly, SPD. **9.** Programming Typescript: Making Your JavaScript Applications Scale, Boris Cherny			

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-VI : Machine Learning Lab (VAC154)

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:	**Th:**	**Theory**	**CIA:**
Practicals: 2/week	**Pr:1**		**End-Sem:**
		Pract:	--
		Oral:	--25
		Termwork	--

Course Objectives: The student should be able to

1. fundamental elements of machine learning for classification, regression, clustering.
2. Design and evaluate the performance of a different machine learning models

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Implement different supervised and unsupervised learning algorithms.

CO2: Evaluate performance of machine learning algorithms for real-world applications.

Pr. No,	Practical Name	CO
1	data consists of temperatures of INDIA averaging the temperatures of all places month wise. Temperatures values are recorded in CELSIUSA. Apply Linear Regression using suitable library function and predict the Month-wisetemperature.B. Assess the performance of regression models using MSE, MAE and R-Square metricsC. Visualize simple regression model.	CO1
2	Regression: Using Polynomial regression resolve bluff query for new employee salary	CO2
3	Classification: Using KNN (with WCSS) Predict if a customer with certain age and Salary will purchase a product or not	CO2
4	Classification: Using Decision Tree Predict if a customer with certain age and Salary will purchase a product or not	CO2
5	Classification: Using SVM Predict if a customer with certain age and Salary will purchase a product or not	CO2

6	Classification: Using RFC Predicting if a customer with certain age and Salary will purchase a product or not.	CO2
7	Classification: Using Naïve Bayes Predict if a customer with certain age and Salary will purchase a product or not	CO2
8	Clustering: Using K-Means clustering, determine Customers of a Mall according to Categories so as to launch a scheme for business growth a product or not for imbalanced data and determining Fitting issues and Sampling methods and Optimizing techniques	CO2

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

T.Y. B.Tech(Information Technology) (2023 Pattern)

Sem-VI

2315393:Android Application Development

Teaching Scheme: TH : 04 Hrs./Week	Credits Th:04	Examination Scheme: CIA : 50 ESE : 50

Course Objectives:-

1.Demonstrate the Understanding of fundamentals of Android Programming.

2.To understand the Android Operating System.

3.To study Android Apps Development Cycle.

4. Build their ability to develop software with reasonable complexity on mobile platforms.

5. To learn to create Android Applications

6. Design the Android apps by using Java Concepts.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Understanding the fundamentals of Android Programming.

CO2: Understand the Android Operating System.

CO3: Describe the process of developing mobile applications.

CO4: Create mobile applications on different android platforms.

CO5: Create Android Applications

CO6: Design and implement mobile applications involving data storage in databases

Units		
Unit 1	**Introduction to JAVA and Android (09 Hrs.)**	**CO**
Overview of Java, XML and SQL, History of Android, Android Stack, Android Project Structure, Android OS, Features of Android, Android Architecture and building blocks, Android App build process, Android UI– resources, themes, threads etc,		**CO1**
Unit 2	**Introducing Android (09 Hrs.)**	**CO2**
SDK Overview, Android Emulator, Android Installation, setting up development environment using Eclipse/ Android Studio, DDMS, Activity Lifecycle, Manifest File, Locales, Drawable, Listeners,Supporting Multiple Screens.		
Unit 3	**Android Application Structure (9 Hrs.)**	**CO3**
Android basic building blocks: Activities, Services, Broadcast Receivers & Content providers, UI Components - Views & notifications, Components for communication -Intents & Intent Filters,Android API levels (versions & version names) AndroidManifest.xml, Uses-permission & uses-sdk, Dalvik Virtual Machine & .apk file extension, Resources & R.java, Assets, Layouts & Drawable Resources, Activities and Activity lifecycle, First sample Application.		
Unit 4	**Activities, Fragments, Intents and Android User Interface (09 Hrs.)**	**CO4**
Introduction to Activities, Activity Lifecycle, Introduction to Intents, Linking Activities using Intents, calling built-in applications using Intents, Introduction to Fragments, Adding Fragments Dynamically, Lifecycle of Fragment, Toast, Understanding the components of a screen, Adapting to Display Orientation, Split Screen / Multi-Screen Activities.		
Unit 5	**Designing User Interface with Widgets (09 Hrs.)**	CO5
Using Basic Views: Text View, Button, ImageButton, EditText, CheckBox, Switch, ToggleButton,Radio Button, and Radio Group Views, ProgressBar View, AutoCompleteTextView View, Using Picker Views, Using RecyclerView to Display Long Lists, Understanding Specialized Fragments, Displaying Pictures and Menus, VideoView. Multimedia, Animation and Graphics: Playing Audio, Playing Video, Rotate Animation, Fade In / Fade Out Animation, Zoom Animation, Scale Animation, 2D and 3D Graphics.		
Unit 6	**Databases, Location-Based Services and Google Map (09 Hrs.)**	CO6
Data Storage: Shared Preferences, Internal Storage, External Storage, SQLite Databases, Content provider. and Remote Databases. Introduction to SQLite and Room library, SQLite Open Helper and SQLite Database, Creating, opening and closing database, Creating,		

opening and closing database, Building and executing queries, SMS Messaging, Sending E-mail, Web App, JSON Parsing, JSON Web Service, Display Google Maps, Getting Location Data, Monitoring a Location. Accessing Phone services (Call, SMS, MMS), Network connectivity services, Sensors, Bluetooth/Wi-Fi Connectivity.	
Books & Other Resources	
Text Books:- 1. David Griffiths and Dawn Griffiths, "Head First Android Development: A Brain-Friendly Guide", 2nd Edition, Shroff / O'Reily Publication 2. Barry Burd, "Java Programming for Android Developers for Dummies", 2nd Edition, Dummies. 3. Wei-Meng Lee, "Beginning Android 4 Application Development", WROX Publication	
Reference Books:- 1. Herbert Schildt, "Java: The Complete Reference", 9th Edition, Tata McGraw Hill 2. Reto Meier, "Professional Android 4 Application Development", John Wiley and sons 3. John Horton, "Android Programming for Beginners", 3rd Edition, Packt Publication	

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) *(2023 Pattern)*

Sem-VII

2300401: Industry Internship / Internship (Exit Course)

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Practical:08**	**Theory**	**CIA: --**
Practical: --			**End-Sem:--**
		Pract:	--
		Oral:	50
		Termwork	100

Course Objectives: The student should be able to

1. encourage and provide opportunities for students to get professional / personal experience through internships.
2. learn to apply the technical knowledge gained from academics / c1assroom learning in real life/industrial situations.
3. get familiar with various tools and technologies used in industries and their applications.
4. enable students to develop professional skills and expand their professional network with the development of employer-valued skills like teamwork, communication.
5. apply the experience gained from industrial internship to the academic course completion project.
6. nurture professional and societal ethics in students.
7. understand the social, economic and administrative considerations that influence the working environment of industrial organizations.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: develop professional competence through industry internship
CO2: apply academic knowledge in a personal and professional environment
CO3: build the professional network and expose students to future employees
CO4: Apply professional and societal ethics in their day to day life
CO5: become a responsible professional having social, economic and administrative considerations
CO6: make own career goals and personal aspirations.

PROCEDURE

Internships are educational and career development opportunities, providing practical experience in a field or discipline. Internships are far more important as the employers are looking for employees who are properly skilled and having awareness about industry environment, practices and culture. Internship is structured, short-term, supervised training often focused around particular tasks or projects with defined time scales.

Core objective is to expose technical students to the industrial environment, which cannot be simulated/experienced in the classroom and hence creating competent professionals in the industry and to understand the social, economic and administrative considerations that influence the working environment of industrial organizations.

Engineering internships are intended to provide students with an opportunity to apply theoretical knowledge from academics to the realities of the field work/training. The following guidelines are proposed to give academic credit for the internship undergone as a part of the Engineering curriculum.

Guidelines of 4th Semester Internship for Exit Course (2 weeks)

Duration: Internship to be completed within 2 weeks as mentioned in the structure of curriculum for the respective semester / Exit Course. It is to be assessed and evaluated in 4th semester.

Guidelines of 6th Semester Internship (4 weeks)

Duration: Internship to be completed within 4 weeks after the end of 6th Semester and before the commencement of 7th semester. It is to be assessed and evaluated in 7th semester.

Internship work Identification: Student may choose to undergo Internship at Industry / Govt. / NGO / MSME / Rural Internship/ Startup to make themselves ready for the industry.

Contacting various companies for Internship and Internship work identification process should be initiated by the students with support of training and placement cell / industry institute cell /internship cell. This will help students to start their internship work on time. Also, it will allow students to work in vacation period.

Student can take internship work in the form of online/onsite work from any of the following but not limited to:

a. Working for consultancy/ research project
b. Contribution in incubation/innovation/entrepreneurship cell/institutional innovation council/startups cells of institute
c. Development of new product/business plan/registration of start-up
d. Industry/government organization internship

e. Internship through Internshala
f. In-house product development, intercollegiate, inter department research internship under research lab/group, micro/small/medium enterprise/online internship
g. Research internship under professors, IISC, IIT's, research organizations
h. Registered NGOs or social internships, rural internship
i. Participate in open source development
j. Development of Physical and/or numerical, mathematical, soft computing model
k. Company Registration Number / Startup registration number must be produced in case of company internship.

Internship Diary/ Internship Workbook: Students must maintain Internship Diary/ Internship Workbook. The main purpose of maintaining diary/workbook is to cultivate the habit of documenting. The students should record in the daily training diary the day-to-day account of the observations, impressions, information gathered and suggestions given, if any. The training diary/workbook should be signed after every day by the supervisor/ in charge of the section where the student has been working.

Internship diary/workbook and internship report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the institute immediately after the completion of the training. Internship diary/workbook may be evaluated on the basis of the following criteria.

i. Proper and timely documented entries
ii. Adequacy & quality of information recorded
iii. Organization of the information

Internship Work Evaluation: Every student is required to prepare and maintain documentary proofs of the activities done by him as internship diary or as workbook. The evaluation of these activities will be done by programme head/cell in-charge/project head/ faculty mentor or Industry Supervisor based on overall compilation of internship activities, sub-activities, level of achievement expected, evidence needed to assign the points and the duration for certain activities.

Assessment and evaluation is to be done in consultation with internship supervisor (internal and external) and a supervisor from place of internship.

Recommended evaluation parameters: Post internship internal evaluation 100 Marks and internship diary / workbook and internship report 50 Marks. Evaluation through Seminar Presentation / Viva - Voce at the Institute.

The student will present a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria.

Depth of knowledge, communication skills, presentation skills, team work, creativity, planning & organizational skills, adaptability, analytical skills, attitude and behavior at work, societal understanding, ethics, regularity and punctuality, attendance record, log book, student's feedback from external internship supervisor

After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact industrial supervisor/faculty mentor/TPO for assigning special topics and problems and should prepare the final report on the student's presence physically, if the student is found absent without prior intimation to the department/institute/concern authority/T & P Cell, entire training can be cancelled.

The report shall be presented covering following recommended fields but not limited to:

i. Title/cover Page
ii. Internship completion certificate
iii. Internship place details: Company background-organization and activities/scope and object of the study/personal observations
iv. Index/table of contents
v. Introduction
vi. Title/problem statement/objectives
vii. Motivation/scope and rationale of the study
viii. Methodological details
ix. Results/analysis/inferences and conclusion
x. Suggestions/recommendations for improvement to industry, if any
xi. Attendance record
xii. Acknowledgement
xiii. List of reference (books, magazines and other sources)

Feedback from internship supervisor (external and internal): Post internship, faculty coordinator should collect feedback about student with following recommended parameters.
Technical knowledge, discipline, punctuality, commitment, willingness to do the work, communication skill, individual work, team work and leadership

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(B.E. – I.T.) (2023 Pattern)

Sem-VII

2315401 Object Oriented Analysis and Design

Teaching Scheme: TH : 02 Hrs./Week PR :	Credits Th:02 Practical:	Examination Scheme: CIA : 25 ESE : 50

Course Objectives:-

1. To explore & understand the principles of Object Oriented Analysis & Design.
2. To lay a foundation for advanced programming
3. To Describe Object Oriented Analysis and Design concepts and apply them to solve problems
4. To Prepare Object Oriented Analysis and Design documents for a given problem using UnifiedModeling Language

Course Outcomes:-

On completion of the course, learner will be able to

CO1:To Introduce various designing techniques and methods for object oriented

CO2: Performance analysis with real time system

CO3: Demonstrate a familiarity with object oriented data and system.

