

GIET UNIVERSITY, GUNUPUR-765022

DEPARTMENT

OF

COMPUTER SCIENCE & ENGINEERING

(SCHOOL OF ENGINEERING & TECHNOLOGY)



BACHELOR'S DEGREE PROGRAMME

(B. Tech- CSE)

Course Structure and Syllabi

For

Students Admitted in

[2021-22]

Academic Session

SYLLABUS STRUCTURE

1ST SEMESTER (2021-25)

Sl. No.	Course Category	Course Code	Course Title	Hours per week			Credits	CIA	ESE
				L	T	P			
			THEORY						
1	BS	21BBSBS11001	Engineering Mathematics-I	3	1	0	4	30	70
2	BS	21BBSBS10002	Engineering Physics/	3	0	0	3	30	70
		21BBSBS10003	Engineering Chemistry						
3	ES	21BBSES10001	Basic Electrical and Electronics Engineering /	3	0	0	3	30	70
		21BBSES10002	Elements of Mechanical Engineering	3	1	0	4		
4	ES	21BBSES11003	Programming for Problem Solving	2	0	0	2	30	70
5	HS	21BBSHS11001	Communicative English and Soft Skills	2	0	0	2	30	70
6	HMS	21BBSHS10002	HV&PE/	2	0	0	2	30	70
	ES	21BBSES10004	Dietetics & Nutrition	2	0	0	2	30	70
PRACTICAL / SESSIONAL									
1	BS	21BBSBS10102	Engineering Physics Laboratory	0	0	2	1	35	15
		21BBSBS10103	Engineering Chemistry Laboratory						
2	ES	21BBSES10101	Basic Electrical and Electronics Engineering Laboratory (For BEE)	0	0	2	1	35	15
3	ES	21BBSES11103	Programming for Problem Solving Laboratory	0	0	4	2	70	30
4	HS	21BBSHS11101	Communicative English and Soft Skills Laboratory	0	0	2	1	35	15
5	ES	21BBSES10105	Engineering Graphics & Design	1	0	2	2	70	30
		21BBSES10106	Engineering Workshop						
6	MC	21BBSMC11101	Induction Program(3 weeks)	0	0	0	0	0	0
TOTAL CREDIT							23		

SYLLABUS STRUCTURE 2ND SEMESTER (2021-25)

Sl. No.	Course Category	Course Code	Course Title	Hours per week			Credits	CIA	ESE
				L	T	P			
			THEORY						
1	BS	21BBSBS12001	Engineering Mathematics-II	3	1	0	4	30	70
2	BS	21BBSBS10002	Engineering Physics/	3	0	0	3	30	70
		21BBSBS10003	Engineering Chemistry						
3	ES	21BBSES10001	Basic Electrical and Electronics Engineering /	3	0	0	3	30	70
		21BBSES10002	Elements of Mechanical Engineering	3	1	0	4		
4	ES	21BBSES12003	Data Structure & Algorithms	2	0	0	2	30	70
5	HS	21BBSHS12001	Communicative English & Technical Communication	2	0	0	2	30	70
6	HMS/	21BBSHS10002	HV&PE/						
	ES	21BBSES10004	Dietetics & Nutrition	2	0	0	2	30	70
PRACTICAL / SESSIONAL									
1	BS	21BBSBS10102	Engineering Physics Laboratory	0	0	2	1	35	15
		21BBSBS10103	Engineering Chemistry Laboratory						
2	ES	21BBSES10101	Basic Electrical and Electronics Engineering Laboratory	0	0	2	1	35	15
3	ES	21BBSES12103	Data Structure & Algorithms Laboratory	0	0	4	2	70	30
4	HS	21BBSHS12101	Communicative English and Technical Communication Laboratory	0	0	2	1	35	15
5	ES	21BBSES10105	Engineering Graphics & Design	1	0	2	2	70	30
		21BBSES10106	Engineering Workshop						
6	MC	21BBSMC12101	NSS/YOGA	0	0	0	0	0	0
TOTAL CREDIT							23		

Subject Code		Title of the subject								L	T	P	C		
21BBSBS11001		Engineering Mathematics-I								3	1	0	4		
Course Educational Objectives															
CEO1	To find critical points, and use them to locate maxima and minima.														
CEO2	To provide the standard methods for solving differential equations.														
CEO3	To study Fourier series and to express a function in Fourier series.														
CEO4	To use matrices, determinants and techniques for solving systems of linear equations in the different areas of Linear Algebra.														
Course Outcomes: Towards the end of the course students will be able to :															
CO1	Implement the engineering problems using the concept of Partial differentiation and series and to understand its application.														
CO2	Solve the initial value and boundary value problem of ODE related to Electrical circuit.														
CO3	Execute the technique of Fourier series for applying in Engineering applications.														
CO4	Find the Eigen value and vector of a matrix by using properties of linear algebra														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	2													
CO2	2	3													
CO3	1	3													
CO4	2	3													
SYLLABUS															
UNIT-I (10 Hours)															
MULTI-VARIABLE CALCULUS															
Limit and Continuity, Partial differentiation, Euler’s theorem, Total derivative, Taylor’s theorem for function of two variable (without proof), Maxima and Minima for function of two variables,Differentiation under integral sign (Leibnitz rule).															
UNIT- II (12 Hours)															
DIFFERENTIAL EQUATIONS-I															
Ordinary differential Equations: First order and first-degree differential equations and their method of solving, Application to Electrical circuits and heat conduction.															
DIFFERENTIAL EQUATIONS-II															
Linear differential equations of higher order and their different methods of solutions (operator methods). Second order linear differential equations and their solutions: Euler Cauchy equation, solution by undermined coefficient method and variation of parameters. Simple application to electrical circuits.															

UNIT -III**(8 Hours)**

Fourier series, Fourier expansion of functions of arbitrary period, Even and odd functions, Half Range Expansion.

UNIT -IV**(10 Hours)****LINEAR ALGEBRA:**

Matrices, Types of matrices, Rank of matrix, Eigen values and Eigen vectors, Cayley — Hamilton theorem (without proof), system of linear equations, Orthogonal matrices, Complex matrices, Hermitian and skew-Hermitian matrices, Unitary matrices, similarity of matrices. Quadratic forms and Canonical forms.

Prescribed Books:

1. Advanced Engineering Mathematics by E. Kreyszig, Tenth Edition, Willey
2. Differential Calculus by Santi Narayan and P.K .Mittal, S.Chand Publications

References:-

1. Higher Engineering Mathematics by BS Grewal : Khanna Publishers, New Delhi.
2. Higher Engineering Mathematics by B.V.Ramana, McGraw Hills Education
3. Advanced Engineer methods by N. P. Bali & Manish Goyal
4. Differential Calculus by J. Sinha Roy & S. Padhi.
5. Differential Calculus” by Vinay Kumar, 3rd Edition 2021, Mc Graw Hill,

Subject Code		Title of the subject										L	T	P	C	
21BBSBS12001		Engineering Mathematics-II										3	1	0	4	
Course Educational Objectives																
CEO1	To focus on partial derivative and its methods.															
CEO2	To make them understand about laplace and fourier transform.															
CEO3	To calculate the gradients and directional derivatives of functions of several variables															
CEO4	To introduce the concept of Vector differentiation and integration that finds applications in various fields like solid mechanics, fluid flow, heat problems and potential theory															
Course Outcomes: Towards the end of the course the students will be able																
CO1	To know how to solve the partial differential equation by suitable method.															
CO2	I. To Solve Ordinary differential and integral equation by using Laplace transform, II. Execute the technique of Fourier Integral and transform for learning in advanced Engineering Mathematics.															
CO3	To relate gradient, curl and divergence and its application in fluid dynamics.															
CO4	To evaluate multiple integrals by using Green's, Stokes' and divergence theorem to give physical interpretation of the curl and divergence of a vector field .															
CO-PO & PSO Mapping																
COs	PROGRAMME OUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2														
CO2	2	3														
CO3	1	3														
CO4	2	3														
SYLLABUS																
UNIT - I (08 Hours)																
INTRODUCTION OF PARTIAL DIFFERENTIAL EQUATIONS:																
Formation of Partial differential equations, linear partial differential equation of first order: Lagrange's linear differential equation, Non-Linear partial differential equation of first order by Charpit's method.																
UNIT-II (12 Hours)																
LAPLACE TRANSFORMS:																
Definition, existence of Laplace Transforms, Properties of Laplace Transforms, Evaluation of integrals by Laplace Transforms, Inverse transforms, convolution theorem, transforms of unit step function, unit impulse function, and periodic function. Solution of ordinary differential equations by Laplace Transform, Definition of Fourier Integral and Fourier transform																
UNIT - III (8 Hours)																
VECTOR DIFFERENTIAL CALCULUS:																
vector and scalar functions and fields, Derivatives, Curves, tangents and arc Length, gradient, divergence, curl and their simple application.																

UNIT - IV**(12 Hours)****VECTOR INTEGRAL CALCULUS:**

Definition and evaluation of double integration and triple integration, Evaluation of line integral, Surface integral and volume integral and their applications, Transformations theorems- Green's Theorem in plane, Stoke's Theorem, Gauss Divergence Theorem and their applications.

Prescribed Books

1. Advanced Engineering Mathematics by E. Kreyszig, John Wiley & Sons Inc. 10th Edition

References:

1. Higher Engineering Mathematics by B. V. Ramana, Mc Graw Hill Education.
2. Higher Engineering Mathematics by BS Grewal : Khanna Publishers, New Delhi.
3. Advanced Engineering mathematics by H. K. Dass.
4. Differential Calculus by J. Sinha Roy & S. Padhi.

Subject Code		Title of the subject									L	T	P	C	
21BBSBS120B1		Engineering Mathematics-II (ONLY FOR BIOTECH)									3	1	0	4	
Course Educational Objectives															
CEO1	To focus on coordinate system														
CEO2	To study vector function and scalar function in vectors.														
CEO3	To provide the standard methods for solving algebraic equations.														
CEO4	To study the probability and it's properties.														
Course Outcomes: Towards the end of the course the students will be able to															
CO1	Understand the concept of straight-line and circle and application.														
CO2	Find the gradient, divergence, curl and their simple application.														
CO3	Solve the algebraic equations by using different methods and also understand theconcept of interpolation.														
CO4	Understand the concept of conditional probability and testing of hypothesis.														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2													
CO2	2	3													
CO3	1	3													
CO4	2	3													
SYLLABUS															
UNIT – I (10 Hours)															
CO-ODINATE GEOMETRY															
Straight Lines: Introduction, Slope of a line and angle between two lines. Various forms of equations of a line: parallel to axes, point-slope form, slope-intercept form, two point form, intercepts form and normal form. General equation of a line.															
Cirlces : circle, Equation of circle whose centre and radius is known, General equation of a circle, equation of tangent and normal Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x ₁ , y ₁) & (x ₂ ,y ₂),															
UNIT - II (8 Hours)															
VECTORS															
vectors and scalars, Types of Vectors, Algebra of vectors, Position Vectors, Scalar product, vector product, unit vectors, Scalar triple product and vector triple product, vector functions ,Derivatives, Curves, tangents and arc Length, gradient, divergence, curl and their simple application.															
UNIT -III (10 Hours)															
NUMERICAL METHODS:															
Errors, solving of algebraic and transcendental equations by using bisection method, fixed point iteration and Newton-Raphson's method. Finite Differences, Newton's forward and backward interpolation formula (without proof), Newton divided difference interpolation, Lagrange interpolation.															

UNIT-1V**(12 Hours)****PROBABILITY AND STATISTICS**

Events, Sample space, definition of probability, Axioms of probability, Addition theorem of probability with examples, Multiplication theorem of probability with illustrate examples. Conditional probability, Bay's theorem with examples.

Mean, Median, Mode, Testing of hypothesis (chi-square test), Regression and correlation analysis, fitting of straight line by least square method.

Prescribed Books:

1. Advanced Engineering Mathematics by E. Kreyszig, Tenth Edition, Willey
2. Differential Calculus by Santi Narayan and Mittal, S.Chand Publications

Reference:-

1. Higher Engineering Mathematics by BS Grewal : Khanna Publishers, New Delhi.
2. Higher Engineering Mathematics by B. V. Ramana, McGraw Hills Education
3. Advanced Engineer methods by N. P. Bali & Manish Goyal.
4. Elements Of Mathematics

Subject Code		Name of the Subject										L	T	P	C	
21BBSHS11001		Communicative English and Soft Skills										2	0	0	2	
Course Educational Objectives																
CEO1	To promote communication skills and soft skills.															
CEO2	To enhance the employability and entrepreneurial skills															
CEO3	To motivate the students to participate in group discussions without stage fear															
Course Outcomes: Towards the end of the course, the students will be able to:																
CO1	Understand the importance of effective communication for professional development															
CO2	Application of vocabulary and grammar for effective communication.															
CO3	Application of Information and Communication Technology (ICT) for career development															
CO4	Nurture and motivate positive attitude towards placements.															
CO-PO & PSO Mapping																
COs	PROGRAMME OUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1										3						
CO2										3						
CO3										3						
CO4										3						
SYLLABUS																
UNIT -1 Importance of English for Communication in the 21st Century (9 hours)																
1.1 Role of English in enhancing employability and entrepreneurial skills (1)																
1.2 The Nature and Scope of Communication (1)																
1.3 English Language skills, i.e., LSRW skills ; appropriate use of skills in communicative contexts (1+1+1)																
1.4 The process of communication and factors that influence communication: Sender, receiver, channel, code, topic, message, context, feedback, noise, filters and barriers (steps such as Ideation, Encoding, Transmission, Decoding, etc. need to be dealt with); Audience and purpose (1 + 1)																
1.5 Types of Communication: General and Professional Communication; Written communication and Spoken communication. (1 + 1)																
UNIT -2. English Vocabulary, Grammar & Usage (8 hours)																
2.1 Synonyms and Antonyms 1																
2.2 Words often confused 1																
2.3 Technical terms and one word substitutes 1																
2.4 Sentence Structure and syntax 1																
2.5 Common errors in English. 1+1																
2.6 Communicative use of the Passive Voice 1																
2.7 Difference between American, British and Indian English (Vocabulary based) 1																
UNIT- 3. Introduction to Corporate Communication (11 hours)																
3.1 Seven C's communication and Ten C's of Non-communication. 1																
3.2. Intercultural and cross cultural communication. 1																
3.3 Corporate Communication – Direction of Communication: Downward Communication, Upward Communication, Horizontal/Lateral Communication, Diagonal Communication 1 + 1																
3.4 Communication challenges in today's work place: Advances in technology; culturally diverse workforce; Team-based organizational Settings; how to overcome these challenges 1 + 1																
3.5 Information and Communication Technology (ICT) and the corporate world, Power point presentation using multimedia; Internet and Intranet. 1+1																
3.6 Corporate/Business etiquette: Mobile etiquette, proper handshake, body language, social etiquette. 1 + 1																
3.7 How to handle difficult conversations at work 1																

UNIT- 4 Soft skills Development.**(8 hours)**

- 4.1 Importance of soft skills in personal and professional life 1+1
- 4.2 Time and stress management. 1+1
- 4.3 Leadership, team work and net-working skills 1+1
- 4.4. Lateral thinking and problem solving skills; Emotional Intelligence 1+1

Teaching Methods: Chalk& Board/ PPT/Video Lectures

Text Books:

- 1. An Introduction to Professional English and Soft Skills by B. K. Das et al., Cambridge University Press.
- 2. Communicative English for Engineers and Professionals by Nitin Bhatnagar and Mamta Bhatnagar. Published by DK/Pearson.
- 3. Practical English Usage. Michael Swan, OUP,1995

Reference Books:

- 1. Technical Communication , Principle and Practice by Meenakshi Raman & Sangeeta Sharma,Oxford University Press
- 2. Business Communication Today by Bovee, Courtland L., Thill, John V. Prentice Hall.
- 3. The Ace of Soft Skills: Attitude, Communication and Etiquette for Success by Gopalaswamy Ramesh and Mahadevan Ramesh. Pearson.
- 4. Oxford Guide to English Grammar by John Easthood. Oxford University Press.
- 5. 365 Ways to Change Your World by Norman Vincent Peale by Orient Paperbacks.
- 6. Soft Skills For Your Career by Kalyani Samantray Oxford University Press, 2016.

Lab Code		Name of the Lab								L	T	P	C			
21BBSHS11101		Communicative English and Soft Skills Laboratory								0	0	2	1			
Course Educational Objectives																
CEO1		To develop the communication skills of the students, especially the Listening and Speaking skills.														
CEO2		To develop the vocabulary and usage skills of students by practice.														
CEO3		To enable students to participate in group discussions through proper listening and speaking.														
CEO4		To enable students eliminate grammatical mistakes in speech and writing.														
Course Outcomes: The students will be able to:																
CO1		Build up a good range of vocabulary and know proper usage.														
CO2		Become active listeners with good comprehension, participation, and evaluation.														
CO3		Develop conversational and public speaking competencies.														
CO4		Use grammar for effective speaking in GD and other formats of speaking.														
CO5		Eliminate stage fear and hesitancy in speaking.														
CO-PO & PSO Mapping																
		PROGRAMME OUTCOMES											PSOs			
COs		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1											3					
CO2											2					
CO3											3					
CO4											3					
CO5											2					
SYLLABUS																
Phonetics & Listening Skills 10 hours = 5 classes [2 listening tests x 10 marks=20 marks]																
Vowels, diphthongs, consonants, consonant clusters; The International Phonetic Alphabet (IPA); phonemic transcription; Problem sounds; Syllable division and word stress; Sentence rhythm and weak forms; Contrastive stress in sentences to highlight different words; Intonation: falling, rising, and falling-rising tones; Listening to Newspaper reading/Video, etc.																
Listening with a focus on pronunciation (ear-training): segmental sounds, stress, weak forms, intonation & Listening for comprehension.																
Reading comprehension skills: Identifying main ideas and details; analyzing text structure; inferencing underlying ideas/meanings: speculating what may happen next in the reading text; integrating reading to listening and speaking activities.																
Speaking skills 10 hours = 5 classes [4 speaking tests x 10 = 40 marks]																
• Topics for 1 minute, 2 minutes, and 5 minutes speaking; Pictures, Quotations, Attitude-testing Questions may be used.																
• Responding to handouts, articles, books magazines and newspapers.																
• Summarizing a reading text.																
Individual/Group presentations discussion on given topics																
Soft skills development 10 hours = 5 classes [4 assignments x 10 = 40 marks]																
• Basic Writing skills 1+1+1																
• Time & stress management 1+1																
• Lateral thinking & problem solving 1+1																
• Practice with GD techniques 1+1+1																
Teaching Methods: Chalk& Board/ PPT/Video Lectures																
Text/Reference Books:																
1. Form and Finesse, Business Communication and Soft skills by Shruti Das, Published by Orient Black Swan.																
2. Business and Corporate Soft skills developed by Rai Tech. University (PDF available)																
3. Spoken English (with CD). Sasikumar V and P V Dhamija. New Delhi: Tata McGraw-Hill Education Pvt. Ltd. (2 nd Ed.)																

Subject Code		Title of the subject									L	T	P	C	
21BBSHS12001		Communicative English and Technical Communication									2	0	0	2	
Course Educational Objectives															
CEO1	To develop the communication skills and soft skills of the students														
CEO2	To enhance the ability of the students to develop employability and entrepreneurial skills														
CEO3	To enable students to successfully participate in GDs and PIs														
CEO4	To make students communicate effectively using technologies and techniques														
CEO5	To inculcate a sense of professionalism in students														
Course Outcomes: <i>The students will be able to:</i>															
CO1	Understand the importance of technology in communication														
CO2	Develop career conscious leading to preparation for career.														
CO3	Understand the nature and scope of corporate communication and try to be industry-ready.														
CO4	Prepare professional documents for career needs (e.g. Job application letter, résumé) and professional needs (e.g., Memo and E-mail writing)														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1										3					
CO2										3					
CO3										3					
CO4										3					
SYLLABUS															
UNIT 1 Introduction to Technical Communication (7 hours)															
1.1 Essence of Technical Communication 1															
1.2 Nature and Scope of Technical Communication: 1 +1 +1															
Technical Communication -- Interactive and Adaptable; Technical Communication -- Reader Centered;Technical Communication and teamwork; Technical Communication Has Ethical, Legal, and Political Dimensions; Technical Communication – its International and Cross-Cultural nature.															
1.3 Need of Technical communication for career development 1															
1.4 Computer Assisted Language Learning (CALL) – Self learning through use of technology, Effectiveness of CALL for developing English Language Skills; Use of Internet 1 +1															
UNIT 2 Workplace Communication (15 hours)															
2.1. Career making: Setting Goals, SWOT analysis 1															
2.2 Preparing a Résumé: Elements of a Résumé; Types of Résumés: Chronological Résumé,Functional Résumé; Use of job portals 1 +1 +1															
2.3 Effective Job Application Letter/Cover letter 1 +1															
2.4 Group Discussion 1+1+1															
2.5 Job Interview 1+1															
2.6 Effective Oral Presentation 1+1															
2.7 Handling a Meeting 1+1															

UNIT 3 Technical Approach to Reading	(6 Hours)
3.1 Know your Reading speed; Advantages of speed reading	1
3.2 SQ4R Techniques of Reading	1+1
3.3. Techniques of Rapid reading: skimming, scanning, inferencing	1+1
3.4 Understanding coherence and cohesion	1
UNIT 4 Technical Writing	(10 hours)
4.1 Writing a technical paper	1+1
4.2 Writing business letters – significance, purpose, structure and elements, layout; types of businessletters	1+1
4.3 Email Etiquette	1
4.4 Business Reports and Technical proposals	1+1+1
4.5 Using the Social media for better communication	1+1
Teaching Methods: Chalk& Board/ PPT/Video Lectures	
Text Books: 1. Form and Finesse, Business Communication and Soft skills by Shruti Das, Published by Orient BlackSwan. 2. Business Communication Today by Bovee, Courtland L., Thill, John V. Prentice Hall. 3. Technical Communication Today by Richard Johnson-Sheehan. Edition 5. Pearson. 4. Communicative English for Engineers and Professionals by Nitin Bhatnagar and Mamta Bhatnagar. Published by DK/Pearson.	
Reference Books: 1. Basic Communication Skills for Technology by Andre J. Rutherford, Pearson Education Asia, Patparganj, New Delhi. 2. Business Communication by Varinder Kumar and Bodh Raj. Kalyani Publishers. 3. A Textbook of English Phonetics for Indian Students by T. Balasubramanian 4. Technical Communication , Principle and Practice by Meenakshi Raman &Sangeeta Sharma, Oxford University Press 5. How to Read better and Faster by Norman Lewis. 4th Edition. Publisher: Crowell. 6. Soft Skills For Your Career by Kalyani Samantray OXFORD UNIVERSITY PRESS, 2016	

Subject Code		Name of the Subject								L	T	P	C			
21BBSHS12101		Communicative English and Technical Communication Laboratory								0	0	2	1			
Course Educational Objectives																
CEO1	To enable students to successfully participate in GDs and PIs.															
CEO2	To make students communicate effectively by classroom practice.															
CEO3	To inculcate a sense of professionalism in students															
Course Outcomes: <i>The students will be able to:</i>																
CO1	Prepare professional documents for career needs (e.g. Job application letter, résumé) and professional needs (e.g., Memo and E-mail writing)															
CO2	Effectively participate in GD and PI.															
CO3	Emerge as an effective presenter/public speaker															
CO4	Understand the practical needs at workplace (e.g., organize a meeting)															
CO-PO & PSO Mapping																
COs	PROGRAMME OUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1										3						
CO2										3						
CO3										2						
CO4										3						
SYLLABUS																
1. Writing an Effective Job Application Letter/Cover letter										4 hours						
2. Writing a winning resume and posting in job portals										4 hours						
3. Group Discussion, case studies and problem statement										4 hours						
4. Job Interview, versant test, video resumes										4 hours						
5. Oral presentation										4 hours						
6. Organizing a Meeting										4 hours						
7. Practice Vocabulary Exercises										4 hours						
8. Pictorial Demonstration										2 hours						
9. Profiling a company										4 hours						
10. Summarizing books/research paper/news report										2 hours						
Text Books:																
1. Form and Finesse, Business Communication and Soft skills by Shruti Das, Published by Orient BlackSwan.																
2. Business Communication Today by Bovee, Courtland L., Thill, John V. Prentice Hall.																
3. Technical Communication Today by Richard Johnson-Sheehan. Edition 5. Pearson.																
4. Communicative English for Engineers and Professionals by Nitin Bhatnagar and Mamta Bhatnagar. Published by DK/Pearson.																
Reference Books:																
1. Basic Communication Skills for Technology by Andre J. Rutherford, Pearson Education Asia, Patparganj, New Delhi.																
2. Business Communication by Varinder Kumar and Bodh Raj. Kalyani Publishers.																
3. A Textbook of English Phonetics for Indian Students by T. Balasubramanian																
4. Technical Communication , Principle and Practice by Meenakshi Raman &Sangeeta Sharma, Oxford University Press																
5. How to Read better and Faster by Norman Lewis. 4th Edition. Publisher: Crowell.																
6. Soft Skills For Your Career by Kalyani Samantray OXFORD UNIVERSITY PRESS, 2016																

Course Code	Course Title	L	T	P	C	
21BBSES11003	Programming for Problem Solving	2	0	0	2	
Pre -Requisite: computer basics.						
Course Educational Objective						
CEO1:To formulate algorithm, translate into program and then execute the programs for verifying its correctness.						
CEO2: To analyze a problem for knowing its efficiency and decompose it into functions using divide and conquer approach.						
Course Outcome: student can able to						
CO1	Formulate simple algorithms for arithmetic and logical problems and translate into programs.					
CO2	Understand and develop programs using loop, arrays and analyse its complexity.					
CO3	Understand and develop programs using strings, functions and recursions.					
CO4	Develop programs using pointers and structures, and understand their functionality.					