CO4: To give clear idea on implementing design with UML diagram like state diagram, activity diagram, use case diagram etc.

Units		
Unit 1	**Introduction to UML (07 Hrs.)**	**CO**
What is modeling? Object Oriented Thinking, History of UMLBuilding Blocks of UML, Introduction to OMG standards MDA, XMI, UML 2.0.RUP emphasizing Inception, Elaboration, Construction, Transition Phases. 4+1Architecture, UML Meta model.Abstraction, The three models, Object and class concepts Basic Classdiagrams, Need, purpose & application of UML diagrams, Link and associationconcepts, Generalization & Inheritance, Navigation of class models.		CO1
Unit 2	**STATE MODELING & USE CASE DIAGRAMS (07 Hrs.)**	
State Modeling: Events, States, Transitions and Conditions, Statediagrams, State diagram behavior. Need, purpose. Advanced object and class concepts, Use Case Modeling: Actor Identification, Actor Classification, Actor Generalization, Use Cases Identification,Communication, Uses/Include and Extend Associations, Writing a Formal UseCases, Use Case realizations. Need, purpose		CO2
Unit 3	**ACTIVITY DIAGRAMS & SEQUENCE DIAGRAMS(07 Hrs.)**	
Activity Diagram : Activity and Actions, Initial and Final Activity,Activity Edge, Decision and Merge Points, Fork and Join, Input and Output Pins,Activity Group, Activity Partitions, Constraints on Action, Swim Lanes.Sequence Diagram: Context, Objects and Roles, Links, Object LifeLine, Message or stimulus, Activation/Focus of Control, Modeling Interactions.		CO3
Unit 4	**COLLABORATION, COMPONENT AND DEPLOYMENT DIAGRAMS (07 Hrs.)**	
Collaboration Diagram: Objects and Links, Messages and stimuli,Active Objects, Communication Diagram, Iteration Expression, Parallel Execution,Guard Expression, Timing Diagram. Design Using UML Activity DiagramComponent Diagram, Interfaces and ports, Deployment diagrams,Need, purpose & application of above diagrams two, three tier architecture,Concept of Forward Engineering and Reverse Engineering of UML Diagrams		CO4
Books & Other Resources		

Text Books:-

1. Blaha , Rumbaugh:"Object Oriented Modeling and Design with UML"(2/e) Pearson Education.

Reference Books:-

1. Dathan , Ramnath : "Object Oriented Analysis, Design & Implementation," OUP.
2. McRobb& Farmer: "Object Oriented System Analysis & Design" McGraw Hill.
3. Booch, Rumbaugh& Jacobson: "The UML User guide" PearsonEducation.
4. Whitten & Bentley: "System Analysis & Design Methods" TataMcGraw Hill.
5. Booch: "Object Oriented Analysis & Design with Applications", Pearson Education.
6. Visual modeling with *Rational Rose* and *UML* by Terry Quatrani, by Addison-Wesley Professional

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** FinalY. B.Tech(Information Technology) (2023 Pattern) Sem-VII 2315402: Information and Cyber Security

Teaching Scheme: **TH : 02 Hrs./Week**	**Credits** **Th:02**	**Examination Scheme:** **CIA : 25** **ESE : 50**

Course Objectives:-

1. To offer an understanding of principle concepts, central topics and basic approaches in information and cyber security.
2. To know the basics of cryptography.
3. To acquire knowledge of standard algorithms and protocols employed to provide confidentiality, integrity and authenticity.
4. To enhance awareness about Personally Identifiable Information (PII), Information Management, cyber forensics.

Course Outcomes:-

On completion of the course, learner will be able to

- CO1:Gauge the security protections and limitations provided by today's technology.
- CO2:Identify information security and cyber security threats.
- CO3:Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
- CO4:Build appropriate security solutions against cyber-attacks.

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** FinalY. B.Tech(Information Technology) (2023 Pattern) Sem-VII 2315402: Information and Cyber Security

Units		
Unit 1	**Security Basics** **(07 Hrs.)**	**CO**
Introduction, Elements of Information Security, Security Policy, Techniques, Steps, Categories, Operational Model of Network Security, Basic Terminologies in Network Security. Threats and Vulnerability, Difference between Security and Privacy.		**CO1**
Unit 2	**Data Encryption Techniques And Standards** **(07 Hrs.)**	**CO2**
Introduction, Encryption Methods: Symmetric, Asymmetric, Cryptography, Substitution Ciphers. Transposition Ciphers, Stenography applications and limitations, Block Ciphers and methods of operations, Feistal Cipher, Data Encryption Standard (DES), Triple DES, DES Design Criteria, Weak Keys in DES Algorithms, Advance Encryption Standard (AES).		
Unit 3	**Public Key And Management** **(7 Hrs.)**	**CO3**
Public Key Cryptography, RSA Algorithm: Working, Key length, Security, Key Distribution, Deffie-Hellman Key Exchange, Elliptic Curve: Arithmetic, Cryptography, Security, Authentication methods, Message Digest, Kerberos, X.509 Authentication service. Digital Signatures: Implementation, Algorithms, Standards (DSS), Authentication Protocol.		
Unit 4	**Confidentiality And Cyber Forensic** **(07 Hrs.)**	**CO4**
Introduction to Personally Identifiable Information (PII), Cyber Stalking, PII impact levels with examples Cyber Stalking, Cybercrime, PII Confidentiality Safeguards, Information Protection Law: Indian Perspective.		
Books & Other Resources		

Text Books:-

1. Bernard Menezes, “Network Security and Cryptography”, Cengage Learning India, 2014, ISBN No.: 8131513491
2. Nina Godbole, Sunit Belapure, “Cyber Security”, Wiley India, 2014, ISBN No.: 978-81-345-2179-1

Reference Books:-

1. Eoghan Casey, “Digital Evidence and Computer Crime Forensic Science, Computers and the Internet ”, ELSEVIER , 2011, ISBN 978-0-12-374268-1
2. Atul Kahate , “ Cryptography and Network Security”, Mc Graw Hill Publication, 2nd Edition, 2008, ISBN : 978-0-07-064823-4
3. William Stallings, “Cryptography and network security principles and practices”, Pearson, 6th Edition, ISBN : 978-93-325-1877-3
4. Forouzan, “Cryptography and Network Security (SIE)”, Mc Graw Hill, ISBN, 007070208X, 9780070702080

5. Dr. Nilakshi Jain-Digital Forensic: The Fascinating World of Digital Evidences-Wiley India-ISBN: 9788126565740

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** Final Y. B.Tech(Information Technology) (2023 Pattern) Sem-VII 2315403: Information and Cyber Security Lab

Teaching Scheme: **PR : 02 Hrs./Week**	**Credits** **Practical:01**	**Examination Scheme:** **ESE : 25a**

Course Objectives:-

1. To offer an understanding of principle concepts, central topics and basic approaches in information and cyber security.
2. To know the basics of cryptography.
3. To acquire knowledge of standard algorithms and protocols employed to provide confidentiality, integrity and authenticity.

Course Outcomes:-

On completion of the course, learner will be able to

- CO1: The students will be able to implement different substitution ciphers.
- CO2: The students will be able to implement Data Encryption Techniques
- CO3: The students will be able to implement a key exchange algorithm.
- CO4: The students will be able to implement Public Key Cryptography algorithms.

Suggested List of Laboratory Experiments/Assignments

Sr.No.	Title	CO
1	Implementation of Caesar Cypher in c++.	CO1
2	Implementation of Hill Cypher in c++.	CO1
3	Implementation of Vigenere Cypher in c++.	CO2
4	Implementation of S-DES algorithm.	CO2
5	Implementation of S-AES algorithm.	CO2
6	Implementation of Diffie-Hellman key exchange algorithm.	CO3
7	Implementation of RSA algorithm..	CO4
8	Implementation of ECC algorithm.	CO4

Books & Other Resources

Text Books:-

1. Bernard Menezes, “Network Security and Cryptography”, Cengage Learning India, 2014, ISBN No.: 8131513491
2. Nina Godbole, Sunit Belapure, “Cyber Security”, Wiley India, 2014, ISBN No.: 978-81-345-2179-1

Reference Books:-

1. Eoghan Casey, “Digital Evidence and Computer Crime Forensic Science, Computers and the Internet ”, ELSEVIER , 2011, ISBN 978-0-12-374268-1
2. Atul Kahate , “ Cryptography and Network Security”, Mc Graw Hill Publication, 2nd Edition, 2008, ISBN : 978-0-07-064823-4
3. William Stallings, “Cryptography and network security principles and practices”, Pearson, 6th Edition, ISBN : 978-93-325-1877-3
4. Forouzan, “Cryptography and Network Security (SIE)”, Mc Graw Hill, ISBN, 007070208X, 9780070702080
5. Dr. Nilakshi Jain-Digital Forensic: The Fascinating World of Digital Evidences-Wiley India-ISBN: 9788126565740

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(B.E. – I.T.) (2023 Pattern)

Sem-VII

2315404 Object Oriented Analysis and Design Lab

Teaching Scheme: TH : PR : 02 hrs./week	Credits Th: Practical: 01	Examination Scheme: CIA : 25 ESE : 25

Course Objectives:-

1. To explore & understand the principles of Object Oriented Analysis & Design.
2. To lay a foundation for advanced programming
3. To Describe Object Oriented Analysis and Design concepts and apply them to solve problems.
4. To Prepare Object Oriented Analysis and Design documents for a given problem using Unified Modeling Language

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Introduce various designing techniques and methods for object oriented programming.

CO2: give clear idea on implementing design with UML diagram like state diagram, activity diagram, use case diagram etc

CO3: Implement GRASP pattern & GOF pattern.

Sr. no.	Practical Title	CO
1	Write Problem Statement for System / Project	CO1
2	Prepare a use case model, from the given description using UML 2 notations	CO2
3	Prepare Activity Model from the given description using UML 2 notations	CO2
4	Prepare a class diagram from the given problem description using UML2.0and Implement the class diagram with a suitable object oriented language	CO2
5	Prepare a Design Model from Analysis Model	CO2
6	Prepare a Sequence diagram from the given problem description using UML2.0 and Implement the Sequence diagram with a suitable object oriented language.	CO2
7	Prepare a state model from the given problem description, draw a state diagram using UML2 notations and Implement the state model with a suitable object oriented language.	CO2
8	Identification and Implementation of GRASP pattern	CO3
9	Identification and Implementation of GOF pattern.	CO3

Books & Other Resources

Text Books:-

1. Blaha , Rumbaugh:"Object Oriented Modeling and Design with UML"(2/e) Pearson Education.

Reference Books:-

1. Dathan , Ramnath : "Object Oriented Analysis, Design & Implementation," OUP.
2. McRobb& Farmer: "Object Oriented System Analysis & Design" McGraw Hill.
3. Booch, Rumbaugh& Jacobson: "The UML User guide" PearsonEducation.
4. Whitten & Bentley: "System Analysis & Design Methods" TataMcGraw Hill.
5. Booch: "Object Oriented Analysis & Design with Applications", Pearson Education.
6. Visual modeling with *Rational Rose* and *UML* by Terry Quatrani, by Addison-Wesley Professional

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

Information Technology (2023 Pattern)

Sem-VII

Generative Adversarial Networks (2315405A)

Teaching Scheme: TH : 02 Hrs./Week	Credits: 02	Theory: 02	Examination Scheme: CIA : 25, ESE : 50, TW :

Course Objectives: -

1. To understand what is GAN
2. Describe architecture, Design, underlying technologies, platforms , interface of GAN

Course Outcomes: -

On completion of the course, learner will be able to

- CO1: Explain what is GAN
- CO2: Explain architecture and design of GAN
- CO3: Describe the objects connected in GAN
- CO4: Understand the applications of GAN.