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1									
CO2	1	3	2									
CO3	1	3	3									
CO4	2	2	3									

UNIT- I (10 Hours)

Programming: Introduction to Structured Programming Approach, Basic structure of C program, C compilers, Compilation and Execution Process, Error debugging.

C Tokens, keywords, identifiers, data types, constants, variables, standard I/O statements, Operators classifications, Operator precedence and associativity, Implicit and Explicit type casting.

Control Flow Statements: **Selection Logic:** if, if..else, else if ladder, nested if

UNIT- II (10 Hours)

switch..case, **Iteration Logic:** while, do-while and for loop, break, continue, nested loop. **Arrays:** 1-D

Array: declaration, initialization, array operations, 2-D Array: declaration, Initialization, 2-D array operations

UNIT- III (10 Hours)

Character arrays and Strings: String handling operations, strcmp(), strcat(), strcpy(), strlen().

User Defined Functions: Function categories, Parameter passing in functions, Passing arrays to functions, Recursive functions, storage classes

UNIT- IV (10 Hours)

User Defined Data Types: Structures: Declaration and initialization of structures, accessing structure elements, nested structures, structures and arrays, structures and functions, typedef **Pointers:** Declaration and initialization of pointers, Pointer arithmetic, Pointer and Arrays, call by value and call by address, Function returning pointer, pointer to structure, Dynamic memory allocation.

Text Books:

- 1) E. Balaguruswamy, Programming in ANSI C, 7th edition, Tata McGraw-Hill
- 2) Let us „C“ by Yashwant Kanethkar, 16th edition, BPB Publications
- 3) Byron Gottfried, Schaum's Outline of Programming with C, 3rd edition, McGraw-Hill.

References:

- 1) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, 2nd edition, Prentice Hall of India
- 2) Programming in C, by Reema Thareja, 2nd edition, OUP India
- 3) C Programming and Coding by swatisaxena, BPB Publications.

Course Code	Course Title	L	T	P	C	
21BBSES11103	Programming for Problem Solving Laboratory	0	0	4	2	
Pre -Requisite:						
Course Educational Objective						
CEO1: To develop programs for problems on different applications of array, functions, Pointers and structure.						
CEO2: To analyse different problems by comparing and implementing in programming.						
Course Outcome						
CO1	To understand operating system and its simple commands, writing programs, compilation, debug and execution process.					
CO2	To develop programs using loop controls, arrays and understand the complexity using different programs.					
CO3	To develop programs using functions and recursive function by decomposing a problem and analyse them.					
CO4	To Solve numerical problems, develop different programs using pointers, structures and analyse their functionality.					

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1									
CO2	1	2	2	1								
CO3	1	2	2	1								
CO4	1	2	2	1								

Lab Experiment 1: Familiarization with programming environment

- 1) Introduction to OS: Before starting experiments explain the facilities and operations of OS.
- 2) Introduction to the C compiler, Compilation and Execution Process & writing simple programs.

Lab Experiment 2: Simple computational problems using arithmetic expressions.

- 1) WAP to input radius of a circle and Find the area, perimeter of it.
- 2) WAP to input two numbers and swap them without using intermediate variable.

Lab Experiment 3: Simple computational problems using arithmetic expressions.

- 1) Write a program to accept Fahrenheit and calculate its equivalent Celsius.
- 2) WAP to input three unequal numbers and find the greatest using conditional operator.

Lab Experiment 4: Problems involving if, switch

- 1) Write a program to input a lower case alphabet and test whether it is vowel or consonant.(using else..if and switch both)
- 2) Write a program to find the greatest among three numbers.(using else..if and switch both)

Lab Experiment 5: while, do..while and for loops:

- 1) Write a program to find the Greatest Common Divisor of two integers using while statement.
- 2) Write a program to accept a positive integer and test it for Armstrong or not using do..while statement.

Lab Experiment 6: Nested Loop

- 1) Write a program to calculate the following sum using nested for statement: $\text{Sum} = 1 - (x^2)/2! + (x^4)/4! - (x^6)/6! + (x^8)/8! - (x^{10})/10!$
- 2) Write a program to generate the following pyramid using nested for statement:

```

      1
    1 2 1
  1 2 3 2 1
1 2 3 4 3 2 1

```

Lab Experiment 7: 1D Array interaction

- 1) Write a program to accept 10 integers in to an array and find largest and smallest integers present in them.
- 2) Write a program to input 10 elements into an array. Then search for a given value in the array to know its existence.

Lab Experiment 8: 2D Array interaction

- 3) Write a program to input values into two matrices A(3x4), B(4x3). Perform matrix multiplication and display the resultant matrix.
- 4) Write a program to input two strings and test whether they are equal or not using string handling functions.

Lab Experiment 9: User Defined Functions

- 1) Write a C program which contains three UDF's namely add(), subtract() and multiply(). Each function accepts two integers as their arguments and calculate and return the results
- 2) Write a program to create an UDF and test a number is prime or not.

Lab Experiment 9: Recursive Functions

- 1) Write a program to accept 10 elements into an integer array. Find the largest element present using recursive function.
- 2) Write a program to generate Fibonacci series using a recursive function.

Lab Experiment 10: structures

- 1) Write a program to store 11 cricket players' details into an array of structure. The structure having member's player name, team name and batting average. Displays the name of players whose batting average is ≥ 30 .
- 2) Write a program to create a structure COMPLEX. Input two complex numbers using UDF and find the sum of them.

Lab Experiment 11: Pointers and Dynamic Memory Allocation

- 1) Write a program to create user defined function called swap having two integer pointers as its arguments and it has no return value. Call this function using call-by-address.
- 2) Write a program to store 'n' integers using dynamic memory allocation. Find the average value of the integers using a user defined function.

Lab Experiment 12: structure with pointer

- 1) Write a program create a structure PRODUCT having members Product no, Name and Price. Using a pointer Input 5 product details into a structure array and then display those products whose price is > 1000 rupees.
- 2) Write a program to create a structure EMPLOYEE to store N employee details i.e: employee no, name, salary. Display only those employee names whose salary ≥ 50000 .

Teaching Methods: Chalk & Board/ PPT/ Video Lecture

- A case study can be given to each student for each UNIT.
- A Mini Project can be given which the student have to do during the semester break.

Text Books:

- 4) E. Balaguruswamy, Programming in ANSI C, 7th edition, Tata McGraw-Hill
- 5) Let us „C“ by Yashwant Kanethkar, 16th edition, BPB Publications
- 6) Byron Gottfried, Schaum's Outline of Programming with C, 3rd edition, McGraw-Hill

References:

- 4) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, 2nd edition, Prentice Hall of India
- 5) Programming in C, by Reema Thareja, 2nd edition, OUP India
- 6) C Programming and Coding by swatisaxena, BPB Publications.

Course Code	Course Title	L	T	P	C
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21BBSES12003	DATA STRUCTURE AND ALGORITHMS	2	0	0	2	
Pre -Requisite: Basic knowledge of Algorithms						
Course Educational Objective						
CEO1: Develop algorithms for performing different operations on arrays, stack, Queue, linkedlist. Analyze the difference between them and understand different applications. Understand different searching and sorting methods and applications.						
CEO2: Understand and analyze Binary search Tree, AVL Tree, Heap Tree and their applications. Understand the memory representation of graph, its traversal methods and applications. Analyze the Hashing techniques in compare with other sorting techniques.						
Course Outcome: student can able to						
CO1	Develop algorithms for performing different operations on 1D array, matrix, stack, Queue, analyze the difference between them and understand different applications.					
CO2	Understand different searching and sorting methods, Linked lists and them compare them in terms of performance and applications.					
CO3	Understand the Binary Tree and its memory representation; analyze Binary search Tree and its applications, compare the BST with AVL Tree, Heap Tree and examine the advantages.					
CO4	Understand the memory representation of graph; analyze traversal methods and applications of graph. Analyze the Hashing techniques in compare with other sorting techniques.					

CO-PO Mapping:

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	2	2	2									
CO2	3	2	3									
CO3	3	3	3									
CO4	2	3	2									
UNIT- I (11 Hours) Basic concepts: Data abstraction, Data structures and types. Algorithm specification, 1D array: operations, 2D array: row major order and column major order Stack: Basic concepts, operations and implementation of stack using arrays, Mathematical procedure for conversions of arithmetic expressions. Applications of stack: infix to postfix conversion and postfix evaluation. Queue: Linear queue, operations and implementation using arrays, circular queue and its operations, Basics concepts of Double ended Queue and priority queue												
UNIT- II (11 Hours) Searching: Linear search and Binary search on elements in a linear array. Sorting: Bubble sort, Insertion sort, Selection sort using linear array. Linked Lists: Basic concepts and operations of single linked list, linked stack, linked queue, circular single linked list, and Double linked list. Basic concept of Circular double linked list.												
UNIT- III (11 Hours) Trees: Introduction, Terminology, Binary Trees, Memory Representation of Binary Trees using arrays and linked lists, Binary Tree traversal methods (recursive and non-recursive), Construction of binary tree using in-order & pre-order sequences, in-order & post-order sequence. Expression Tree, Construction of expression tree using stack. Binary Search Trees: Algorithm for construction, searching and insertion operation, Introduction to Height Balanced trees, Balance factor, Balancing the BST by rotations during insertions of a node.												

UNIT- IV**(11 Hours)**

Heaps: Introduction to binary heaps, definition of a Max-heap, Min-heap, creating Max-Heap Tree using insertion, Graphs: Terminologies, Memory Graph representation - Adjacency matrix, Incidence Matrix, Linked Representation, path matrix, Warshall's Algorithm to find path matrix, Graph Traversals (BFS & DFS), Topological Sorting
Hashing: Hashing Functions: Division, Mid-square, Folding methods. Collision, linear probing, chaining

Teaching Methods: Chalk& Board/ PPT

Text Books:

1. "Fundamental of Data Structure" (Schaums Series) Tata-McGraw-Hill.
2. Pai: "Data Structures & Algorithms; Concepts, Techniques & Algorithms "TataMcGraw Hill.
3. Gilberg and Forouzan: "Data Structure- A Pseudo code approach with C" by Thomsonpublication

Reference Books:

1. "Fundamentals of data structure in C" Horowitz, Sahani& Freed, Computer SciencePress.
2. "Data Structures and algorithms" by Narasimha Karumanchi, CareerMonk Publications
3. "Data structures through C in depth" by S.K.Srivastava, BPB Publications

Subject Code	Name of the Subject	L	T	P	C	
21BBSES12103	DATA STRUCTURE AND ALGORITHMS LABORATORY	0	0	4	2	

Course Outcomes: Upon successful completion of this course, students should be able to:

CO1	Understand the concepts of algorithms and implement in developing the programs for different operations of 1D array
CO2	Develop programs for performing different operations on matrix, analyze them and understand their applications.
CO3	Design code for stack and queue operations and analyze their performance.
CO4	Develop the codes for different operations on linked list, implement concepts of stack and queue using linked list and compare them.

CO-PO Mapping

COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	3												
CO2	2	3	3												
CO3	3	2	2												
CO4	2	2	1												

SYLLABUS

Experiment-1 (functions)

Q1) Write a program to create methods for performing addition, subtraction, multiplication and division on 2 integers.

Experiment 2: (concepts of array)

Q1) Write a C program to create methods for operations insertion, deletion, searching and display on 1D array of elements.

Experiment 3: (matrix)

Q1) Write a C program to create function for performing matrix multiplication.

Experiment-4: (pointer and DMA)

Q1) Write a program to store N numbers using dynamic memory allocation and then find the largest element using UDF.

Experiment 5: (structure and DMA)

Q1) Write a C program to create a structure called student to store your rollno, name, age. Create an array to input 5 students data and then create an UDF to display details where age >= 20.

Experiment 6: (stack)

Q1) Write a program using C++ to create a stack and perform:
(i) push operation (ii) pop operation (iii) display operation

Experiment 7: (linear queue)

Q1) Write a C program to create a linear queue and perform the following operations: (i) insertion (ii) deletion and (iii) Traversal

Experiment 8: (circular queue)

Q1) Write a C program to create a circular queue and perform the following operations: (i) insertion (ii) deletion and (iii) Traversal

Experiment 9: (sorting)

Q1) Write a program to implement bubble sort and selection sort on a list of array elements

Experiment 10: (sorting)

Q1) Write a program to implement linear and binary search on array elements using UDF

Experiment 11: (sorting)

Q1) write a program to implement insertion sort on a given list of array elements.

Experiment 12: (sorting)

Q1) Write a C program to implement quick sort to a given list of integers to sort in ascending order.

Experiment 13: (single linked list)

Q1) Write a C program that uses functions to perform the following operations on single linked list:

- i) Insertion at beginning, ii) insertion at end, iii) insertion at node item, iv) Deletion of 1st node,
- v) deletion of last node, vi) deletion of a given node item, vii) search for a node item, iv) display all nodes

Experiment 14: (linked stack)

Q1) Write a C program that uses functions to implement linked stack on single linked list.

Experiment 15: (linked queue)

Q1) Write a C program that uses functions to implement linked queue on single linked list.

Text Books/ Reference Books:

1. Pai: "Data Structures & Algorithms; Concepts, Techniques & Algorithms" Tata McGrawHill.
2. "Fundamentals of data structure in C" Horowitz, Sahani & Freed, Computer Science Press.
3. "Data structures through C in depth" by S. K. Srivastava, BPB Publications.

Subject Code		Title of the subject										L	T	P	C	
21BBSBS10002		Engineering Physics										3	0	0	3	
Course Educational Objectives																
CEO1	Providing fundamental knowledge about the oscillations and waves															
CEO2	Providing knowledge of mathematical concepts to solve electromagnetic problems															
CEO3	To familiar with structure and different properties of materials.															
CEO4	To attain fundamental information about Quantum mechanics with applications.															
Course Outcomes: Upon successful completion of this course, students should be able to:																
CO1	Understand and analyze the concept of oscillation and wave mechanics.															
CO2	Interpret the fundamentals of electromagnetism and deduce the electromagnetic wave equations.															
CO3	Describe the principle of lasing and optoelectronics devices in communication system.															
CO4	Explain the ideas of crystal structure, crystal diffraction and classification of materials.															
CO5	Express the basics of quantum mechanics and illustrate the quantum mechanical problems.															
CO-PO & PSO Mapping																
COs	PROGRAMME OUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2														
CO2	2	2														
CO3	1	2														
CO4	1	2														
CO5	2	2														
SYLLABUS																
UNIT: 1 Oscillation, Wave and Optoelectronics (14 Hours)																
Introduction to Oscillatory motion, Damped harmonic oscillation and its characteristics, Waves and its characteristics, Superposition of Waves, coherent and incoherent superposition, Interference of light waves, Newton's Ring experiment, diameter of rings, determination of wavelength of unknown light and refractive index of liquid. LASER, Lasing action and characteristics & application of laser beam, construction and working of He- Ne Laser, applications of Laser. Optical fiber, Acceptance angle, Numerical aperture, Step index and Graded index fibers, Attenuations in optical fibers, Block diagram of optical fiber communication systems and applications.																
UNIT: 2 Electromagnetic Theory (12 Hours)																
Review of grad, divergence and curl, Gauss divergence theorem and Stoke's theorem (no derivations), fundamental laws of electrostatics, magneto-statics and electromagnetism, displacement current and conduction current, Maxwell's equations, Equation of continuity using Maxwell's Relations. Electromagnetic wave and its characteristics, electromagnetic wave equation for free space and in charge free conducting medium, electromagnetic energy and Poynting vector, Poynting theorem.																
UNIT: 3 Solid state Physics (14 Hours)																
Crystal Structure: crystal direction and plane, Miller indices, Inter planar spacing, Reciprocal Lattice and its characteristics, Reciprocal Lattice of SC, FCC and BCC, Brillouin Zone, X-ray diffraction (Basic)& Bragg's law, Super Conducting Materials: Origin, type-1 and type-2, meissner's effect, critical magnetic field and current density, Applications. Magnetic Materials: Properties of Magnetic Materials types and applications. Di-electric Materials: Polar and non-polar dielectric, types of dielectric, piezoelectric, pyro-electric and ferroelectric, Applications. Nano Materials: (elementary ideas) Surface to volume ratio, graphene, carbon nano tubes and their applications.																

UNIT: 4 Quantum Mechanics**(12 Hours)**

Introduction to dual nature: Black body radiation, photoelectric effect, Compton effect (qualitative ideas only), de-Broglie's hypothesis, Heisenberg's uncertainty principle and its application to non-existence of electron inside the nucleus and ground state energy of one dimensional harmonic oscillator, Basic postulates of Quantum Mechanics, Wave function and its characteristics, probability density, normalization, eigen values, eigen functions and expectation values, Schrödinger's equation (time dependent and time independent). Application of Schrödinger equation to particle in a box and its Energy eigen values, Qualitative ideas on potential step and potential barrier with transmission probability.

Teaching Methods: Chalk& Board/ PPT/Video Lectures

Text Books:

1. *Engineering Physics* by D. K. Bhattacharya and Poonam Tanden, Oxford University Press.
2. *Engineering Physics*, H K Malik and A K Singh, Tata McGraw Hill, MGH.

Reference Books:

1. Materials Science & Engg., V. Raghvan, Prentice Hall of India.
2. Concepts of Modern Physics, A. Beiser, S. Mahajan and S.R. Choudhary, Tata McGraw Hill.
3. Lasers & Optical engineering, P Dass, Narosa Publishers, Springer Publisher.
4. Engineering Physics by B. B. Swain and P. K. Jena, KitabMahal, Cuttack
5. Sears & Zemansky's University Physics with Modern Physics, Young and Freedman.
6. Fundamental of Physics, Halliday & Resnick, Wiley Publisher.

Lab Code		Name of the Lab						L	T	P	C	QP			
21BBSBS10102		Engineering Physics Laboratory						0	0	2	1				
Course Educational Objectives															
CEO1	Providing fundamental information on basic instruments and their uses.														
CEO2	To familiarize with different apparatus and applications to different experiments.														
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>															
CO1	Understand the concepts of oscillation and waves through experimental observation.														
CO2	Study and explain the experimental observation of interference and diffraction pattern														
CO3	Interpret the fundamental characteristics of various materials and semiconductor materials through experiments														
CO4	Analyze the quantum concept of light by experimental observation.														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		1	1											
CO2	2		1	1											
CO3	2		1	1											
CO4	2		1	2											

List of Experiments:

1. Determination of the acceleration due to gravity by using Bar/Kater's pendulum.
2. Verification of the laws of transverse vibration by using sonometer.
3. Determination of Rigidity modulus of a wire by Static/Dynamic method.
4. Determination of wavelength of light by Newton's Rings apparatus.
5. Determination of no. of lines of a diffraction grating plate.
6. Determination of slit width of a double slit.
7. Determination of plank's constant using photo-voltaic cell.
8. Determination of band gap energy of PN junction (Ge/Si) diode.
9. Determination of the resistivity of a semiconductor with temperature by four- probe method.
10. Determination of dielectric constant of given solid by Lecher wire method.

Add on Experiments

11. Determination of coefficient of Thermal conductivity (**K**) of a metal (Cu) by using Searle's apparatus.
12. Study of mono-chromaticity and divergence of the given laser beam.
13. Study of reflection and total internal reflection by optical fibers.
14. Study of B-H curve of ferromagnetic substance.
15. Study the Hall Effect.

Practical Text Books:

1. Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia PublishingHouse.
2. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted1985, Heinemann Educational Publishers.
3. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, KitabMahal, New Delhi.

Subject Code		Title of the subject					L	T	P	C						
21BBSBS10003		Engineering Chemistry					3	0	0	3						
Course Educational Objectives																
CEO1	To impart the knowledge of application of chemical sciences in the field of engineering															
CEO2	To give an idea about microscopic chemistry in terms of atomic and molecular orbitals.															
CEO3	The course aims at elucidating principles of applied chemistry in industrial systems,water treatment and engineering materials															
CEO4	To give detailed knowledge about the reactivity of metal with environment and its prevention from corrosion.															
CEO5	To enlighten the students with the applications of advanced materials.															
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>																
CO1	The students will be able to analyze microscopic chemistry in terms of atomic andmolecular orbitals.															
CO2	Identify suitable water treatments techniques for domestic and industrial purposes															
CO3	Differentiate various types of corrosion, and gain knowledge on control measuresassociated with corrosion															
CO4	Understand various types of polymers, their preparation along with applications															
CO-PO & PSO Mapping																
COs	PROGRAMME OUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2	2														
CO2	3	1					1									
CO3	3	1										1				
CO4	2	1					1									
SYLLABUS																
UNIT:1 ATOMIC AND MOLECULAR STRUCTURE (10 Hours)																
Schrodinger’s wave equation(no derivation), Significance of wave functions, Particle in a box, Application for conjugated molecule, Molecular Orbital theory and Energy level diagram for Homodiatomic molecules of H ₂ , N ₂ , O ₂ & F ₂ , and Hetero diatomic molecule CO & NO																
UNIT:02 WATER CHEMISTRY (10 Hours)																
Types of Hardness, Determination of Hardness by EDTA method, Treatment of water for Domestic use, Water softening processes Lime-soda process, Ion Exchange method, Boiler feed water, Scale and Sludge, Caustic embrittlement, Carbonate and phosphate conditioning, Colloidal conditioning, Calgon conditioning.																
UNIT: 03 CORROSION (10 Hours)																
EMF, Relation between E.M.F and free energy, Electrochemical series , Galvanic series, Faraday’s Law of Electrolysis, Definition of corrosion, Types of corrosion: Dry corrosion and wet corrosion, Galvanic corrosion, Concentration cell corrosion, Factors influencing corrosion, Corrosion control: Cathodic protection (Sacrificial anodic protection and Impressed current cathodic protection), Protective coatings: Electroplating , Galvanization and Tinning.																

UNIT: 04 POLYMER CHEMISTRY**(10 Hours)**

Introduction, polymer, Classification of polymers, Plastics: Thermosetting and thermoplastic pastics, Preparation , Properties and uses of different plastics such as PVC, PE, PTFE, Bakelite,Nylon- 6,6,Conducting Polymer (Polyaniline, Polyacetylene), Bio-Degradable and Non-Bio Degradable polymer.

Teaching Methods: Chalk& Board/ PPT/Video Lectures/Journals**Text Books:****1.Engineering chemistry by Jain & Jain, DhanpatRai publishing company (p) Ltd.****Reference Books:**

1. A Text Book of Engineering Chemistry by S.S.Dara, S Chand Publishers.
2. A Text Book of Engineering Chemistry by Sashi Chawla, Dhanpat Rai Publishing house.
3. Text Book of Engineering Chemistry, 2nd edition, by R.Gopalan, D.Venkapaya &SulochanaNagarajan, Vikas Publishing House Pvt. Ltd.
4. B. Tech Chemistry- I and II by P. K. Kar, S. Dash, B. Mishra kalyani publishers.
5. Physical Chemistry By P.W Atkins
6. Engineering Chemistry (NPTEL Web Book) by B . L Tembe, Kamaluddin and M.S. Krishna
7. Essentials of Physical Chemistry, Bahl &Tuli, S.Chand Publishing
8. Applied Chemistry, Sunita Rattan, Kataria
9. Engineering Chemistry, Baskar, Wiley
10. Engineering Chemistry Fundamental and Applications, Shikha Agarwal (Second Edition) 2019, Cambridge University Press.
11. University chemistry by B.H. Mahan.

Lab Code	Name of the lab	L	T	P	C	QP									
21BBSBS10103	Engineering Chemistry Laboratory	0	0	2	1										
Course Educational Objectives															
CEO	To train the students about the applications of chemical sciences in the field of engineering and technology														
Course Outcomes: Upon successful completion of this course, students should be able to:															
CO1	Understand the basic methods of chemical analysis and instrumentations involved														
CO2	Standardize of Chemicals														
CO3	Estimate the hardness, ions in salts and compositions in ores estimation appropriate consideration for the public health and safety and environmental consideration.														
CO4	Synthesizes the drugs and know about their applications														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1		1	2											
CO2	1		2	2											
CO3			2	2			1								
CO4	1		1									3			
List of Experiments:															
1. Determination of amount of OH ⁻ and CO ₃ ²⁻ present in supplied water sample.															
2. Determination of total hardness of water.															
3. Standardization of KMnO ₄ using sodium oxalate.															
4. Determination of ferrous ion in Mohr's salt by standardized KMnO ₄ .															
5. Determination of percentage of dissolved oxygen in given water sample.															
6. Estimation of available chlorine in bleaching powder/ chloride content.															
7. Determination of rate constant of acid catalyzed hydrolysis of ester.															
8. Preparation of drug (aspirin/Paracetamol).															
9. Adsorption of acetic acid by charcoal.															
10. Acid value of oil.															
11. Determination of strength of HCl and CH ₃ COOH acid from the mixture of acids using NaOH by Conductrometry.															
12. Determination moisture and ash content of coal.															
13. Determination of partition coefficient of iodine in benzene and water.															
14. Preparation and determination of pH of buffer solution.															
15. Determination of viscosity of supplied sample.															
Add on Laboratory															
1. Synthesis of materials by solgel technology															
2. Synthesis of hybrid materials by microemulsion technique															
3. Separation and purification technique (Homogeneous Mixture)															
4. Synthesis of Polystyrene and determination of molecular weight by UV method															
5. Preparation of Soap and Sanitizer															

Practical Text Books:

1. Chemistry Practicals By S. Dara.
2. Theory and Practicals of Engineering Chemistry By Dr Sunita Ratan S.K. Kataria & Sons; Reprint 2012 edition (2013).