Units

Unit 1	Introduction to Generative Models	(07 Hrs.)	CO
Introduction to Generative Models vs. Discriminative Models, and where GANs are situated in this context, Intuition Behind GANs, Role of the discriminator, Role of the generator,BCE loss,Training vs. Inference, Deep Convolutional GANs, Review of Pytorch, convolutions, activation functions, batch normalization, padding & striding, pooling & upsampling, transposed convolutions, Mode Collapse and Problems with BCE Loss, Earth Mover's Distance (Wasserstein Distance), Wasserstein-Loss Condition on W-loss Critic ,1-Lipschitz Continuity Enforcement			CO1
Unit 2	**Controllable Generation and Conditional GAN**	**(10Hrs.)**	
Conditional Generation: Intuition & Inputs, Controllable Generation and how it is situated vis-a-vis Conditional Generation, Vector Algebra in Latent Space, Challenges with Controllable Generation Using Classifier Gradients for Controllable Generation, Supervised disentanglement Evaluation: Inception Score, Frechet Inception Distance, HYPE, classifier-based evaluation of Disentanglement, Challenges in Generative Model evaluation, particularly GANs, Importance of Evaluation, Fidelity vs. Diversity Tradeoffs, Truncation Trick Sampling, Inception Embeddings vs. Pixel Comparisons, Inception Score: Intuition, Shortcomings, Frechet Inception Distance: Intuition, Shortcomings, Gold Standard in Fidelity (human-centered approach), Intuition of Precision vs. Recall in Generative Models, Evaluating Disentanglement using the Classifier Method, Perceptual Path Length			CO2
Unit 3	**Advancements in GANs**	**(04 Hrs.)**	
Components of StyleGAN: Disentangled Intermediate Latent W-Space, Noise Injection at Multiple , Layers (Increased Style Supervision), Uncorrelated Noise for Stochasticity, Adaptive Instance, normalization, Progressive Growing, StyleGAN2, Bias, Fine-tuning Large GANs, Pros/Cons			CO3
Unit 4	**Image-to-Image Translation**	**(07 Hrs.)**	
Pix2Pix for Paired Image-to-Image Translation, U-Net, Skip Connections, PatchGAN, CycleGAN for Unpaired Image-to-Image Translation, Cycle Consistency, Identity Loss, Multimodal Generation: Shared Latent Space Assumption (UNIT), Extended to Multimodal (MUNIT), Beyond Image-to-Image: Other Translation Forms, GauGAN: Instance Segmentation to Images, Text-to-Image, Image-to-Text Musical-Notes-to-Melody, Data augmentation, Image Editing, In-painting, and GAN Inversion Image Editing, Photoshop 2.0, Inverting a GAN, Challenges from Increasing Model Size, BiGAN			CO4

GAN Inversion vs. Image Optimization, Combining Inversion Techniques ("Warm Start") with Optimization	

Text Books:-

1. Internet of Things: A Hands-On Approach Arshdeep Bahga, Vijay Madisetti VPT – Paperback 2015 978- 0996025515 628/- 2
2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things David Hanes, Gonzalo Salgueiro, Patrick Grossetete Cisco Press – Paperback – 16 Aug 2017 978-1- 58714-456- 1599/-
3. Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications Daniel Minoli Willy Publication s - 2013 978-1-118- 47347

Reference Books:-

1. Smart Internet of things projects Agus Kurniawan Packt - Sep 2016 978-1- 78646- 651-8 2 The Internet of Things Key Olivier Willy Publication 2nd Edition 978-
2. 2. Applications and protocols Hersent s 119- 99435-0, 3 The Internet of Things Connecting Objects to the Web Hakima Chaouchi, Willy Publications 978-1- 84821- 140-7

Text Book:

1. Jason Brownlee, Generative Adversarial Networks with Python Deep Learning Generative Models for Image Synthesis and Image Translation, (https://library.samdu.uz/files/2f5a61f0ad7c97dee937881342009f3a_Generative_Adversarial_Networks_with_Python_by_Jason_Brownlee.pdf)

Reference Books:

1. GANs in Action: Deep learning with **Generative Adversarial Networks** : Langr, Jakub, Bok
2. 10: Ian Goodfellow's Generative Adversarial Networks: AI Learns to Imagine

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

Information Technology (2023 Pattern)

Sem-VII

2315405B: Internet of Things

Teaching Scheme: TH : 02 Hrs./Week	Credits: 02	Theory: 02	Examination Scheme: CIA : 25, ESE : 50, TW :

Course Objectives: -

1. To understand what is Internet of things
2. Describe architecture, Design, underlying technologies, platforms and cloud interface.

Course Outcomes: -

On completion of the course, learner will be able to

- CO1: Explain what is internet of things
- CO2: Explain architecture and design of IoT
- CO3: Describe the objects connected in IoT
- CO4: Understand the platforms in IoT.

Units

Unit 1	**Introduction To Internet Of Things** **(07 Hrs.)**	**CO**
What is the Internet of Things? Internet of Things Definitions and Frameworks : IoT Definitions, IoT Architecture, General Observations, ITU-T Views, Working Definition, IoT Frameworks, Basic Nodal Capabilities, Physical Design of IoT: IoT Protocols, Logical Design of IoT: Functional block, communication Model, Communication API's, IoT Enabling Technologies: WSN, cloud computing, Big data Analytics, communication Protocols, Embedded systems, IoT levels and Deployment templates: Level 1 to Level 5.		**CO1**
Unit 2	**Iot Network Architecture And Design** **(07 Hrs.)**	**CO2**
The one M2M IoT Standardized Architecture, The IoT World Forum (IoTWF) Standardized Architecture, A Simplified IoT Architecture, IoT protocol stack, The Core IoT Functional Stack, IoT Data Management and Compute Stack: Fog Computing, Edge Computing, The Hierarchy of Edge, Fog, and Cloud IoT and M2M: Introduction to M2M, Difference between IoT and M2M, SDN and NFV for IoT		
Unit 3	**Smart Objects: The "THINGS" In IoT** **(07 Hrs.)**	**CO3**
Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects: Communications Criteria, IoT Access Technologies: IEEE 802.15.4, IEEE 802.15.4g and 802.15.4e, IEEE 1901.2a, LoRaWAN		
Unit 4	**IoT PLATFORMS** **(07 Hrs.)**	**CO4**
What is an IoT Device, Exemplary Devices: Raspberry Pi, Raspberry Pi Interfaces, Other IoT Devices: pcDuino, BeagleBone Black ,CubieBoard, ARDUINO		

Text Books:-

1. Internet of Things: A Hands-On Approach Arshdeep Bahga, Vijay Madisetti VPT – Paperback 2015 978- 0996025515 628/- 2
2. IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things David Hanes, Gonzalo Salgueiro, Patrick Grossetete Cisco Press – Paperback – 16 Aug 2017 978-1- 58714-456- 1599/-
3. Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications Daniel Minoli Willy Publication s - 2013 978-1-118- 47347

Reference Books:-

1. Smart Internet of things projects Agus Kurniawan Packt - Sep 2016 978-1- 78646- 651-8 2 The Internet of Things Key Olivier Willy Publication 2nd Edition 978-
2. 2. Applications and protocols Hersent s 119- 99435-0, 3 The Internet of Things Connecting Objects to the Web Hakima Chaouchi, Willy Publications 978-1- 84821- 140-7

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** FinalY. B.Tech(Information Technology) (2023 Pattern) Sem-VII 2315406: Artificial Intelligence

Teaching Scheme: **TH : 02 Hrs./Week**	**Credits** **Th:02**	**Examination Scheme:** **CIA : 25** **ESE : 50**

Course Objectives:-

1. To offer an understanding of principle concepts, central topics and basic approaches in Artificial Intelligence.
2. To acquire knowledge of standard algorithms and protocols employed in AI
3. To enable students to create AI based systems.

Course Outcomes:-

On completion of the course, learner will be able to

- CO1:understands the basics of AI.
- CO2:Identify role of AI in everyday problems.
- CO3:Analyze and implement standard algorithms for AI
- CO4:Build appropriate AI based solution using standard AI algorithms..

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** FinalY. B.Tech(Information Technology) (2023 Pattern) Sem-VII 2315406: Artificial Intelligence

Units		
Unit 1	**Basics** **(07 Hrs.)**	**CO**
AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation.		**CO1**
Unit 2	**AI Searching** **(07 Hrs.)**	**CO2**
Searching- Searching for solutions, uniformed search strategies – Breadth first search, depth first Search. Search with partial information (Heuristic search) Hill climbing, A* ,AO* Algorithms, Problem reduction, Game Playing-Adversial search, Games, mini-max algorithm, optimal decisions in multiplayer games, Problem in Game playing, Alpha-Beta pruning, Evaluation functions.		
Unit 3	**Knowledge Representation** **(7 Hrs.)**	**CO3**
Knowledge representation issues, predicate logic- logic programming, semantic nets- frames and inheritance, constraint propagation, representing knowledge using rules, rules based deduction systems. Reasoning under uncertainty, review of probability, Baye's probabilistic interferences and dempstershafer theory.		
Unit 4	**Expert Systems** **(07 Hrs.)**	**CO4**
Expert systems:- Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web, knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty.		
Books & Other Resources		
Text Books:- 1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", SecondEdition, Pearson Education		
Reference Books:- 1. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press. 2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problemsolving", Fourth Edition, Pearson Education. 4. J. Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers.3. William Stallings, "Cryptography and network security principles and practices", Pearson, 6th Edition, ISBN : 978-93-325-1877-3		

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) *(2023 Pattern)*

Sem-VII

2300401: Industry Internship / Internship (Exit Course)

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	**Practical:08**	**Theory**	**CIA: --**
Practical: --			**End-Sem:--**
		Pract:	--
		Oral:	50
		Termwork	100

Course Objectives: The student should be able to

1. encourage and provide opportunities for students to get professional / personal experience through internships.
2. learn to apply the technical knowledge gained from academics / c1assroom learning in real life/industrial situations.
3. get familiar with various tools and technologies used in industries and their applications.
4. enable students to develop professional skills and expand their professional network with the development of employer-valued skills like teamwork, communication.
5. apply the experience gained from industrial internship to the academic course completion project.
6. nurture professional and societal ethics in students.
7. understand the social, economic and administrative considerations that influence the working environment of industrial organizations.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: develop professional competence through industry internship
CO2: apply academic knowledge in a personal and professional environment
CO3: build the professional network and expose students to future employees
CO4: Apply professional and societal ethics in their day to day life
CO5: become a responsible professional having social, economic and administrative considerations
CO6: make own career goals and personal aspirations.

PROCEDURE

Internships are educational and career development opportunities, providing practical experience in a field or discipline. Internships are far more important as the employers are looking for employees who are properly skilled and having awareness about industry environment, practices and culture. Internship is structured, short-term, supervised training often focused around particular tasks or projects with defined time scales.

Core objective is to expose technical students to the industrial environment, which cannot be simulated/experienced in the classroom and hence creating competent professionals in the industry and to understand the social, economic and administrative considerations that influence the working environment of industrial organizations.

Engineering internships are intended to provide students with an opportunity to apply theoretical knowledge from academics to the realities of the field work/training. The following guidelines are proposed to give academic credit for the internship undergone as a part of the Engineering curriculum.

Guidelines of 4th Semester Internship for Exit Course (2 weeks)

Duration: Internship to be completed within 2 weeks as mentioned in the structure of curriculum for the respective semester / Exit Course. It is to be assessed and evaluated in 4th semester.

Guidelines of 6th Semester Internship (4 weeks)

Duration: Internship to be completed within 4 weeks after the end of 6th Semester and before the commencement of 7th semester. It is to be assessed and evaluated in 7th semester.

Internship work Identification: Student may choose to undergo Internship at Industry / Govt. / NGO / MSME / Rural Internship/ Startup to make themselves ready for the industry.

Contacting various companies for Internship and Internship work identification process should be initiated by the students with support of training and placement cell / industry institute cell /internship cell. This will help students to start their internship work on time. Also, it will allow students to work in vacation period.

Student can take internship work in the form of online/onsite work from any of the following but not limited to:

a. Working for consultancy/ research project
b. Contribution in incubation/innovation/entrepreneurship cell/institutional innovation council/startups cells of institute
c. Development of new product/business plan/registration of start-up
d. Industry/government organization internship

e. Internship through Internshala
f. In-house product development, intercollegiate, inter department research internship under research lab/group, micro/small/medium enterprise/online internship
g. Research internship under professors, IISC, IIT's, research organizations
h. Registered NGOs or social internships, rural internship
i. Participate in open source development
j. Development of Physical and/or numerical, mathematical, soft computing model
k. Company Registration Number / Startup registration number must be produced in case of company internship.

Internship Diary/ Internship Workbook: Students must maintain Internship Diary/ Internship Workbook. The main purpose of maintaining diary/workbook is to cultivate the habit of documenting. The students should record in the daily training diary the day-to-day account of the observations, impressions, information gathered and suggestions given, if any. The training diary/workbook should be signed after every day by the supervisor/ in charge of the section where the student has been working.

Internship diary/workbook and internship report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the institute immediately after the completion of the training. Internship diary/workbook may be evaluated on the basis of the following criteria.

i. Proper and timely documented entries
ii. Adequacy & quality of information recorded
iii. Organization of the information

Internship Work Evaluation: Every student is required to prepare and maintain documentary proofs of the activities done by him as internship diary or as workbook. The evaluation of these activities will be done by programme head/cell in-charge/project head/ faculty mentor or Industry Supervisor based on overall compilation of internship activities, sub-activities, level of achievement expected, evidence needed to assign the points and the duration for certain activities.

Assessment and evaluation is to be done in consultation with internship supervisor (internal and external) and a supervisor from place of internship.

Recommended evaluation parameters: Post internship internal evaluation 100 Marks and internship diary / workbook and internship report 50 Marks. Evaluation through Seminar Presentation / Viva - Voce at the Institute.

The student will present a seminar based on his training report, before an expert committee constituted by the concerned department as per norms of the institute. The evaluation will be based on the following criteria.

Depth of knowledge, communication skills, presentation skills, team work, creativity, planning & organizational skills, adaptability, analytical skills, attitude and behavior at work, societal understanding, ethics, regularity and punctuality, attendance record, log book, student's feedback from external internship supervisor

After completion of Internship, the student should prepare a comprehensive report to indicate what he has observed and learnt in the training period. The student may contact industrial supervisor/faculty mentor/TPO for assigning special topics and problems and should prepare the final report on the student's presence physically, if the student is found absent without prior intimation to the department/institute/concern authority/T & P Cell, entire training can be cancelled.

The report shall be presented covering following recommended fields but not limited to:

i. Title/cover Page
ii. Internship completion certificate
iii. Internship place details: Company background-organization and activities/scope and object of the study/personal observations
iv. Index/table of contents
v. Introduction
vi. Title/problem statement/objectives
vii. Motivation/scope and rationale of the study
viii. Methodological details
ix. Results/analysis/inferences and conclusion
x. Suggestions/recommendations for improvement to industry, if any
xi. Attendance record
xii. Acknowledgement
xiii. List of reference (books, magazines and other sources)

Feedback from internship supervisor (external and internal): Post internship, faculty coordinator should collect feedback about student with following recommended parameters.
Technical knowledge, discipline, punctuality, commitment, willingness to do the work, communication skill, individual work, team work and leadership

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) ***(2023 Pattern)***

Sem-VII

2300402: Poject Stage – I

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	Pratical:04	**Theory**	**CIA: --**
Practical: 8 hrs/week			**End-Sem:--**
		Pract:	--
		Oral:	75
		Termwork	100

Course Objectives: The student should be able to

1. Identify the latest technical/practical challenges in the field of Engineering.
2. Inculcate the ability to describe, interpret and analyze technical content.
3. Develop competency of technical writing with critical thinking and develop the skill of technical writing along with presentation.
4. Develop Innovative project ideas can be published as a patent.

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Identify the local / global problems and inference engineering solutions for it.

CO2: Appraise the current Engineering research / techniques / developments / interdisciplinary areas relevant to the identified problem..

CO3: Utilize technical resources, journals etc.

CO4: Evaluate technical content and draw conclusions.

CO5: Demonstrate the ability to perform critical research writing, technical report and presentation.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) ***(2023 Pattern)***

Sem-VII

2300402: Poject Stage – I

Term Work

The Project Stage I Internal guides should prepare a continuous evaluation sheet of each individual and refer as continuous internal assessment for term work marks. Project group must comprise of minimum three and maximum five students. The project report should contain the following.

1. Introduction of the topic, its relevance to engineering, need for the study, aims and objective, limitations.
2. Literature review from reference books, journals, conference proceedings, published reports / articles / documents with conclusion. The literature review should be from published literature in the last three years.
3. Problem statement and methodology
4. Theoretical contents related to the chosen topic or case studies if applicable.
5. Concluding remarks or summary.
6. References

Project Stage I Examination: The students must prepare presentation on Project Stage I and present in presence of examiners through a viva-voce examination.

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** Final.Y. B.Tech(Information Technology) (2023 Pattern) Sem-VII 2315705:Raspberry pie Repairing Course

Teaching Scheme: **Practical : 02 Hrs./Week**	**Credits**	**Examination Scheme:**
	–	–

Course Objectives:-

1. To impart practical skills and hands-on experience in troubleshooting and repairing.
2. To teach repairing hardware and software issues related to Raspberry Pie boards.
3. To impart knowledge on practical learning
4. To gain valuable expertise in Raspberry Pie repair.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Understand practical skills and hands-on experience in troubleshooting and repairing.

CO2: Analyze and repairing hardware and software issues related to Raspberry Pi boards.

CO3: Apply knowledge on practical learning.

CO4: Develop valuable expertise in Raspberry Pi repair**.**

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** Final.Y. B.Tech(Information Technology) (2023 Pattern) Sem-VII 2315705:Raspberry pie Repairing Course

Module 1: Introduction to Raspberry Pie and Hardware Basics	**CO**
• Overview of Raspberry Pie boards, their applications, and significance in the tech industry • Understanding different models and specifications of Raspberry Pie boards • Identifying key components and ports on the Raspberry Pie • Hands-on session: Setting up and booting Raspberry Pie for the first time	**CO1**
Module 2: Software Setup and Configuration	**CO2**
• Installing and configuring operating systems on Raspberry Pie • Updating firmware and software packages • Troubleshooting software-related issues • Hands-on session: Software installation and troubleshooting on Raspberry Pie	
Module 3: Real-world Projects and Case Studies	**CO3, CO4**
• Analyzing real-world Raspberry Pie repair case studies • Undertaking repair projects based on actual scenarios • Applying problem-solving skills to address complex issues • Hands-on session: Practical repair projects based on case studies	
Books & Other Resources	

1. Raspberrypi.org
2. Raspberry Pi user guide, Eden Upton and Gareth Halfacreee, John Wiley & Sons, 2016.
3. Raspberry Pi Cookbook: Software and Hardware Problems and Solutions, by Simon Monk, O'Reilly.
4. Raspberry Pi For Dummies by Sean McManus, Mike Cook.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(Information Technology) *(2023 Pattern)*

Sem-VII : LaTeX Course 2315805

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:	**Th:**	**Theory**	**CIA:**
Practicals:	**Audit Course**		**End-Sem:**
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Use LaTeX for typesetting research articles, books, presentations, and scientific documentation
2. Understand the components of LaTeX system
3. Apply LaTeX for complex documentation projects

Course Outcomes:

On completion of the course, learner will be able to–

CO1: - Understand the basic concepts of LaTeX and its environment

CO2: prepare articles and books using LaTeX by typesetting lists, tables, and mathematics.

CO3: Use LaTeX to import images and graphics in documentation.

CO4: Prepare and use bibliographic database in LaTeX

CO5: Create presentation in LaTeX.

Module 1: Introduction and Installation **7Hrs**	**CO**
what is LATEX ?) What are the essential and supportive software, How to install essential and supportive software, Configuration of MiKTEX, LATEX using Command line, LATEX using TEX Maker. History of LATEX , LATEX versus WYSIWYG word processors, The basic LATEX File structure,LATEX commands and special characters, Errors LATEX , Files in LATEX , LATEX packages	CO1 to CO2
Module 2 LATEX Commands & Environments **7Hrs**	CO1 to CO4
Text-mode commands in LATEX , Math-mode commands in LATEX . Environments in LATEX , Bibliographies in LATEX ,Indexes in LATEX,	
Module 3 Letter, Article, Books in latex **7Hrs**	CO1 to CO5
letter class in LATE, article class in LATEX , report class in LATEX . book class in LATEX .	

Text Book: A A Rumale, A S Rumale, "How To Typeset Your Project Report In LATEX: A Ready Reckoner", IASER, Baramati, https://books.google.co.in/books/about/How_To_Typeset_Your_Project_Report_In_LA.html?id=hwVPDwAAQBAJ&redir_esc=y)

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(Information Technology) *(2023 Pattern)*

Sem-VII : Introduction to Industry 4.0-5.0 (VAC155)

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:	**Th:**	**Theory**	**CIA:**
Practicals:	**Audit Course**		**End-Sem:**
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Recognize new advancements in Industry operations and industry centeredness
2. Understand the Industry 4.0
3. Accept the changes and challenges of industry 5.0

Course Outcomes:

On completion of the course, learner will be able to–

CO1: - Understand the basic concepts of Industry 4.0 and the other related fields.

CO2: Understand cyber physical system and the emerging applications.

CO3: Explain the impact of various aspects of Industry 4.0.

CO4: Interpret the aspects of legal issues

Module 1: Introduction and Installation **7Hrs**	**CO**
Introduction, Historical Context, General framework, Application areas, Dissemination of Industry 4.0 and the disciplines that contribute to its development, Artificial intelligence, The Internet of Things and Industrial Internet of Things, Additive manufacturing, Robotization and automation, Current situation of Industry 4.0. Introduction to Industry 4.0 to Industry 5.0 Advances	CO1 to CO2
Module 2 Industry 4.0 and cyber physical systems **7Hrs**	CO1 to CO4
Introduction to Cyber Physical Systems (CPS), Architecture of CPS- Components, Data science and technology for CPS, Emerging applications in CPS in different fields. Case study: Application of CPS in health care domain.	
Module 3 Smart Grids and energy sources **7Hrs**	CO1 to CO4
Energy Storage for Mitigating the Variability of Renewable Electricity Sources-Types of electric energy storage, Potential of Sodium-Sulfur Battery Energy Storage to Enable Integration of Wind-Case study. Electric Vehicles as Energy Storage: V2G Capacity Estimation. Smart grid definition and development Smart Grid, Understanding the Smart Grid, Smart grid solutions, Design challenges of smart grid and Industry 4.0.	
Module 4 Industry 5.0 Human-Robot Collaboration **7Hrs**	CO1 to CO4
Human-Robot Collaboration in Industry, Example video Airplane Assembly and others,Collaborative Robots, tasks, Collaborative Robots, examples (Yumi, IIWA, UR, Panda, …), Types of Human-Robot	

Collaboration,Safety of Human-Robot Collaboration (Standards and Norms in the EU,Applications with Collaborative Robots (examples of existing or future applications in the field of manufacturing)	

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

S.Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-VII : Understanding payment gateways and E-Commerce Law(2315491)

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:3	**Th:3**	**Theory**	**CIA:**
Practicals:			**End-Sem:100**
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. Understand different protocols of Payment gateways
2. Recognize different Payment processes
3. Implement payment gateways
4. Understand importance of payment gateways in E-Commerce

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and describe the role of Payment gateways in present, past and future E-Businesses

CO2: Comprehend basic components of E-Payment system.