Subject Code		Title of the subject								L	T	P	C		
21BBSES10001		Basic Electrical and Electronics Engineering								3	0	0	3		
Course Outcomes: Upon successful completion of this course, students should be able to:															
CO1	Understand basics of Electrical Engineering and to solve DC, single and threephase AC electrical networks mathematically.														
CO2	Acquire knowledge about the magnetic circuit and fundamental principles of AC & DC machines.														
CO3	To acquire the knowledge about the characteristics and working principles of semiconductor diodes, Bipolar Junction Transistor.														
CO4	To get an insight about the basic introduction of Digital electronics														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	1													
CO2	3	2													
CO3	3	2													
CO4	3	3													
SYLLABUS															
Unit – I [12 Hrs]															
DC Circuits & Theorems: Introduction to electrical terminology; Ohm's Law, Equivalent Resistance, Series-parallel circuits, Star-delta transformation, Types of elements, Source conversion, Ideal and practical voltage & current sources; Kirchhoff's Law, Mesh and Nodal Analysis, Superposition theorem, Thevenin's theorem, Norton's theorem excited by independent sources.															
Single Phase AC Circuits: AC Fundamentals: RMS & Average value, Form and peak factors, Complex algebra, Concepts of reactance, Impedance and their representation, AC through pure R, L, C, series RL, series RC & series RLC circuit.															
Unit – II: [12 Hrs.]															
Three-phase AC Circuits: Comparison between 1-ph & 3-ph AC circuit, Star & Delta connection, Relation between line and phase quantities.															
Magnetic Circuits: Magnetic flux, Magnetic flux density, Magnetic fields intensity, Relation between B & H, Reluctance, B-H curve, Analogy between Electric and Magnetic circuit, Leakage flux, Hysteresis loss, Eddy current loss.															
DC Machines: Introduction, Construction and working principle of DC generator and DC motor, Types of DC machine, EMF equation of DC generator.															
AC Machines: Construction and working principle of Single-phase Transformer, EMF equation, Transformation ratio, threephase Induction motor: Principle of operation, Rotating magnetic field, Types of rotors, Synchronous speed and slip, Introduction to 1- phase Induction motor.															

Unit – III	[12 Hrs.]
Semiconductor Diodes: Introduction; Ideal Diode; Semiconductor Materials; Energy Levels; Extrinsic Materials- <i>n</i> - and <i>p</i> -Type; Semiconductor Diode; Resistance Levels; Diode Equivalent Circuits; Half-Wave Rectification; Full-Wave Rectification. Bipolar Junction Transistors: Introduction; Transistor Construction; Transistor Operation; Common-Base Configuration; Transistor Amplifying Action; Common-Emitter Configuration; Common-Collector Configuration.	
Unit – IV	[12 Hrs.]
Electronic Instrumentation: Introduction; Basic Principle; CRT Features; Block Diagram of Oscilloscope; Function Generator; Standard Signal Generator; Digital Multimeters. Digital Electronics Fundamentals: Binary, Octal, Hexadecimal and Decimal Number System and their Conversion; Binary Arithmetic; 1's and 2's Complements; Axioms and Laws of Boolean Algebra; Reducing Boolean Expressions; Logic Gates; Boolean Expressions and Logic Diagrams.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures	
Text Books: 1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010. 2. Basic Electrical Engineering, N K De, Dipu Sarkar, University Press, 2016 3. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009. 4. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010. 5. Electronic Devices and Circuit Theory by Robert L Boylestad and Louis Nashelsky, 11th Edition, Prentice Hall. 6. Electronic Instrumentation by H S Kalsi, 3rd Edition, McGraw Hill. 7. Digital Design by M. Morris Mano, 5th Edition, Pearson Education.	
Reference Books: 1. Microelectronic Circuits by A. S. Sedra and Kenneth C. Smith, 7th Edition, Oxford University Press. 2. Fundamentals of Digital Circuits, 4th Edition, A. Anand Kumar, PHI. 3. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.	

Lab Code	Name of the Lab										L	T	P	C	
21BBSES10101	Basic Electrical and Electronics Engineering Laboratory										0	0	2	1	
Course Outcomes: Upon successful completion of this course, students should be able to:															
CO1	Experimentally verify the basic circuit theorems														
CO2	Measure power and power factor in ac circuits using different lamps														
CO3	Understand and identify different parts of AC and DC machines.														
CO4	Verify the characteristics of diodes, transistors, OP-amps, digital electronic components experimentally and able to use oscilloscope, signal generator to measure amplitude and frequency of different waveforms.														
CO5	Demonstrate the operating principle and VI characteristics of Semiconductor diode and transistor.														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		1	2												
CO2		2	2												
CO3		1	2												
CO4		2	2												
CO5		2	2												

SYLLABUS

List of experiments/demonstrations:

Electrical Part:

Observations & Demonstration:

- Basic safety precautions. Introduction and use of measuring instruments — voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.
- Demonstration of cut-out sections of machines: DC machine (commutator- brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winding - slip ring arrangement) and single-phase induction machine.

Experiments: (Any 5 Experiments) :

1. Verification of Superposition, Thevenin's & Norton's Theorem
2. Power factor improvement using capacitor for fluorescent lamp.
3. Calculation of current, voltage and power in series R-L-C circuit excited by single-phase AC supply and calculation of power factor.
4. Open Circuit Characteristics of a separately excited DC Shunt generator
5. Load Characteristics of DC shunt motor
6. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.

Electronics Part: (Any 5 Experiments) :

1. Familiarization of electronic components and devices (testing of semiconductor diodes and transistors using digital multimeter)
2. Study and use of oscilloscope, signal generator to view waveforms and measure amplitude and frequency of a given waveform.
3. V-I characteristics of semiconductor diode and determining its DC and AC resistance.
4. Studies on half-wave and full-wave rectifier circuits without and with capacitor filter; recording of the waveforms and measurement of average and rms values of the rectifier output.
5. V-I characteristic of an n-p-n or p-n-p transistor, DC biasing the transistor in common-emitter configuration and determination of its operating point (i.e., various voltages and currents).
6. Studies on Logic gates (Truth table verification of various gates).

Subject Code		Title of the subject								L	T	P	C			
21BBSES10002		Elements of Mechanical Engineering								3	1	0	4			
Pre -Requisite: Math and Physics																
Course Educational Objectives																
CEO1:		To understand the basics of forces and force analysis.														
CEO2:		To apply the established engineering methods to complex engineeringproblem.														
CEO3:		To understand the fundamental Concepts of thermodynamics and to distinguish the components and working principle of heat engine and determine the COP of heat pump and refrigerator.														
CEO4:		To impart basic knowledge on automation and basic codes in CNC machining.														
Course Outcomes: At the end of the course, the student will be able to:																
CO1		Determine the resultant force and moment for given force system. Locate thecentroid and compute MOI of composite plane sections.														
CO2		Evaluate the forces in members of trusses, frames and problems related to friction														
CO3		To understand the basics of thermodynamics and application of various Laws and gain knowledge on heat power energy systems and its applications.														
CO4		To enable the students to understand on CNC coding and flexiblemanufacturing system.														
CO-PO & PSO Mapping																
COs		PROGRAMME OUTCOMES												PSOs		
		1	2	3	4	5	6	7	8	9	10	11	12			
CO1		3	2													
CO2		3	2													
CO3		2	2													
CO4		3	3													
SYLLABUS																
UNIT:1 [10 hours]																
STATICS OF PARTICLES																
Force System: Force, Parallelogram Law, Free body diagram, Determination of reactions, Lami's theorem, Principle of Transmissibility of forces. Moment of a force, Couple, Varignon's theorem, Resolution of a force into a force and a couple. Resultant of coplanar force system. Equilibrium of coplanar force system.																
Concept of Centre of Gravity: Basic definition of Centroid and centre of mass, Area Moment of Inertia, Perpendicular axis theorem and Parallel axis theorem, Radius of gyration																
UNIT:2 [10 Hours]																
ANALYSIS OF TRUSSES AND FRICTION																
Plane Truss: Perfect and imperfect truss, Assumptions and Analysis of Plane Truss byMethod of joints and Method of section.																
Laws of Friction - Angle of Friction-Angle of Repose-Ladder and Wedge Friction, Numerical problems on ladder and free body diagram on analysis of wedge friction.																

UNIT:3

[14 Hours]

Fundamental Concepts and Definitions: Definition of Thermodynamics, System, surrounding and universe, Macroscopic & microscopic point of view. Property, State, Path, process, Cyclic process, Density, Specific volume, Pressure, temperature. Thermodynamic equilibrium, Quasi-static process, concept of ideal gas, Work and heat transfer, Zeroth law. First law: First law of thermodynamics. Application of first law in non-flow and flow processes. Steady flow energy equation, limitation of first law. Second law: Thermal reservoir, Statements of second law, Heat engines, COP of heat pump and refrigerator. Carnot cycle.

Basic concepts of power plant and IC engines. Numerical based on simple formula.

UNIT:4

[8 Hours]

Robotics and Automation

Basic concept of Robotics and its Classification, Numerical Control of machine tools, Introduction to CNC machine, Basic codes used in CNC, Introduction to Flexible manufacturing system.

Teaching Methods: Chalk& Board, PPT, Blended , Cut Model Demonstrations

Text Books:

1. Engineering Mechanics by S. S. Bhavikatti, K. G. Rajashekarappa, New Age International
2. Engineering Mechanics by R K Bansal, Laxmi Publications
3. Basic Mechanical Engineering by Agrawal&Agrawal, Wiley
4. Engineering Thermodynamics by P.K.Nag, McGraw Hill
5. Machine tool design by N.K Meheta, McGraw Hill, Third edition, 2018
6. Computer aided Design and Manufacturing by Mikell P. Groover, McGraw-Hill Inc, 2007

Ref. Books:

1. S.Timoshenko, and D.H.Young, "Engineering Mechanics", Tata Mc-Graw Hill Book, 5th edition
2. Engineering Mechanics: Statics by J.L Meriam , Wiley
3. Engineering Mechanics : Statics and Dynamics by R. C. Hibbler, Pearson
4. Thermodynamics An Engineering Approach by Cengel& Boles, McGraw Hill
5. An Introduction to Mechanical Engineering by Wickert & Lewis, Cengage Learning
6. Thermal engineering by domkundwar and kothandaraman, Dhanpatrai Publishing Company

Subject Code	Title of the subject										L	T	P	C	
21BBSHS10002	Human Values and Professional Ethics										2	0	0	2	
Course Educational Objectives															
CEO1	To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.														
CEO2	To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.														
CEO3	To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.														
Course Outcomes: At the end of the course, the student will be able to:															
CO1	It ensures students sustained happiness through identifying the essentials of human values and skills.														
CO2	It facilitates a correct understanding between profession and happiness.														
CO3	It helps students understand practically the importance of trust, mutually satisfying human behavior and enriching interaction with nature.														
CO4	Ability to develop appropriate technologies and management patterns to create harmony in professional and personal life.														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1							1	3	2			1			
CO2									2			2			
CO3							3	3	3			3			
CO4							2	3							
SYLLABUS															
UNIT 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education.[8 Hrs]															
1. Understanding the need, basic guidelines, content and process for Value Education															
2. Self Exploration-what is it? - its content and process; „Natural Acceptance“ and Experiential Validation- as the mechanism for self exploration															
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations															
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority															
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario															
UNIT 2: Understanding Harmony in the Human Being - Harmony in Myself! [6 Hrs]															
1. Understanding human being as a co-existence of the sentient „I“ and the material „Body“															
2. Understanding the needs of Self („I“) and „Body“															
3. Understanding the Body as an instrument of „I“ (I being the doer, seer and enjoyer)															
4. Understanding the characteristics and activities of „I“ and harmony in „I“															
5. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail															

UNIT 3: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence.**[6 Hrs]**

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
3. Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space
4. Holistic perception of harmony at all levels of existence

UNIT 4: Implications of the above Holistic Understanding of Harmony on Professional Ethics.**[10 Hrs]**

1. Natural acceptance of human values
2. Definitiveness of Ethical Human Conduct
3. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
4. Competence in professional ethics:
5. Ability to utilize the professional competence for augmenting universal human order
6. Ability to identify the scope and characteristics of people-friendly and eco- friendly production systems,
7. Ability to identify and develop appropriate technologies and management patterns for above production systems.
8. Case studies of typical holistic technologies, management models and production systems

TEXT BOOK(s):

R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2

REFERENCES BOOKS:

1. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Publishers.
3. Susan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, *Limits to Growth*, Club of Rome's Report, and Universe Books.