CO3: Explain the impact of various payments methods on E-commerce.

CO4: Interpret the aspects of legal issues of payment gateways

CO5: Implement and design a payment gateway application.

Unit 1: Introduction **7Hrs**	**CO**
Introduction to WWW : Protocols and programs, secure connections, application and development tools, the web browser, What is server, choices, setting up UNIX and Linux web servers, Logging users, dynamic IP Web Design: Web site design principles, planning the site and navigation, Electronic Commerce: Overview, Definitions, Advantages & Disadvantages of E Commerce,	CO1 to CO2
Unit 2 E-Payment Mechanism **7Hrs**	CO1 to CO3
E-Payment Mechanism; Payment through card system, E-Cheque, E-Cash, E-Payment Threats & Protections, E-Marketing: Home – shopping, E-Marketing, Tele-Marketing Electronic Data Interchange (EDI): Meaning, Benefits, Concepts, Application, EDI Model, protocols (UN EDI FACT / GTDI, ANSIX – 12 Risk of E-Commerce: Overview, Security for E-Commerce, Security Standards, Firewall, Cryptography, Key Management, Password Systems, Digital Certificates, Digital Signatures	

Unit 3: Payment gateways 7Hrs	CO1-CO4
Meaning of E-Payment, Difference between E-Payment & Conventional Payment, Payment Gateways, What is a Payment Gateway? Process of Payment Gateway, Securing Information through Payment Gateway, Examples of a Payment Gateway, Steps about functioning of a Payment Gateway, Steps showing a typical E-Payment System, Types of Payment Gateways, Hosted Payment Gateways, Self Hosted Payment Gateways, API hosted payment Gateways, Local bank integration Gateways	
Unit 4 Threats 7Hrs	CO1-CO4
Threats of E-Commerce, Cyber Laws. Technologies: Relationship between E-Commerce and Networking, Different Types of Networking for E-Commerce, internet, intranet, EDI Systems. Wireless Application Protocol: Definition, Hand Held Devices, Mobility & Commerce. Mobile Computing, Wireless Web, Web Security, Infrastructure Requirement for E Commerce. Business Models of E-Commerce; Model Based on Transaction Type, Model Based on Transaction Party – B2B, B2C, C2B, C2C, E-Governance.	
Unit 5 payment gateways implementation 7Hrs	CO5
What Is a Payment Gateway? How Does It Function? Who Can Benefit from Using a Payment Gateway? What Are the Benefits of Building a Custom Gateway? Basic Components of Payment Gateways: Fraud Protection Systems, Tokenization, Recurring Payments, Seamless Payment Gateway Integration, Scalability, Disputes and Arbitration, Hosted Payment Gateways, Virtual Terminal, Working Hours (24/7), Critical Factors to Remember in Payment Gateway Development, Interaction Between Merchants, Buyers, and Marketplace Operators, Integration, Scalability, Time to Market, System Architecture, Deployment, Monitoring	
Unit 6 Payment gateways in India and abroad Case studies 7Hrs	CO1-CO5
Razorpay, PayGlocal, PayU, CCAvenue, OPEN, BillDesk, Cashfree, Paytm, Instamojo, MobiKwik, Nimbbl, Paypal	

TEXT BOOKS:

1. Web Technologies, Uttam K Roy, Oxford University Press 2. The Complete Reference PHP – Steven Holzner, Tata McGraw-Hill

REFERENCE BOOKS:

1. Elias. M. Awad, " Electronic Commerce", Prentice-Hall of India Pvt Ltd.

2. RaviKalakota, Andrew B. Whinston, "Electronic Commerce-A Manager's guide", Addison-Wesley.

3. Efraim Turban, Jae Lee, David King, H.Michael Chung, “Electronic Commerce–A ManagerialPerspective",

Addison-Wesley.

4. Elias M Award, “Electronic Commerce from Vision to Fulfilment”, 3rd Edition, PHI,

Judy Strauss, Adel El-Ansary, Raymond Frost, “E-Marketing”, 3RDEdition, Pearson Education

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(Information Technology) *(2023 Pattern)*

Sem-VII : Understanding payment gateways and E-Commerce Law Lab(2315492)

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:	**Pr:2**	**Theory**	**CIA:**
Practicals: 4/week	**Audit Course**		**End-Sem:**
		Pract:	--
		Oral:	--25
		Termwork	**--25**

Course Objectives: The student should be able to

1. Understand different protocols of Payment gateways
2. Recognize different Payment processes
3. Implement payment gateways
4. Understand importance of payment gateways in E-Commerce

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and describe the role of Payment gateways in present, past and future E-Businesses

CO2: Comprehend basic components of E-Payment system.

CO3: Explain the impact of various payments methods on E-commerce.

CO4: Interpret the aspects of legal issues of payment gateways

CO5: Implement and design a payment gateway application..

Practical 1	**CO**
Design a website for book selling business	CO1 to CO3
Practical 2	CO5
Integrate the payment gatway with website	
Practical 3 7Hrs	CO5
Implement your own private payment gateway and integrate it with web site	
Practical 4	CO5
Check payment gateway security for transactions	
Practical 5	CO1 and CO2
Case study of any payment gateway service	

Practical 6	CO4
Payment gate ways and Law	
Practical 7	Co1-CO5
Design and Integrate different payment gateways in an e-commerce website for FMCG	
Practical 8	CO5
Define a payment gateway through email, SMS and other means	

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (B.E. – I.T.) (2023 Pattern)

Sem-VIII

2315407 Advance Computer Architecture

Teaching Scheme: TH : 03 Hrs./Week PR :	Credits Th:03 Practical:	Examination Scheme: CIA : 50 ESE : 50

Course Objectives:-

1. To make students know about Computer architecture & Parallelism concepts in Programming
2. To give the students an elaborate idea about the different memory systems and buses.
3. To introduce the advanced processor architectures to the students.
4. To make the students know about the importance of multiprocessor and multi-computers.
5. To study about data flow computer architectures

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Demonstrate concepts of parallelism in hardware/software.
CO2: Understand the parallel processing concepts.
CO3: Discuss memory organization and mapping techniques.
CO4: Describe architectural features of advanced processors.
CO5: Gain knowledge about multiprocessors & multi-computers.
CO6: Understand about data flow and VLSI

Units		
Unit 1	**PARALLEL COMPUTER MODELS (07 Hrs.)**	**CO**
Evolution of Computer architecture, system attributes to performance, Multi processors and multi computers, Multi-vector and SIMD computers, PRAM and VLSI models-Parallelism in Programming, conditions for Parallelism-Program Partitioning and Scheduling-program flow Mechanisms-Speed up performance laws-Amdahl's law, Gustafson's law-Memory bounded Speedup Model.		CO1
Unit 2	**PARALLEL PROCESSING CONCEPTS (07 hrs.)**	
Introduction to Parallel Computing: Motivating Parallelism, Scope of Parallel Computing, Organization and Contents of the Text, Parallel Programming Platforms: Implicit Parallelism: Trends in Microprocessor & Architectures, Limitations of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines Levels of parallelism (instruction, transaction, task, thread, memory, function) Models (SIMD, MIMD, SIMT, SPMD, Dataflow Models, Demand-driven Computation) Architectures: N-wide superscalar architectures, multi-core, multi-threaded		CO2
Unit 3	**MEMORY ORGANIZATION AND BUSES (07 Hrs.)**	
Memory hierarchy-cache and shared memory concepts-Cache memory organization-cache addressing models, Aliasing problem in cache, cache memory mapping techniques-Shared Memory organization-Interleaved memory organization, Lower order interleaving, Higher order interleaving. Back plane bus systems-Bus addressing, arbitration and transaction.		CO3
Unit 4	**ADVANCED PROCESSORS (07 Hrs.)**	
Instruction set architectures-CISC and RISC scalar processors-Super scalar processors-VLIW architecture- Multi-vector and SIMD computers-Vector processing principles-Cray Y-MP 816 system-Inter processor communication		CO4
Unit 5	**MULTI PROCESSOR AND MULTI COMPUTERS (07 Hrs.)**	
Multiprocessor system interconnects- Cross bar switch, Multiport memory-Hot spot problem, Message passing mechanisms-Pipelined processors-Linear pipeline, on linear pipeline-Instruction pipeline design-Arithmetic pipeline design.		CO5
Unit 6	**DATA FLOW COMPUTERS AND VLSI COMPUTATIONS (07 hrs.)**	
Data flow computer architectures-Static, Dynamic-VLSI Computing Structures-Systolic array architecture, mapping algorithms into systolic arrays, Reconfigurable processor array-VLSI matrix arithmetic processors-VLSI arithmetic models, partitioned matrix algorithms, matrix arithmetic pipelines.		CO6
Books & Other Resources		

Text Books:-

1. Kai Hwang, Advanced Computer architecture Parallelism ,scalability ,Programmability, McGraw Hill, N.Y, 2003
2. Kai Hwang and F.A. Briggs, Computer architecture and parallel processor' McGraw Hill, N.Y, 1999
3. David Culler Jaswinder Pal Singh, "Parallel Computer Architecture: A hardware/Software Approach", Morgan Kaufmann, 1999.

Reference Books:-

1. David A. Pearson and John L. Hennessey, ―Computer organization and design Elsevier, Fifth edition, 2014.

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** Final Y. B.Tech(Information Technology) (2023 Pattern) Sem-VIII 2315408: Multimedia Systems

Teaching Scheme: **TH : 03 Hrs./Week**	**Credits** **Th:03**	**Examination Scheme:** **CIA : 50** **ESE : 50**

Course Objectives:-

To understand input and output devices, device drivers, control signals and protocols, DSPs

To study and use standards (e.g., audio, graphics, video)

To implement applications, media editors, authoring systems, and authoring by studying streams/structures, capture/represent/transform, spaces/domains, compression/coding

To design and develop content-based analysis, indexing, and retrieval of audio, images, animation, andvideo

To demonstrate presentation, rendering, synchronization, multi-modal integration/interfaces

To Understand IoT architecture‘s and Multimedia Internet of things

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Describe the media and supporting devices commonly associated with multimedia information and systems.

CO2: Demonstrate the use of content-based information analysis in a multimedia information system.

CO3: Critique multimedia presentations in terms of their appropriate use of audio, video, graphics, color, and other information presentation concepts.

CO4: Implement a multimedia application using an authoring system.

CO5: Understanding of technologies for tracking, navigation and gestural control.

CO6: Implement Multimedia Internet of Things Architectures.