Title of the subject												
Subject Code						L	T	P	C			
21BBSES10004		Dietetics and Nutrition				2	0	0	2			
Course Educational Objective												
CEO1: Graduates can understand the importance of diet for good health												
CEO2: Graduates should know about balance diet, menu planning and critically evaluation of meal												
Course outcomes: At the end of the course, the student will be able to:												
CO1		Know about importance of health and balance diet										
CO2		Understand about composition of human diet and their function										
CO3		Acquire knowledge on role of vitamins and minerals in food										
CO4		Get an idea about menu planning and critically evaluation of meal										
COs	PROGRAMME OUTCOMES(POs)											
	1	2	3	4	5	6	7	8	9	10	11	12
	CO1	2										
	CO2		3									
	CO3	1										2
	CO4		2									
UNIT:110 Hours												
Basic Aspects												
A. Definition of the terms Health, Nutrition and Nutrients												
B. Importance of food (Physiological, Psychological and social function of food) in maintaining good health.												
C. Classification of nutrients, Balanced diet, food groups												
Balanced Diet												
• Definition												
• Importance of balanced diet												
D. RDA for various nutrients- age, gender, physiological state												
UNIT:210 Hours												
Macronutrients												
Carbohydrates												
• Definition												
• Classification(Mono, di and polysaccharides)												
• Dietary Sources												
• Function- Excess												
Lipids												
• Definition												
• Classification												
• Dietary Sources												
• Functions												
Protein												
• Definition												
• Classification based upon amino acid composition												
• Dietary sources												
• Functions												
• Methods of improving quality of protein in food(special emphasis on soya protein and whey protein)												

Energy

- Definition of Energy and Units of its measurement (Kcal)
- energy contribution from macronutrients(carbohydrates proteins, and fat)
- Factors affecting energy requirements
- Concept of BMR, SDA
- Dietary Sources of energy
- Concept of energy balance and the health hazards associated with Underweight, Overweight

Water

- Definition
- Dietary Sources (visible, invisible)
- Function of water
- Role of water maintaining health (water balance)

UNIT:3

8 Hours

Macronutrients

A. Vitamins

- Definition and classification (water and fat soluble vitamins)
- Food Sources, function and significance of
 1. Fat soluble vitamins (Vitamin A, D, E, K)
 2. Water soluble vitamins (Vitamin C, Thiamine, Riboflavin, Niacin, Cyanocobalamin and Folic acid)

B. Minerals

- Definition and classification (major and minor)
- Food Sources, functions and significance of calcium, Iron, Sodium, Iodine and Fluorine

UNIT:4

6Hours

Digestion and Absorption

Mechanical and Chemical breakdown of food

Menu Planning

- Planning of nutritionally balanced meals based upon the three food group system
- Factor affecting food planning
- Critical evaluation of few meals served at the Institutes/Hotels based on the principle of meal planning
- Calculation of proximate principles and energy of 3 Indian and 3 Conti lunch menus
- Critical evaluation and suggested improvement.

Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert/MOOCs

Text Books

1. Food Science and nutrition- Sunetra Roday
2. Food hygiene and sanitation –Sohna Roda
3. Nutrition and Dietetics by Shubhangini A. Joshi

Ref. Books

1. Food Science- Porter and Hotchkin
 2. Advanced Nutrition and Dietetics in Nutrition Support
- Editor(s): Mary Hickson PhD RD,, Sara Smith PhD RD,, Kevin Whelan PhD RD FBDA,

SUBJECT CODE		TITLE OF THE SUBJECT								L	T	P	C	
21BBSES10106		Engineering Workshop								1	0	2	2	
Pre Requisite: Concept of Measurement and dimension.														
Course Educational Objectives:														
CEO1	To learn the different types of hand and machine tools for various industrial application.													
CEO2	To familiarize with the basic manufacturing processes and to study various tools and equipment used hands on training is given in different sections.													
CEO3	To know principle of metrology and measurement in industries.													
CEO4	To develop basic principles and devices involved in measuring and surface textures.													
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>														
CO1	Understand various safety precautions and identify the use of different hand tools, machine tools and their operation.													
CO2	Demonstrate the process configuration and basic mechanism of different machines like Lathe, Shaper, Milling machine, Drilling machine, Grinding machine and CNC.													
CO3	Apply welding and fabrication knowledge and skills to meet expectation of various industries.													
CO4	Identify various measuring tools and device such as Sine bar, Slip gauge, Surface roughness tester, and express error of various measuring devices.													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	1			1										
CO2	2			2										
CO3	1			3										
CO4	1			3										
Minimum:10 Experiments														
Unit 1 Safety Precaution: To study the various Safety precautions in workshop.Fitting : Study of different hand tools and Machine tools used in fitting.														
Unit 2 Machining: Study of various components and working principle of lathe machine Preparation of a cylindrical job by lathe (Facing, Taper turning, Step Turning, knurling)Study on Shaper and Milling Machine. Overview to CNC Lathe machine.														
Unit 3 Welding Practice : Hands on practice on Electric Arc Welding to prepare Lap Joint, Butt Joint, T Joint and Corner Joint.Preparation of Lap joint with the help of Oxyacetylene Gas welding.														
Unit 4 Measurement and Calibration : Measurement of length, height and diameter by Vernier caliper and Micrometer Angular measurement by using sine bar. Measurement of flatness of surface plate by using spirit levels. Measurement of surface roughness using surface roughness tester.Calibration of LVDT using indicator / CRO Calibration of load cell using electrical resistance strain gauge.														

Calibration of thermocouples.

Teaching Methods: Chalk & Board, Hands on practice.

Text Books:

1. Elements of Workshop Technology, Vol. I and II by Hajra choudhary, Khanna Publishers(7th Edition 2011)

2. Workshop Technology by WAJ Chapman, Viva Books (5th Edition 1985)

Reference Books:

Workshop Manual by Kannaiah / Narayana, Scitech Publicaitons(P) Ltd. (3rd Edition 2015) Mechanical measurement, instrumentation and control by A.K. sawhney and Punnet sawhney ,Dhanpat Rai Publication (7th Edition 2017)

Engineering Metrology R.K. Jain, Khanna Publication (7th Edition 2018).

SUBJECT CODE		TITLE OF THE SUBJECT								L	T	P	C	
21BBSES10105		Engineering Graphics & Design Lab								1	0	2	2	
Pre –Requisite:														
Course Educational Objectives														
CEO1	To enable students to acquire and use engineering drawing skills as a means of accurately and clearly communicating ideas, information and instructions													
CEO2	To enable students to acquire requisite knowledge, techniques and attitude required for advanced study of engineering drawing and basic of AUTOCAD.													
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>														
CO1	Able to prepare the orthographic projections of points and straight lines placed in various quadrants													
CO2	Demonstrate the ability to draw orthographic projections of various solids.													
CO3	Ability to draw and interpret the sectioned views of solids													
CO4	To provide students with adequate knowledge and experience in preparing engineering drawings using AutoCAD													
CO-PO & PSO Mapping														
COs	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	2			2										
CO2	2			3										
CO3	2			3										
CO4	3			3										
Unit 1 Introduction: Drawing Instruments and their uses, BIS conventions, Types of line, Dimensioning line Conventions. Orthographic Projections : Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angleonly),True and apparent lengths, True and apparent inclinations to reference planes. 1-Sheet														
Unit 2 Orthographic Projections of Plane Surfaces (First Angle Projection Only): Introduction, Definitions–projections of plane surfaces–triangle, square, rectangle, rhombus,pentagon, hexagon and circle, planes in different positions by change of position method 1-Sheet Projections of Solids (First Angle Projection Only) : Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms,pyramids, cylinders and cones in different positions. 1-Sheet														
Unit 3 Sections and Development of Lateral Surfaces of Solids: Introduction, Section planes, Sections, Section views, Sectional views, Apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP. 1 – Sheet														

Unit 4**AUTO CAD:**

Layout of the software, standard tool bar/menus and description of most commonly used toolbars, navigational tools. Co-ordinate system and reference planes. Definitions of HP, VP, RPP & LPP. Creation of 2D/3D environment. Selection of drawing size and scale. Commands and creation of Lines, Co-ordinate points, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints.

Teaching Methods: Chalk& Board, Computer software(AUTO CAD)

TEXT BOOKS

Engineering Drawing - N.D. Bhatt & V.M. Panchal, Charotar Publishing House, Gujarat. Computer Aided Engineering Drawing - S. Trymbaka Murthy, 4th Ed, University Press Engineering Drawing by N.S. Parthasarathy and Vela Murali Oxford University Press.

Reference Books

Engineering Graphics - K.R. Gopalakrishna, Subash Publishers Bangalore.
Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production-Luzadder Warren J., Duff John M., Eastern Economy Edition, Prentice-Hall of India Pvt. Ltd., New Delhi.
Computer Aided Engineering drawing, Prof. M. H. Annaiah, New Age International Publisher, New Delhi

SN	CC	Sub Code	Name of the Subject	L	T	P	C	ISA	ESA
THEORY									
1	BS	21BCSBS23001	Discrete Mathematics	3	1	0	4	30	70
2	ES	21BCSES23004	Digital Electronics	3	0	0	3	30	70
3	PC	21BCSPC23001	Data Base Management Systems	3	0	0	3	30	70
4	PC	21BCSPC23002	Object Oriented Programming through Java	3	0	0	3	30	70
5	PE	21BCSPE23011	PE-I (From Bucket)	3	0	0	3	30	70
6	HS	21BHSHS20002	Engineering Economics and Costing/ Organizational Behavior	2	0	0	2	30	70
			TOTAL	17	1	0	18	180	420
PRACTICAL/SESSIONAL									
7	ES	21BCSES23104	Digital Electronics Lab	0	0	2	1	35	15
8	PC	21BCSPC23002	Object Oriented Programming through Java Lab	0	0	2	1	35	15
9	PC	21BCSPC23101	Data Base Management Systems Lab	0	0	2	1	35	15
10	PST		Summer Industry Internship-I	0	0	2	1	35	15
11	MC	21BCSMC20003	Environmental Sciences				0		
12	PST	21BCSPW23102	Learning Project-I			2	1		
			TOTAL	0	0	10	5	140	60
			TOTAL	17	1	10	23	320	480

Professional Elective Bucket

Sl.	Sem	Professional Elective I
1	III	Introduction to Data Science
2	III	Data Preparation and Analysis

Subject Code	Name of the Subject	L	T	P	C										
	Database Management System	3	0	2	4										
Course Educational Objectives															
Pre -Requisite: A student should have basic idea on programming and file systems.															
CEO 1	Gain a good understanding of the architecture and functioning of Database Management Systems as well as associated tools and techniques.														
CEO 2	Understand and apply the principles of data modeling using Entity Relationship and develop a good database design.														
CEO3	Understand the use of Structured Query Language (SQL) and its syntax														
CEO4	Apply Normalization techniques for effective database design.														
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>															
CO1	<i>Identify</i> and <i>Classify</i> the concepts of Database Management system, Data models and architecture of database, ER to Relational mapping concepts.														
CO2	<i>Applying</i> The constraints in database using different query languages like:- relational algebra and calculus, SQL and QBE for <i>implementing</i> the Data definition and data manipulate languages in Database.														
CO3	<i>Compare</i> the different normal forms to <i>Apply</i> normalization process to construct consistent Database.														
CO4	<i>Design and Develop</i> the Database with concurrency control and recovery strategies to make complete Database without confliction and anomalies in concurrent access environment.														
CO-PO & PSO Mapping:															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1	1												
CO2	3	2	1												
CO3	2	1	1												
CO4	2	1	2												
Avg.															
SYLLABUS															
UNIT:1 (15 Hours)															
Introduction to database Systems, advantages of database system over traditional file system, Basic concepts & Definitions, Database users, Database Language, Database System Architecture, Schemas, Sub Schemas, & Instances, database constraints, 3-level database architecture, Data Abstraction, Data Independence, Mappings, Structure, Components & functions of DBMS, Data models.															
UNIT:2 (13 Hours)															
Entity relationship model, Components of ER model, Mapping E-R model to Relational schema, Relational Algebra, Tuple & Domain Relational Calculus, Relational Query Languages: SQL and QBE. Database Design:-Database development life cycle (DDLC), Automated design tools, Functional dependency and Decomposition, Join strategies, Dependency Preservation & lossless Design, Normalization, Normal forms:1NF, 2NF,3NF, and BCNF, Multi-valued Dependencies, 4NF & 5NF. Query processing and optimization: Evaluation of Relational Algebra Expressions, Query optimization, Query cost estimation.															

UNIT:3	(10 Hours)
Network and Object Oriented Data models, Storage Strategies: Detailed Storage Architecture, Storing Data, Magnetic Disk, RAID, Other Disks, Magnetic Tape, Storage Access, File & Record Organization, File Organizations & Indexes, Order Indices, B+ Tree Index Files, Hashing Data Dictionary.	
UNIT:4	(12 Hours)
Transaction processing and concurrency control: Transaction concepts, properties of transaction, concurrency control, locking and Timestamp methods for concurrency control schemes. Database Recovery System, Types of Data Base failure & Types of Database Recovery, Recovery techniques, fundamental concepts on Object-Oriented Database, Object relational database, distributed database, Parallel Database, introduction to Data warehousing & Data Mining.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures	
Text Books:	
1. Sudarshan, Korth: Database System Concepts, 6th edition, McGraw-Hill Education	
2. Elmasari&Navathe: Fundamentals of Database System, Pearson Education.	
Reference Books:	
1. Elmasari&Navathe: Fundamentals of Database System, Pearson Education.	
2. Ramakrishnan: Database Management Systems, McGraw-Hill Education.	
3. Andrew S. Tanenbaum: Modern Operating Systems, 3rd Edition, Pearson Education.	
4. Terry Dawson, Olaf Kirch: Linux Network Administrator's Guide, 3rd Edition O'Reilly	

Subject Code	Name of the Subject					L	T	P	C						
BPPCS3030	Object Oriented Programming Through Java					3	0	2	4						
Course Educational Objectives															
CEO1	The model of object oriented programming: abstract data types, encapsulation, inheritance and polymorphism														
CEO2	Fundamental features of an object oriented language like Java: object classes and interfaces, exceptions and libraries of object collections														
CEO3	How to take the statement of a business problem and from this determine suitable logic for solving the problem; then be able to proceed to code that logic as a program written in Java.														
CEO4	How to test, document and prepare a professional looking package for each business project using java doc.														
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>															
CO1	Analyze ,formulate and model problems using concepts of object oriented analysis and design and implement using Java.														
CO2	Write programs using basic data types and strings, using loops, Array.														
CO3	Analyze the problems and resolve run-time errors with Multithreading and Exception Handling techniques														
CO4	Understand the power of generics and Collections Framework and Java.io package														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1											1		
CO2	3	2	2										1		
CO3	2	2	2										2		
CO4	2	1	2										1		
Avg.													1		
SYLLABUS															

Unit I	(12Hrs)
An introduction to Object Oriented Programming, Features of Object-Oriented Programming Introduction to Java. Difference between C/C++ and Java, Features of Java, First Java Program, Writing the java program, Compiling the program, JVM and its significance in executing a program, Architecture of JVM. Understanding, Java Tokens, Datatypes, Operators, Control Structures and Arrays, Conditional Statements, Loops/ Iterators, Jumping Statements, Java Arrays, Multidimensional Arrays, Taking Input from keyboard, Command Line Arguments, Using Scanner Class, Using Buffered Reader class.	
Unit -II	(12Hrs)
Introduction to Classes and Objects. Constructors, static Keyword, this Keyword, Array of Objects, Access Modifiers (Public, Private, Protected, Default). Inheritance, Types of Inheritance and Java supported Inheritance, super, Polymorphism, Method Overloading, Constructor Overloading, Method Overriding, Dynamic Method Dispatching. String Manipulations. Wrapper classes, Auto boxing and unboxing. Abstract classes, Interfaces, Multiple Inheritance Using Interfaces, Java API Packages, User-Defined Packages, Accessing Packages, Error and Exception Handling, Types of exceptions Hierarchy of Exception classes, try, catch, finally, throw, throws, Commonly used Exceptions and their details ,User defined exception classes.	
Unit – III	(12 Hrs)
Multithreading, Thread in Java, Thread execution prevention methods. (yield(), join(), sleep()), Concept of Synchronization, Inter Thread Communication, Basics of Deadlock, Demon Thread, Improvement in Multithreading, Inner Classes, Introduction, Member inner class, Static inner class, Local inner class, Anonymous inner class. IO Streams (java.io package), Byte Stream and Character Stream, Files and Random Access Files, Serialization, Collection Frame Work (java.util), Util Package interfaces, List, Set, Map.	
Unit – IV	(12 Hrs.)
Applet Introduction, Life Cycle of an Applet, GUI with an Applet, Abstract Window Toolkit (AWT), Introduction to GUI, Description of Components and Containers, Component/Container hierarchy, Understanding different Components/Container classes and their constructors, Event Handling, Different mechanisms of Event Handling, Listener Interfaces, Adapter classes.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures	
Text Book: 1. <i>Programming in Java. Second Edition. Oxford Higher Education. (SachinMalhotra/ SauravChoudhary)</i> 2. <i>Core Java For Beginners. (RashmiKanta Das), Vikas Publication</i>	
Reference Book: 1. <i>JAVA Complete Reference (9th Edition) HerbertSchelidt</i>	

Name of the Subject	L	T	P	C
INTRODUCTION TO DATA SCIENCE	3	0	0	3
Unit – I: Introduction (10 Hours)				
Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues. Data Collection Strategies, Data Categorization: NOIR Topology.				
Unit – II: Data Pre-Processing & Exploratory Data Analysis (12 Hours)				
Descriptive Statistics – Mean Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map Correlation Statistics –ANOVA.				
Data Pre-Processing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.				

Unit – III: Model Development	(12 Hours)
Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.	
Unit – IV: Model Evaluation	(12 Hours)
Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Over fitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.	
Text Books:	
1. 1.JojoMoolayil, “Smarter Decisions: The Intersection of IoT and Data Science”, PACKT, 2016. 2. 2.Cathy O’Neil and Rachel Schutt , “Doing Data Science”, O'Reilly,2015. 3. 3.David Dietrich, Barry Heller, Beibei Yang, “Data Science and Big data Analytics”, EMC 2013 4. 4.Raj, Pethuru, “Handbook of Research on Cloud Infrastructures for Big Data Analytics”, IGIglobal.	

Name of the Subject	L	T	P	C
Engineering Economics and Costing	2	0	0	2
UNIT: I				
(12 Hours)				
Engineering Economics – Meaning, Nature, Scope, Basic problems of an economy, Micro economics and Macro Economics. Demand and Supply Analysis - Meaning of demand, Demand function, Law of Demand and its exceptions, Determinants of demand, Elasticity of demand &its measurement (Simple numerical problems to be solved) Meaning of supply, Law of supply and its exception, Determinants of supply, Elasticity of supply, Determination of market equilibrium (Simple numerical problems to be solved). Theory of Production -Production function, Laws of returns: Law of variable proportion, Law of returns to scale				
UNIT: II				
(12 Hours)				
Cost and revenue concepts, Elements of costs, Preparation of cost sheet, Segregation of costs into Fixed and variable costs. Basic understanding of different market structures, Price and output Determination under perfect competition (Simple numerical problems to be solved), Break Even Analysis - Linear approach (Simple numerical problems to be solved). Depreciation-Depreciation of capital asset, Causes of depreciation, Methods of calculating depreciation (Straight line method, Declining balance method)				
UNIT:III				
(12 Hours)				
Time value of money - Interest Analysis - Simple and compound, nominal and effective rate of interest, Cash flow diagrams, Principles of economic equivalence. Evaluation of engineering projects- Present worth method, Future worth method, Annual worth method, Internal rate of return method, Cost benefit analysis for public projects.				

UNIT:IV	(10 Hours)
Overview of Indian financial system. Commercial bank, Functions of commercial bank, Credit creation, Central bank, Functions of Central Bank. Inflation- Meaning of inflation, types, causes, measures to control inflation. National Income - Definition, Concepts of national income, Method of measuring national income	
Text Books	
1. Vengedasalam, Deviga. Madhavan, Karunakaran, Principles of Economics, Oxford University Press.	
2. R. Paneer Seelvan, “ Engineering Economics”, PHI	
3. Ahuja,H.L., “Principles of Micro Economics” , S.Chand & Company Ltd	
4.Paul, R.R., Money, Banking and International Trade, Kalyni Publishers.	
Reference Book:	
1. Riggs,J.L., Bedworth and Randhwa, “Engineering Economics”, McGraw Hill Education India	
2. Park, Chan.S, “Fundamental of Engineering Economics”, Pearson.	
3. Engineering Economy by William G.Sullivan, Elin M.Wicks, C. Patric Koelling, Pearson	
4. Thuesen, G.J.,Fabrycky,. Engineering Economy, PHI.	

Name of the Subject	L	T	P	C
Organizational Behaviour	2	0	0	2
UNIT:1 (08 Hours)				
Fundamentals of OB: Definition, scope and importance of OB, Relationship between OB and the individual, Evolution of OB, Theoretical framework (cognitive), behavioristic and social cognitive), Limitations of OB. Attitude: Importance of attitude in an organization, Right Attitude, Components of attitude, Relationship between behavior and attitude, Developing Emotional intelligence at the workplace, Job attitude, Barriers to changing attitudes. Personality and values: Definition and importance of Personality for performance, The Myers-Briggs Type Indicator and The Big Five personality model, Significant personality traits suitable to the workplace (personality and job – fit theory), Personality Tests and their practical applications.				
UNIT:2 (08 Hours)				
Perception: Meaning and concept of perception, Factors influencing perception, Selective perception, Attribution theory, Perceptual process, Social perception (stereotyping and halo effect). Motivation: Definition & Concept of Motive & Motivation, The Content Theories of Motivation (Maslow’s Need Hierarchy & Herzberg’s Two Factor model Theory), The Process Theories (Vroom’s expectancy Theory & Porter Lawler model), Contemporary Theories – Equity Theory of Work Motivation. Foundations of Group Behavior: The Meaning of Group & Group behavior & Group Dynamics, Types of Groups, The Five – Stage Model of Group Development. Managing Teams: Why Work Teams, Work Teams in Organization, Developing Work Teams, Team Effectiveness & Team Building.				
UNIT:3 (08 Hours)				
Leadership: Concept of Leadership, Styles of Leadership, Trait Approach Contingency Leadership Approach, Contemporary leadership, Meaning and significance of contemporary leadership, Concept of Success stories of today’s Global and Indian leaders. Organizational Culture : Meaning & Definition of Organizational Culture, creating & Sustaining Organizational Culture, Types of Culture (Strong vs. Weak Culture, Soft Vs. Hard Culture & Formal vs. Informal Culture), Creating Positive Organizational Culture, Concept of Workplace Spirituality				

UNIT:4**(08 Hours)**

Organizational Change: Meaning, Definition & Nature of Organizational Change, Types of Organizational Change, Forces that acts as stimulants to change. Implementing Organizational Change : How to overcome the Resistance to Change, Approaches to managing Organizational Change, Kurt Lewin's-Three step model, Seven Stage model of Change & Kotter's Eight-Step plan for Implementing Change, Leading the Change Process, Facilitating Change, Dealing with Individual & Group Resistance, Intervention Strategies for Facilitating Organizational Change, Methods of Implementing Organizational Change, Developing a Learning Organization.

Reference Book:

1. Understanding Organizational Behaviour, Parek, Oxford
2. Organizational Behaviour, Robbins, Judge, Sanghi, Pearson.
3. Organizational Behaviour, K. Awathappa, HPH.
4. Organizational Behaviour, VSP Rao, Excel

IV Semester [Second Year]
B. Tech in Computer Science and Engineering (2021 Admission)

SN	CC	Sub Code	Name of the Subject	L	T	P	C	ISA	ESA
THEORY									
1	ES	21BCSES24001	Fundamentals of Python Programming	3	0	0	2	30	70
2	PC	21BCSPC24001	Computer Organization & Architecture	3	0	0	3	30	70
3	PC	21BCSPC24002	Design and Analysis of Algorithms	3	0	0	3	30	70
4	PC	21BCSPC24003	Operating Systems	3	0	0	3	30	70
5	PE	21BCSPE24001	PE-II (From Bucket)	3	0	0	3	30	70
6	HS	21BCSPC23001	Organizational Behavior/Engineering Economics and Costing/	2	0	0	2	30	70
			TOTAL	17	0	0	16	180	420
PRACTICAL/SESSIONAL									
7	ES	21BCSES24101	Python Programming Lab	0	0	2	1	35	15
8	PC	21BCSPC24102	Design and Analysis of Algorithms Lab	0	0	2	1	35	15
9	PC	21BCSPC24103	Operating Systems Lab	0	0	2	1	35	15
10	PST	21BCSPW24102	Learning Project-II	0	0	2	1	70	30
11	MC	21BCSMC20002	Constitution of India/ Essence of Indian Knowledge Tradition				0		
			TOTAL	0	0	8	4	175	75
			TOTAL	17	0	8	20	355	495

Professional Elective Bucket

Sl.	Sem	Professional Elective II
1	IV	Introduction to Soft Computing
2	IV	Fuzzy Logic & Applications

IV Semester [Second Year]

Subject Code		Name of the Subject								L	T	P	C		
BPPCS4010		Fundamental of Python Programming								2	0	2	3		
Course Educational Objectives															
CEO1	To understand the basics of programming using Python.														
CEO2	To Construct and execute basic programs in Python.														
CEO3	To implement database connectivity, CGI, Multithreading and web development in python.														
Course Outcomes: Upon successful completion of this course, students should be able to:															
CO1	Understand the basic concept of Python like data types and syntax of programming.														
CO2	Use python programming with user defined & built-in methods, objects of Python.														
CO3	Design application using the concepts of file, database access and exception handling.														
CO4	Create practical and contemporary applications such as web applications and discrete-event simulations, data analysis and IoT devices.														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES														
	1	2	3	4	5	6	7	8	9	10	11	12			
CO1	3	1			1							1			
CO2	2	3	1	3	2							1			
CO3	2	3	3	3	2				1		1	2			
CO4	2	3	3	3	2				1		1	2			
Avg.	2.25			3					1		1	1.5			
SYLLABUS															
UNIT:1 (08 Hours)															
Introduction: Installation, First Python Program: Interactive Mode Programming, Script Mode Programming; Identifiers, Reserved Words, Lines and Indentation, Multi-Line Statements, Quotation & Comments; Assigning Values to Variables, Multiple Assignment.															
Standard Data Types: Numbers, Strings, Lists, Tuples, Dictionary; Data Type Conversion; Basic Operators: Arithmetic, Comparison, Assignment, Bitwise; Operators: Logical, Membership, Identity; Operators Precedence; Python Numbers & Mathematical functions, Python Strings.															
UNIT:2 (10 Hours)															
Python Program Flow Control : Conditional blocks using if, else and elif, Simple for loops in python, For loop using ranges, string, list and dictionaries, Use of while loops in python, Loop manipulation using pass, continue, break and else, Programming using Python conditional and loops block															
Python Functions, Modules And Packages:Organizing python codes using functions, Organizing python projects into modules, Importing own module as well as external modules,Understanding Packages, Powerful Lamda function in python, Programming using functions, modules and external packages															
Python String, List And Dictionary Manipulations : Building blocks of python programs, Understanding string in-built methods, List manipulation using in-built methods, Dictionary manipulation. Programming using string, list and dictionary in build functions															

UNIT:3	(12 Hours)
Python File Operation : Reading config files in python, Writing log files in python , Manipulating file pointer using seek, Programming using file operations, Understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines() Python Object Oriented Programming – OOPS: Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance , overlapping and overloading operators, Adding and retrieving dynamic attributes of classes , Programming using OOPS support Python Regular Expression : Powerful pattern matching and searching, Power of pattern searching using regex in python, Real time parsing of networking or system data using regex, Password, email, url validation using regular expression, Pattern finding programs using regular expression Python Exception Handling : Avoiding code break using exception handling, Safe guarding file operation using exception handling, Handling and helping developer with error code, Programming using Exception handling	
UNIT:4	(15 Hours)
Python Database Interaction: SQL Database connection using python, Creating and searching tables, Reading and storing config information on database, Programming using database connections Python Multithreading: Understanding threads, forking threads, Synchronizing the threads, Programming using multithreading Python CGI Introduction : Writing python program for CGI application, Creating menus and accessing files, Server client program	
Teaching Methods: Chalk& Board/ PPT/Video Lectures	
Text Books: 1. “Python: The Complete Reference”, Martin C. Brown, McGraw-Hill/Osborne Media. 2. “Learning Python”, Mark Lutz, O’Reilly Media, Inc., Fifth Edition, 2013.	
Reference Books: 1. “Expert Python Programming”, Tarek Ziad, Packt Publishing. 2. “Python Essential Reference, David Beazley”, Developer's Library, Sams Publishing.	