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** Final Y. B.Tech(Information Technology) (2023 Pattern) Sem-VIII 2315408: Multimedia Systems

Units		
Unit 1	**Introduction to multimedia** **(07 Hrs.)**	**CO**
What is Multimedia and their Components, History of Multimedia; Hypermedia, WWW, and Internet; Multimedia Tools: Static (text, graphics, and still images), Active (sound, animation, and video, etc.); Multimedia Sharing and Distribution; Multimedia Authoring Tools: Adobe Premiere, Adobe Director, Adobe Flash..		**CO1**
Unit 2	**Graphics and Data Representation Techniques** **(07 Hrs.)**	**CO2**
Graphics data types, 1-bit Images, 8 –bit grey level ,16-bit grey level images, Image data type, Image data type:8 bit & 24-bit color images, Higher bit depth images, Color Lookup tables. File Formats: GIF, JPEG, PNG, TIFF, PSD, APS, AI, INDD, RAW, Windows BMP, Windows WMF, Netpbm format, EXIF, PTM, Text file format: RTF, TGA Applications/Use of text in Multimedia		
Unit 3	**Multimedia Representations Techniques** **(7 Hrs.)**	**CO3**
Principal concepts for the analog video: CRT, NTSC Video (National Television System Committee), PAL Video (Phase Alternating Line), SECAM Video (System Electronic Couleur Avec Memoire), Digital Video: Chroma Subsampling, High-Definition TV, Ultra High Definition TV (UHDTV), Component Video: High-Definition Multimedia Interface (HDMI),3D Video and TV: various cues, Basics of Digital Audio: What is Sound?, Nyquist Theorem, SNR, SQNR, Audio Filtering, Synthetic Sounds, MIDI Overview: Hardware, Structure, Conversion to WAV, Coding of Audio: PCM, DPCM, DM (Delta Modulation)		
Unit 4	**Compression Algorithms** **(07 Hrs.)**	**CO4**
Introduction to multimedia – Graphics, Image and Video representations – Fundamental concepts of video, digital audio – Storage requirements of multimedia applications – Need for compression – Types of compression algorithms- lossless compression algorithms RLC, VLC, DBC, AC, lossless image compression, differential coding of Images, lossy compression algorithms-Rate distortion theory, Quantization ,Transform coding, wavelet based coding, embedded Zerotress of wavelet coefficients . Image compression standard -JPEG standard, JPEG 2000 standard, LS standard, Bilevel image compression standard. Introduction to video compression - video compression based on motion compensation, Search for motion vectors, MPEG Video coding I , MPEG 1,2,4,7 onwards. Basic Audio Compression Techniques - ADPCM in speech coding, Vocoders, MPEG audio compression		

Unit 5	**Augmented Reality(AR), Virtual Reality (VR) and Mixed Reality (MR) (07 Hrs.)**	**CO5**
Basics of Virtual Reality, difference between Virtual Reality and Augmented Reality, Requirement of Augmented Reality, Components and Performance issues in AR, Design and Technological foundations for Immersive Experiences. Input devices – controllers, motion trackers and motion capture technologies for tracking, navigation and gestural control. Output devices – Head Mounted VR Displays, Augmented and Mixed reality glasses. 3D interactive and procedural graphics. Immersive surround sound. Haptic and vibrotactile devices. Best practices in VR, AR and MR Future applications of Immersive Technologies. VRML Programming Modeling objects and virtual environments Domain Dependent applications:Medical, Visualization, Entertainment, etc.		
Unit 6	**Multimedia Internet of Things (07 Hrs.)**	**CO6**
IoT and Multimedia IoT Architecture: IoT Architecture; M-IoT Architectures: Multi-Agent Based, AI-Based Software-Defined, Big Data Layered; Applications of M-IoT: Road Management System, Multimedia IoT in Industrial Applications, Health Monitoring		
Books & Other Resources		

Text Books:-

1. Tay Vaughan, ―Multimedia making it work‖, Tata McGraw-Hill, 2011, ISBN: 978-0-07-174850-6 MHID: 0-07-174850-4, eBook print version of this title: ISBN: 978-0-07-174846-9, MHID: 0-07-174846-6
2. Ze-Nian Li, Mark S. Drew and Jiang chuan Liu, ―Fundamentals of Multimedia‖, Second Edition, Springer, 2011, ISSN 1868-0941 ISSN 1868-095X (electronic), ISBN 978-3-319-05289-2 ISBN 978-3-319-05290-8 (eBook), DOI 10.1007/978-3-319-05290-8, Pearson Education, 2009.

Reference Books:-

1. Ali Nauman et al. ―Multimedia Internet of Things: A Comprehensive Survey‖, Special Section on Mobile Multimedia: Methodology and Applications, IEEE Access, Volume 8, 2020
2. Kelly S. Hale (Editor), Kay M. Stanney (Editor). 2014. Handbook of Virtual Environments: Design, Implementation, and Applications, Second Edition (Human Factors and Ergonomics) ISBN-13: 978-1466511842. Amazon

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

Final Y. B. Tech(Information Technology) *(2023 Pattern)*

Sem-VIII

(2315409A) : Natural Language Processing

Teaching Scheme:	**Credits=03**	**Examination Scheme**	
Theory: –	**Th:- 03**	**Theory**	**CIA: –50**
Practical: 3 hrs/week	**Practical:**		**End-Sem:50**
Prerequisite : Nil		**Pract:**	**–**
		Oral:	**--**
		Term work	

Course Objectives: The student should be able to

1. The objective of this course is to introduce the fundamentals of Natural Language Processing and Text mining to the students.
2. The aim of this course is to make student understand how to tag a given text with basic Language processing features and design an innovative application using NLP components.
3. This course also aims to introduce the link with NLP and text mining and provides scope to learn text mining to build various applications.

Course Outcomes:

On completion of the course, learner will be able to–

1. CO1: Process the natural language with ease to build useful applications.
2. CO2: Understand the working with Natural Language in computer
3. CO3: Understand the process of text mining
4. CO4: Use NLP and text mining to build useful real world applications.

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** **Final Y. B. Tech(Information Technology) *(2023 Pattern)*** Sem-VIII **(2315409A) : Natural Language Processing**

Unit 1: Introduction to Natural Language Processing **7 hrs**	**CO**
Applications of Natural Language Understanding, Evaluating Language Understanding Systems, The Elements of Simple Noun Phrases, Verb Phrases and Simple Sentences, Noun Phrases, Adjective Phrases, Adverbial Phrases.	CO1
Unit 2: Grammars **7hrs**	CO2
Grammars and Sentence Structure, Top-Down Parser, Bottom-Up Chart Parser, Top-Down Chart Parsing, Finite State Models and Morphological Processing, Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with Features.	
Unit 3: Efficient Parsing **7 hrs**	CO3
Auxiliary Verbs and Verb Phrases, Noun Phrases and Relative Clauses, Human Preferences in Parsing, Encoding Uncertainty: Shift-Reduce Parsers, A Deterministic Parser, Techniques for Efficient Encoding of Ambiguity, Partial Parsing.	
Unit 4: Ambiguity Resolution **7 hrs**	CO4
Part-of-Speech Tagging, Obtaining Lexical Probabilities, Probabilistic Context-Free Grammars, BestFirst Parsing, Semantics and Logical Form, Word Senses and Ambiguity, Encoding Ambiguity in Logical Form, Verbs and States in Logical Form.	
Unit 5: Linking Syntax And Semantics **7 hrs**	
Semantic Interpretation and Compositionality, Prepositional Phrases and Verb Phrases, Lexicalized Semantic Interpretation and Semantic Roles, Handling Simple Questions, Semantic Interpretation Using Feature Unification, Semantic Filtering Using Selectional Restrictions, Semantic Networks, Statistical Word Sense Disambiguation	
Unit 6: Knowledge Representation **7 hrs**	
Handling Natural Language Quantification, Time and Aspectual Classes of Verbs, Automating Deduction in Logic-Based Representations, Procedural Semantics and Question Answering, Hybrid Knowledge Representations, Using World Knowledge, Establishing Coherence, Matching	

Against Expectations, Reference and Matching Expectations, Using Knowledge About Action and Casualty.	

Text Books

1. Allen James, Natural Language Understanding, Pearson India,2nd Edition, ISBN:9788131708958, 8131708950
2. James H. Martin, Daniel Jurafsky, Speech and Language Processing, Pearson,1st Edition, ISBN: 9789332518414, 8131716724.

Reference Books

1. M. Christopher, H. Schutze, Foundations of Statistical Natural Language Processing, MIT Press,1st Edition, ISBN:9780262133609
2. C. Eugene, Statistical Language Learning, MIT Press,1st Edition, ISBN:9780262032162
3. S. Bird, E. Klein &E. Loper, Natural Language Processing with Python, O' Reilly(Shroff Publishers), 1st Edition, ISBN:9788184047486

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** Final Y. B.Tech(Information Technology) (2023 Pattern) Sem-VIII 2315409B:Embedded Systems

Teaching Scheme: **TH : 03 Hrs./Week**	**Credits** **Th:03**	**Examination Scheme:** **CIA : 50** **ESE : 50**

Course Objectives:-

1. To understand the Embedded system design issues.
2. To understand real time operating system concepts.
3. To understand the Embedded Linux environment
4. To understand embedded software development and testing process.

Course Outcomes:-

On completion of the course, learner will be able to

CO1: Apply design metrics of Embedded systems to design real time applications to match recent trends in technology.
CO2: Apply Real time systems concepts.
CO3: Evaluate µCOS operating system and its services.
CO4: Apply Embedded Linux Development Environment and testing tools.
CO5: Analyze Linux operating system and device drivers.
CO6: Analyze the hardware – software co design issues for testing of real time Embedded system.

Units		
Unit 1	**Introduction to Embedded Systems (07 Hrs.)**	**CO**
Introduction to Embedded Systems, Architecture, Classification and Characteristics of Embedded System, Design Process, Design Metrics and optimization of various parameters of embedded system. ARM9 architecture.ARM-CM3 Based Microcontroller LPC1768: Features, Architecture (Block Diagram & Its Description), System Control, Clock & Power Control, GPIO, Pin Connect Block		**CO1**
Unit 2	**Real Time Systems Concepts (07 Hrs.)**	**CO2**
Foreground/ Background systems, Critical section of code, Resource, Shared resource, multitasking, Task, Context switch, Kernel, Scheduler, Non-Preemptive Kernel, Preemptive Kernel, Reentrancy, Round robin scheduling, Task Priorities, Static & Dynamic Priority, Priority Inversion, Assigning task priorities, Mutual Exclusion, Deadlock, Clock Tick, Memory requirements, Advantages & disadvantages of real time kernels.		
Unit 3	**µCOS II (7 Hrs.)**	**CO3**
Features of µCOS II. Kernel structure. µCOS II RTOS services: Task management, Time management, Intertask Communication and Synchronization		
Unit 4	**Embedded Linux Development Environment (07 Hrs.)**	**CO4**
Need of Linux, Embedded Linux Today, Open Source and the GPL, BIOS Versus Boot loader, Anatomy of an Embedded System, Storage Considerations, Embedded Linux Distributions. Embedded Development Environment, Cross-Development Environment, Host System Requirements, Hosting Target Boards. Development Tools, GNU Debugger, Tracing and Profiling Tools, Binary Utilities.		
Unit 5	**Linux Kernel Construction (07 Hrs.)**	**CO5**
Linux Kernel Background, Linux Kernel Construction, Kernel Build System, Kernel Configuration. Role of a Bootloader, Bootloader Challenges. A Universal Bootloader: Das UBoot. Porting U-Boot. Device Driver Concepts, Module Utilities, Driver Methods. Linux File System & Concepts		
Unit 6	**Embedded Software Development, Testing Process and Tools (07 Hrs.)**	**CO6**

Embedded Software development process and tools, Host and Target Machines, linking and Locating Software, Getting Embedded Software into the Target System, Issues in Harware-Software Design and Co-design. Testing on Host Machine, Simulators, Laboratory Tools. Case study of Embedded system like Automatic Chocolate Vending Machine, Mobile Phone, digital camera.	
Books & Other Resources	

Text Books:-

1. Jean J.Labrosse, "MicroC OS II, The Real-Time Kernel", 2nd edition, CMP Books.
2.Christopher Hallinan, "Embedded Linux Primer –A Practical, Real-World Approach "2nd edition, Prentice Hall.

Reference Books:-

1. Raj Kamal, "Embedded Systems – Architecture, Programming and Design" 2nd edition, McGraw Hill.
2.Frank Vahid and Tony Givargis, "Embedded System Design – A Unified hardware/ Software introduction" 3rd edition, Wiley.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(Information Technology) *(2023 Pattern)*

Sem-VIII: Computer Oriented Operation Research (2315410A)

(PE-IV)

Teaching Scheme:	Credits	Examination Scheme	
Theory:3	Th:3	Theory	CIA: 50
Practicals:	Audit Course		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. review, understand and apply foundational Concepts in Computer Science and Engineering in research
2. critically analyze current trends and predict future issues in any ICT system used in businesses
3. apply the theory and practice of problem solving using COOR concepts
4. pursue lifelong multidisciplinary learning as professional engineers in designing effective ICT systems

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Apply mathematical foundations, algorithmic principles, and computer engineering in modeling and design of ICT systems of varying complexity

CO2: use Computer Oriented Operations research for Critically analyzing the problems which prove to be impediment to the development of society and identify & formulate solution

CO3: Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, and sustainability.

CO4: pursue lifelong multidisciplinary learning as professional engineers in designing effective ICT systems

Unit 1: Introduction **7Hrs**	**CO**
Introduction to Operations Research (OR) Operations Research definition and origin. Essential features of the OR approach. Quantification of factors. Stages in OR study. Introduction to Foundation mathematics and statistics Linear Programming (LP), LP and allocation of resources, LP definition, Linearity requirement, Expressing LP problems, Limitations or constraints, Maximization and Minimization problems	CO1 to CO4
Unit 2 Linear Programming **7Hrs**	CO1 to

Linear Programming – Graphical Solutions, Introduction To Graphical LP Maximization solution, Graphical LP Minimization solution, Introduction, Simplex method definition, formulating the Simplex model, Linear Programming – Simplex Method for Maximizing	CO4
Unit 3 Game Theory 7Hrs	CO1-CO3
Introduction, two-person zero-sum games, some basic terms, the maxmini- minimax principle, games without saddle points-Mixed Strategies, graphic solution of 2 * n and m*2 games, dominance property. CPM & PERT- project scheduling, critical path calculations, Crashing.	
Unit 4 Queuing Theory 7Hrs	Co1,CO2,CO3
basic structure of queuing systems, roles of the Poisson and exponential distributions, classification of queues basic results of M/M/1: FIFO systems, extension to multi-server queues.	
Unit 5 Simulations 7Hrs	CO1 - CO4
simulation concepts, simulation of a queuing system using event list,pseudo random numbers, multiplication congruential algorithm, inverse transformation method, basic ideas of Monte-Carlo simulation.	
Unit 6 Transportation Problem 7Hrs	
Basic feasible solutions, Optimum solution by stepping stone and modified distribution methods, Unbalanced and degenerate problems, Transhipment problem. Assignment problems: Hungarian method, Unbalanced problem, Case of maximization, Travelling salesman and crew assignment problems.	

TEXT BOOKS:

1. H.A. Taha, Operation Research-An introduction, Printice Hall of India.

REFERENCE BOOKS:

1. P.K. Gupta and D.S. Hira, Operations Research, S. Chand & Co.

2. S.D. Sharma, Operation Research, Kedar Nath Ram Nath Publications.

3. J.K. Sharma, Mathematical Model in Operation Research, Tata McGraw Hill

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

Information Technology (2023 Pattern)
Sem-VIII
2315410B: Cloud Computing

Teaching Scheme: TH : 03 Hrs./Week	Credits: 03	Examination Scheme: CIA : 50
	Theory: 03	ESE : 50
		TW :

Course Objectives: -

1. To study fundamental concepts of cloud computing
2. To learn various data storage methods on cloud
3. To understand the implementation of Virtualization in Cloud Computing
4. To learn the application and security on cloud computing
5. To study risk management in cloud computing
6. To understand the advanced technologies in cloud computing

Course Outcomes: -

On completion of the course, learner will be able to

- CO1: Understand the different Cloud Computing environment
- CO2: Use appropriate data storage technique on Cloud, based on Cloud application
- CO3: Analyze virtualization technology and install virtualization software
- CO4: Develop and deploy applications on Cloud
- CO5: Apply security in cloud applications
- CO6: Use advance techniques in Cloud Computing

Units

Unit 1	Introduction To Cloud Computing (07 Hrs.)	CO
Importance of Cloud Computing, Characteristics, Pros and Cons of Cloud Computing, Migrating into the Cloud, Seven-Step model of migration into a Cloud, Trends in Computing. Cloud Service Models: SaaS, PaaS, IaaS, Storage. Cloud Architecture: Cloud Computing Logical Architecture, Developing Holistic Cloud Computing Reference Model, Cloud System Architecture, Cloud Development Models.		CO1
Unit 2	**Data Storage and Cloud Computing (07 Hrs.)**	CO2
Introduction to Enterprise Data Storage, Direct Attached Storage, Storage Area Network, Network Attached Storage, Data Storage Management, File System, Cloud Data Stores, Using Grids for Data Storage. Cloud Storage: Data Management, Provisioning Cloud Storage, Data Intensive Technologies for Cloud Computing. Cloud Storage from LANs to WANs: Cloud Characteristics, Distributed Data Storage.		
Unit 3	**Virtualization in Cloud Computing (07 Hrs.)**	CO3
Definition, Adopting Virtualization, Types of Virtualization, Architecture and software, Virtual Clustering, Virtualization Application, Pitfalls of Virtualization. Grid, Cloud and Virtualization, Cloud security. Anatomy of Cloud Infrastructure, CPU virtualization, Network and Storage Virtualization.		
Unit 4	**Cloud Platforms and Cloud Application (07 Hrs.)**	CO4
Amazon Web Services and Components, Amazon Simple DB Elastic Cloud Computing(EC2), Amazon Storage System, Amazon Database service. Microsoft Cloud Services: Azure core concepts, SQL Azure, Windows Azure Platform Appliance. Cloud Computing Application: Healthcare: ECG Analysis in the cloud, Biology: Protein Structure Prediction, Geosciences: Satellite Image Processing, Business and Consumer Applications: CRM and ERP, Social Networking, Google Cloud Application: Google App Engine, Overview of OpenStack Architecture.		
Unit 5	**Security in Cloud Computing (07 Hrs.)**	

Risks in Cloud Computing: Risk Management, Enterprise – Wide Risk Management, Types of Risks. Data Security in Cloud: Security Issues, Challenges, Advantages and Disadvantages, Cloud Digital Persona and Data Security, Content Level Security. Cloud Security Services: Confidentiality, Integrity and Availability, Security Authorization Challenges in the Cloud, Secure Cloud Software Requirements, Secure Cloud Software Testing.	**CO5**
Unit 6 **Advanced Techniques in Cloud Computing** **(07 Hrs.)**	**CO5**
Future Trends in Cloud Computing, Mobile Cloud, Automatic Cloud Computing: Comet Cloud. Multimedia Cloud: IPTV, Energy Aware Cloud Computing, Jungle Computing, Distributed Cloud Computing Vs Edge Computing, Containers, Docker and Kubernetes, Introduction to DevOps. IOT and Cloud Convergence: The Cloud and IoT in your Home, The IOT and Cloud in your Automobile, PERSONAL: IoT in Healthcare.	

Text Books:-

1. A. Srinivasan, J. Suresh, Cloud Computing: A Practicval Approach for Learning Implementation", Pearson, ISBN:978-81-317-7651-3
2. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, "Mastering Cloud Computing McGraw Hill Education.

Reference Books:-

1. James Bond, "The Enterprise Cloud", O'Reilly Media, Inc. ISBN:9781491907627
2. Dr. Kris Jamsa, Cloud Computing: SaaS, PassS, IaaS, Vitualization and more, Wiley Publication
3. Anthony T. Velte Toby J. Velte, Robert Elsenpeter, "Cloud Computing: A practical Approach", 2010, The McGraw-Hill
4. Gautam Shrof, "Enterprise Cloud Computing Technology Architecture and Applications", Cambridge University Press
5. Tim Mather, Subra K Shahid L., " Cloud Security and Privacy", Oreilly.
6. A S Rumale , Dr. D N chaudhari, Dr, V M thakare, " Cloud Computing: Principles and Paradigms, First Edition, 2015", ISBN 978-93-5268-842-5, (https://play.google.com/store/books/details/Cloud_Computing_Principles_and_Paradigms?id=zD9NDwAAQBAJ&hl=am&gl=US&pli=1)

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) *(2023 Pattern)*

Sem-VIII

2300403:RESEARCH METHODOLOGY

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: 4 hrs./week	**Th: 04**	**Theory**	**CIA: 50**
Practical: --	**Practical: --**		**End-Sem: 50**
Prerequisite :		**Pract:**	**--**
		Oral:	**--**
		Termwork	**--**

Course Objectives: The student shall able-

1. To explore the fundamental concepts in Research and comprehend the research problem.
2. To explore research design and sampling.
3. Todescribe the instrumentation schemes and its data collection methods.
4. To understand theregression models, estimation theory and statistical tools.
5. To draft a research papers, reports, proposal and theses in given format.
6. To adopt the best practices in publication ethics and avoid the publication misconduct.

Course Outcomes:

On completion of the course, learner will–

CO1: Analyze types of research methods and apply appropriate methods for defined problem.

CO2: Select and apply the research design as per the need of the proposed research.

CO3: Recognize static and dynamic characteristics of an instrument and predict its reliability.

CO4: Evaluate the impact of statistical analysis in the mathematical model.

CO5: Summarize the reported literature and write research papers, reports, and theses effectively in a proper flow by addressing the novelty and self contribution of the work done.

CO6: Write a plagiarism free research document and publish in reputed journal of high quality indexing database.

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SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(Common) *(2023 Pattern)*

Sem-VIII

2300403: Research Methodology

Unit I : Research Methodology and Research Problem **10 hrs**	**CO**
Definition of Research, Objectives of Research, Motivation behind Research, Types of Research, Research Approaches, Significance of Research, Research versus Research Methodology, Research and Scientific Method, Research Process, Features of a Good Research, Concept of Research Problem, Selecting the problem, necessity of defining the problem, techniques involved defining problem.	CO1
Unit II : Research Design **9 hrs**	CO2
Meaning of Research Design, Necessity of Research design, Framework and Parameters of Research design, Design and Methods, Approaches of Research Design, Types of Research Designs, Principles of Experimental Design, Design of Experiments. Sampling Design: census and sample survey, implication of sample design, steps in sampling design, criteria of selecting a sampling procedure, characteristics of good sample design, types of sample design.	
Unit III : Basic Instrumentation and Data Collection Methods **9 hrs**	CO3
Characteristics of Instruments, Instrumentation Schemes, Indoor and outdoor Experimental Setup, Steps of Experimental Setup, Calibration of Instruments, Reliability of an Instrument. Primary Data collection, observation method, interview method, Types of Data collection methods, Secondary data collection, Scaling, Measuring Instruments and Tools in Engineering Discipline.	
Unit IV: Applied Statistics **9 hrs**	CO4
Elements / Types of Analysis, Measures of Central tendency, Dispersion, Skewness, Regression Analysis, Parameter Estimation, Inferential Statistics: Chi-Square Test and T-Test Analysis, Univariate, Bivariate, and Multivariate Data Analysis, Principal Component Analysis, State Vector Machines, Uncertainty Analysis, Modelling and Prediction of Performance, Multi-Scale Modelling, Sensitivity Analysis.	
Unit V: Literature Survey and Research Paper/Thesis/Report/Proposal Writing **9 hrs**	CO5
Conducting Background Research, Resources for Literature Survey, Reading a Scientific Paper, White Paper, and Patent, Recording and Summarizing the Findings of Literature Survey, Body of Research Papers, Reports, and Theses, Research Reports, Significance of Report writing, Use of Documentation Tools, Bibliography Tools, and Presentation Tools Useful for Writing and Presenting Paper and Theses, Types of Research Report, Steps in writing report, Layout of Reports, Format of research proposal, Individual research proposal, Institutional proposal.	
Unit VI: Research and Publication Ethics **10 hrs**	CO6
Publication ethics: definition, importance, standards setting initiative and guidelines (COPE, WAME etc.), conflict of interest, predatory publishers and journals, open access publication and initiatives, Plagiarism, Software tools to identify plagiarism, Technique to avoid plagiarism, Indexing database, citation databases, Impact factor of journal as per JCR, SNIP, SJR, IPP, Cite Score, Metrics: h-index, g index, i10 index, altmetrics.	

Text Books

1. Dr. C. R. Kothari, “Research Methodology: Methods and Trends”, 2nd Edition, New Age International Publishers.
2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”, 2nd Edition, Juta & Co. Ltd., Lansdowne.

Reference Books

1. Vinayak Bairagi and Mousami V. Munot, “Research Methodology A Practical and Scientific Approach”, CRC Press, Taylor & Francis Group.
2. Ranjit Kumar, “Research Methodology: A Step by Step Guide for Beginners”, 2nd Edition, SAGE Publications.

NPTEL / MOOC Course

1. "Introduction to Research" by Prof. Prathap Haridoss (IIT Madras).
   Link: https://onlinecourses.nptel.ac.in/noc21_ge03/preview
2. “Research and Publication Ethics (RPE)” by Dr. Anirban Ghosh (Netaji Subhas Open University)
   Link: https://onlinecourses.swayam2.ac.in/nou22_ge73/preview

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech (Common) ***(2023 Pattern)***

Sem-VIII

2300404 : Project Stage – II

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory: --	Practical:04	**Theory**	**CIA: --**
Practical: 8 hrs/week			**End-Sem:--**
		Pract:	--
		Oral:	75
		Termwork	100

Course Objectives: The student should be able to

1. Identify the latest technical/practical challenges in the field of Engineering.
2. Inculcate the ability to describe, interpret and analyze technical content.
3. Develop competency of technical writing with critical thinking and develop the skill of technical writing along with presentation.
4. Develop competency of implementing techno commercial and viable solutions.
5. Develop Innovative project ideas can be published as a patent

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Analyze and prepare project requirement specifications, market viability analysis.
CO2: Inference minimal viable engineering solutions / projects for the local / global problems.
CO3: Appraise the current Engineering research / techniques / developments / interdisciplinary areas.
CO4: Demonstrate the operations of projects / solutions.
CO5: Evaluate technical content and draw conclusions.
CO6: Demonstrate the ability to perform critical research writing, technical report and presentation.

Term Work

The Project Stage II report should contain the following. Internal guides should prepare a continuous evaluation sheet for each student and refer as continuous assessment for term work marks.

1. Introduction including aim and objective
2. Review of literature
3. Problem statement and methodology
4. Concepts associated with the project topic
5. Results and discussion
6. Validation of results
7. Conclusions and future scope of work
8. References

Student's publication / achievements

In Project Work Stage II, the student shall complete the project and prepare the final report of project work in standard format duly certified for satisfactory completion of the project work by the concerned guide and Head of the Department/Institute. The final project report shall be submitted in hard bound copy as well as a soft copy. The term work of project stage II shall be assessed jointly by internal and external examiners, along with the project presentation. It is recommended that at least one publication on the project topic to be presented in a conference or published in a referred journal.

Project Stage II Examination: The students must prepare presentation on Project Stage II and present in presence of examiners through a viva-voce examination.

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(Information Technology) *(2023 Pattern)*

Sem-VIII: OS Installation and Backup Recovery Course(2315706)

(EEC)

Teaching Scheme:	**Credits**	**Examination Scheme**	
Theory:	**Pr:2**	**Theory**	**CIA:**
Practicals: 4hrs/week			**End-Sem:**
		Pract:	**--**
		Oral:	**25**
		Termwork	**--**

Course Objectives: The student should be able to

1. review, analyze, and process the needs for OS installation and Backup rcovery
2. install and use different OS like Windows, Android, Mac, Linux, FreeBSD
3. do the backup recovery and use different backup recovery tools

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and describe the installation process of different OS

CO2: Prepare escape bootable disk, multi boot system, and OS recovery system.

CO3: perform and troubleshoot data losses through manual and tool based recovery system

CO4: install OS in virtual environment

Module 1: Installing different OS **7Hrs**	**CO**
Windows installation, Linux distros installation(Ubantu, Redhat, Debian, Suse,), Free BSD, FreeDOS, prepare multi boot system, prepare bootable disk	CO1 to CO2
Module 2 Installing Virtual box/ VMWare/ Virtual machines 07Hrs	CO1 to CO3
Installing Virtual machines on different OS, installing guest operating systems on different VMs, Creating Virtual network Setup, creating virtual storage drive, installing different data recovery tools on host and guest machines, perform manual data reciovery	
Module 3 Data Recovery 7Hrs	CO1-CO4
Perform manual data recovery, setting recovery points in OS, recovering permanently deleted data, using different data recovery tools for different OS	

List of Practicals		
Pr. No.	**Practical title**	**CO**
1.	Windows installation and preparing bootable escape disk	CO1
2.	Installing Virtual machines on Windows and installing Ubuntu as guest operating system on it	CO2
3.	creating virtual storage drive	CO3
4.	Perform manual data recovery and setting recovery points or restoration points in Windows	CO4
5.	Linux installation and preparing bootable escape disk	CO1
6.	Installing Virtual machines on Linux and installing Windows as guest operating system on it	CO2
7.	Use different Data recovery tools and techniques for Windows to recover deleted data	CO4
8.	Use different Data recovery tools and techniques for Linux to recover deleted data	CO4

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(Information Technology) *(2023 Pattern)*

Sem-VIII: Advanced Network Computing Course(2315806)

(EEC)

Teaching Scheme:	Credits	Examination Scheme	
Theory:	Th:	Theory	CIA:
Practicals:	Audit Course		End-Sem:
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. review, analyze, and process the needs for advanced network computing needs
2. Perform and troubleshootthe advanced network computing operations
3. design and implement advanced computer network as per the computing demands

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and describe the role of network in computing

CO2: Comprehend basic components of advanced computer network and computing resources.

CO3: perform and troubleshoot advanced computing operations

CO4: Design the network as per computing demand

Module 1: Introduction **7Hrs**	**CO**
Layered communication architecture: layers, services, protocols, layer entities, service access points, protocol functions, Advanced Routing algorithms, Advanced Network Congestion Control algorithms ,Quality of service	CO1 to CO2
Module 2 Protocols and Networks **7Hrs**	CO1 to CO3
Real Time Transport Protocol Assignment , Internetworking, Performance Issues,,Overview on VPN networks, Overview on Wireless Networks and Mobile Networks: LAN, PAN, Sensor Networks, Ad_hoc Networks, Mobile iP, Mobile TcP, IP security	
Module 3 Cluster Computing **7Hrs**	CO1 - CO4
Scalable Parallel Computer Architecture, Towards Low Cost Parallel Computing & Motivation, Windows opportunity, A Cluster Computer And Its Architecture, Cluster Classification, Commodity Components for Clusters, Network Services/Communication SW, Cluster Middleware and Single Systems Image, Resource management & Scheduling (RMS), Cluster Setup and Administration: Introduction, Setting up the cluster, Security, System Monitoring, System Tuning	

Module 4 Grid and Cloud Computing **7Hrs**	
Introduction to Grid and its Evolution: Beginning of the Grid, Building blocks of Grid, Grid Application and Grid Middleware, Evolution of the Grid: First, Second & Third Generation, Defining Clouds, Cloud Providers, Consuming Cloud Services, Cloud Models – Iaas, Paas, SaaS, Inside the cloud, Administering cloud services, Technical interface, Cloud resources	

SANDIP FOUNDATION	**SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE** B. Tech(S.E. – I.T.) (2023 Pattern) Sem-VIII VAC156 Soft Computing Lab

Teaching Scheme: **TH :** **PR :**	**Credits** **Th:** **Practical:**	**Examination Scheme:** **CIA :** **ESE :**
Audit Course		

Sr. no.	**Module name**
Module 1	Introduction to Soft Computing: Evolutionary Computing, "Soft" computing versus "Hard" computing, Soft Computing Methods, Recent Trends in Soft Computing, Characteristics of Soft computing, Applications of Soft Computing Techniques.
Module 2	Fuzzy Systems: Fuzzy Sets, Fuzzy Relations, Fuzzy Logic, Fuzzy Rule-Based System
Module 3	Genetic Algorithms: Basic Concepts, Basic Operators for Genetic Algorithms, Crossover and Mutation Properties, Genetic Algorithm Cycle, Fitness Function, Applications of Genetic Algorithm.

Books & Other Resources

Textbooks:

1. Soft Computing – Advances and Applications – Jan 2015 by B.K. Tripathy and J. Anuradha – Cengage Learning

Reference Books

1. S. N. Sivanandam & S. N. Deepa, "Principles of Soft Computing", 2nd edition, Wiley India, 2008.
2. David E. Goldberg, "Genetic Algorithms-In Search, optimization and Machine learning", Pearson Education.
3. J. S. R. Jang, C.T. Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", Pearson Education, 2004.
4. G.J. Klir & B. Yuan, "Fuzzy Sets & Fuzzy Logic", PHI, 1995.
5. Melanie Mitchell, "An Introduction to Genetic Algorithm", PHI, 1998.
6. Timothy J. Ross, "Fuzzy Logic with Engineering Applications", McGraw- Hill International editions, 1995

SANDIP INSTITUTE OF TECHNOLOGY AND RESEARCH CENTRE

B. Tech(Information Technology) *(2023 Pattern)*

Sem-VIII: Vertical and horizontal Integration of businesses for Ecommerce(2315493)

Teaching Scheme:	Credits	Examination Scheme	
Theory:4	Th:4	Theory	CIA: 50
Practicals:	Audit Course		End-Sem:50
		Pract:	--
		Oral:	--
		Termwork	--

Course Objectives: The student should be able to

1. understand the need for strategic planning and businesses integration in E-Commerce
2. apply the strategic planning to perform either vertical or horizontal integration of different businesses
3. use E-commerce efficiently through business integration

Course Outcomes:

On completion of the course, learner will be able to–

CO1: Recognize and describe the role of different businesses and supply chains for E-commerce

CO2: Comprehend basic process of strategic business planning in E-commerce.

CO3: Explain the impact of various types of integration on E-Commerce .

CO4: Interpret the aspects of legal issues involved in integration of businesses

CO5: Implement and design a plan for vertical as well as horizontal business integration

Unit 1: Introduction **7Hrs**	**CO**
Growing Role of IT in Retailing- Information Systems and Supply Chain Management- Human Resources and Executive Information System- Customer Relationship Management- Process of CRM- Developing and Implementing CRM Programme. B2B, B2C businesses,	CO1 to CO2
Unit 2 Integration of businesses **7Hrs**	CO1 to CO3
Integration strategy and integration planning, Horizontal Integration, Vertical integration, forward integration, backword integration, legal issues in business integration, non disclosure agreement, Advantages of business integration, disadvantages of integration, business acquisition, impact of integration on E-commerce	
Unit 3 Strategy and business integration **7Hrs**	CO1 - CO4
What is strategy? Mission, vision, and objectives, Core competencies, The five-stage strategic management process, Porter's generic strategies, Situation analysis – SWOT and Five Forces Model,	

Strategic groups, Growth strategies, Michael Porter's Value Chain, Value chain integration, Integrated business planning, ERP and business integration	
Unit 4 E-commerce and logistics 7Hrs	CO3
Integrating E-commerce with logistics, product delivery system, ERP, SCM, B2B service integration, CRM	
Unit 5 Business mergers and acquisition 9Hrs	CO4
Mergers-in the nature of acquisitions and amalgamations, types of merger – motives behind mergers – theories of mergers – operating, financial and managerial synergy of mergers – value creation in horizontal, vertical and conglomerate mergers – internal and external change forces contributing to M&A activities- understanding cross border acquisitions M&A - strategic perspective- industry life cycle and product life cycle analysis in M&A decision, strategic approaches to M&A- SWOT analysis, BCG matrix, Porter's Five forces model- trends in merger activities India and abroad	
Unit 6 Case Studies of E-commerce integration 5Hrs	CO5
E-commerce business integration Models of: Amazon, ebay, zomato, yahoo, meshow, olx, nobroker, etc	

TEXT BOOKS:

1. SudiSudarsanam, Value Creation From Mergers And Acquisitions, Pearson Educationl

2. Electronic Commerce: A Managerial Perspective, Turban, E. et al., Prentice Hall-2008.

REFERENCE BOOKS:

1. Machiraju, Mergers And Acquisitions, New Age Publishers

2. Handbook of International Mergers & Acquisitions, Gerard Picot, Palgrave Publishers Ltd

3. Electronic Business and Electronic Commerce Management, 2nd edition, Dave Chaffey, Prentice Hall, 2006