Subject Code		Name of the Subject		L	T	P	C	
BPCCS4020		Computer Organization and Architecture		3	0	2	4	
Course Educational Objectives								
CEO1	Identify the functional units in a digital computer system,							
CEO2	Distinguish between the various ISA styles and trace the execution sequence of an instruction through the processor.							
CEO3	Compare different approaches used for implementing a functional unit and evaluate different computer systems based on performance metrics.							
CEO4	Provide an outline of working principles of components of computer.							
Course Outcomes: : <i>Upon successful completion of this course, students should be able to:</i>								
CO1	Explain and illustrate the execution cycle of a program.							
CO2	Classify the components of digital computer and designing of control and memory units with performance evaluation.							
CO3	Compute different types of binary arithmetic operation. .							
CO4	Identify the characteristics of memories and explain memory and IO devices working process.							
CO-PO & PSO Mapping								

COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1													
CO2	3	2	1												
CO3	1	3	2	1											
CO4	1	1	3	2											
Avg.															
SYLLABUS															
UNIT:1 (12 Hours) FUNDAMENTALS OF A COMPUTER SYSTEM: Functional Units of a Digital Computer ,Hardware ,Software Interface, Translation from a High Level Language to the Hardware Language Instruction Set Architecture, Styles and features, RISC and CISC Architectures ,Performance Metrics ,Amdahl's Law ,Case Studies of ISA.															
UNIT:(12 Hours) BASIC PROCESSING UNIT: Components of the Processor, Data path and Control – Execution of a Complete Instruction, Hardwired and Micro programmed Control, Instruction Level Parallelism, Basic Concepts of Pipelining, Pipelined Implementation of Data path and Control, Hazards, Structural, Data and Control Hazards ,Exception handling. Parallelism and Multiprocessor Architecture, Flynn's Classification, UMA, NUMA, Distributed Memory Architecture. Array and Vector Processor.															
UNIT:3 (12 Hours) ARITHMETIC FOR COMPUTERS: Addition and Subtraction, Fast Adders, Binary Multiplication, Fast Multiplication, Binary Division and its techniques, Floating Point Numbers, Representation, Arithmetic Operations.															
UNIT:4 (12 Hours) MEMORY AND I/O : Need for a hierarchical memory system, Types and characteristics of memories ,Memory location and address, Endianness of memory representation, Cache memories, Improving cache performance, Virtual memory ,Memory management techniques, cache mapping and its techniques ,Associative memories. Page Replacement Algorithms. Accessing I/O devices – Programmed Input/output, Interrupts, Direct Memory Access ,Interface circuits ,Need for Standard I/O Interfaces like PCI, SCSI, USB.															
Teaching Methods: Chalk& Board/ PPT/Video Lectures															
Text Books: 1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, “Computer Organization and Embedded Systems”, Sixth Edition, Tata McGraw Hill, 2012. 2. David A. Patterson and John L. Hennessy, “Computer Organization and Design: The Hardware/Software Interface”, Fourth Edition, Morgan Kaufmann / Elsevier, 2009. 3. Kai Hwang and F.A. Briggs, “Computer Architecture and Parallel Processing”, McGraw Hill.															
Reference Books: 4. M. Morris Mano, “Computer System Architecture”, PHI 5. William Stallings, “Computer Organization and Architecture – Designing for Performance”, Sixth Edition, Pearson Education, 2003. 6. John P. Hayes, “Computer Architecture and Organization”, Third Edition, Tata McGraw Hill, 1998. 7. John L. Hennessy and David A. Patterson, “Computer Architecture – A Quantitative Approach”, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.															

Subject Code		Name of the Subject										L	T	P	C	
BPCCS4030		Design and Analysis of Algorithms										3	1	0	4	
Course Educational Objectives																
CEO1	Analyze the asymptotic performance of algorithms															
CEO2	Demonstrate familiarity with major algorithms															
CEO3	Apply important algorithmic design paradigms and methods of analysis															
CEO4	Synthesize efficient algorithms in common engineering design situations															
Course Outcomes: Upon successful completion of this course, students should be able to:																
CO1	Analyze worst-case running times of algorithms using asymptotic analysis															
CO2	Apply the algorithms and design techniques to solve problems.															
CO3	Apply the algorithms and design techniques to find the optimal solution.															
CO4	Apply the approximation algorithm for time consuming problem.															
CO-PO & PSO Mapping																
COs	PROGRAMME OUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	1	1	1													
CO2	1	1	1													
CO3	2	3	3													
CO4		1	2	1												
Avg.																
SYLLABUS																
Unit I (15Hrs)																
Introduction:																
Definition, Characteristics of algorithm, Growth of Functions, Asymptotic analysis, Amortized analysis, standard notations and common functions, limit theorem, String's formula. Recurrences: solution of recurrences by substitution, recursion tree and Master methods, Extension Master Methods. Algorithm design techniques.																
Unit -II (15Hrs)																
Divide-and- conquer Approach: Binary search, Quick sort, Merge sort, Heap Sort, Priority Queue, Lower bounds for sorting. Worst case analysis of Quick sort.																
Dynamic programming methodology: Elements of dynamic programming, Matrix-chain multiplication, Longest common subsequence, Assembly-line scheduling.																
Greedy Algorithms: Elements of Greedy strategy, Activity selection Problem, Fractional knapsack problem, Huffman codes.																
Unit – III (10Hrs)																
Graph Algorithms: Data structure for disjoint sets, Disjoint set operations, Linked list representation, path compression, Disjoint set forests. Graph Algorithms and their characteristics, Breadth first search and depth-first search, Minimum Spanning Trees, Kruskal algorithm and Prim's algorithms, single- source shortest paths (Bellman-ford Algorithm and Dijkstra's algorithms), All-pairs shortest paths (Floyd–Warshall Algorithm).																
Unit – IV (10 Hrs)																
Back tracking, Branch and Bound, Eight Queen problem, Sub Set Sum Problem. String matching algorithms, naïve string matching algorithm, Rabin-Karp algorithm, Knuth–Morris–Pratt algorithm, NP - Completeness (Polynomial time, Polynomial time verification, NP - Completeness and reducibility, NP-Complete problems (without Proofs), Approximation algorithms characteristics, Traveling Salesman Problem, vertex Cover Problem.																
Teaching Methods: Chalk& Board/ PPT/Video Lectures																
Text Book:																
1. Introduction to Algorithms, T.H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein, 2nd																

<i>Edition, PHI Learning Pvt. Ltd.</i>
<i>2. Fundamentals of Algorithm, Horowitz & Sahani., 2nd Edition, Universities Press.</i>
Reference Book:
<i>1. Algorithms, Design and Analysis, H. Bhasin, First Edition, Oxford University</i>
<i>2. Design and Analysis of Algorithm, S. Sridhar, Oxford University Press</i>
<i>3. Algorithms, Sanjay Dasgupta, Umesh Vazirani, McGraw-Hill Education.</i>

Subject Code		Name of the Subject										L	T	P	C	
BPPCS3020		Operating System										3	0	2	4	
Course Educational Objectives																
CEO1	Provide an insight into the basic organization of computer systems.															
CEO2	Familiarize students with various components of an Operating System															
CEO3	Focus on fundamental problems and optimal solutions for resource management															
CEO4	Understand different possible solutions for handling deadlock situation.															
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>																
CO1	Correlate the different components of an operating system and analyze techniques for system resource management.															
CO2	Compare and contrast various scheduling algorithms and their performance tradeoffs.															
CO3	Analyze algorithmic solutions for process synchronization problems and handling deadlocks.															
CO4	Analyze performance issues associated with I/O devices.															
CO-PO & PSO Mapping																
COs	PROGRAMME OUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2														
CO2	2	2														
CO3	1	3														
CO4	1	1														
Avg.																
SYLLABUS																
UNIT:1 (10 Hours)																
Operating System Introduction: Operating Systems Objectives and functions, Computer System Architecture, OS Structure, OS Operations, Evolution of Operating Systems - Simple Batch, Multi programmed, time shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, Special - Purpose Systems, Operating System services, user OS Interface, System Calls, Types of System Calls, System Programs, Opening System Design and Implementation, OS Structure, Virtual machines.																
UNIT:2 (12 Hours)																
Process and CPU Scheduling - Process concepts - The Process, Process State, Process Control Block, Threads, Process Scheduling - Scheduling Queues, Schedulers, Context Switch, Pre-emptive Scheduling, Dispatcher, Scheduling Criteria, Scheduling algorithms, Multiple-Processor Scheduling, Real-Time Scheduling, Thread scheduling, Case studies: Linux, Windows. Process Coordination - Process Synchronization, The Critical section Problem, Peterson's solution, Synchronization Hardware, Semaphores, and Classic Problems of Synchronization, Monitors, Case Studies: Linux, Windows.																
UNIT:3 (14 Hours)																
Memory Management and Virtual Memory - Logical & physical Address Space, Swapping, Contiguous Allocation, Paging, Structure of Page Table. Segmentation, Segmentation with																

Paging, Virtual Memory, Demand Paging, Performance of Demanding Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Deadlocks - System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock.

UNIT:4

(14 Hours)

File System Interface - The Concept of a File, Access methods, Directory Structure, File System Mounting, File Sharing, Protection, File System Implementation - File System Structure, File System Implementation, Allocation methods, Free-space Management, Directory Implementation, Efficiency and Performance. Mass Storage Structure - Overview of Mass Storage Structure, Disk Structure, Disk Scheduling, Disk Management, Swap space Management.

Protection - System Protection, Goals of Protection, Principles of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Access Control, Revocation of Access Rights, Capability-Based Systems, Language-Based Protection.

Teaching Methods: Chalk& Board/ PPT/Video Lectures

Text Books/References:

1. *Operating System Principles*, Abraham Silberchatz, Peter B. Galvin, Greg Gagne 8th Edition, Wiley Student Edition.
2. *Operating systems - Internals and Design Principles*, W. Stallings, 6th Edition, Pearson.M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. *Modern Operating Systems*, Andrew S Tanenbaum 3rd Edition PHI.
4. *Operating Systems A concept - based Approach*, 2nd Edition, D. M. Dhamdhare, and TMH.
5. *Principles of Operating Systems*, B. L. Stuart, Cengage learning, India Edition.
6. *Operating Systems*, A. S. Godbole, 2nd Edition, TMH
7. *An Introduction to Operating Systems*, P.C.P. Bhatt, PHI.
8. *Operating Systems*, S. Halder and A. A. Arvind, Pearson Education.
9. *Operating Systems*, R. Elmasri, A. G. Carrick and D. Levine, McGraw Hill.
10. *Operating Systems in depth*, T. W. Doeppner, Wiley.

Subject Code		Name of the Subject							L	T	P	C			
		Introduction to Soft Computing							3	0	0	3			
Course Educational Objectives															
CEO1	To introduce the concepts in Soft Computing														
CEO2	To introduce Fuzzy Logic based Systems														
CEO3	To introduce Neural Network based Systems														
CEO4	To introduce Genetic Algorithm based Systems and its hybrids														
Course Outcomes: Upon successful completion of this course, students should be able to:															
CO1	Define the Fuzzy Systems														
CO2	Analyze different neural network techniques														
CO3	Understand the Genetic algorithm concepts and its applications														
CO4	Identify the suitable hybrid soft computing technology to solve the complex problems														
CO5	Apply the evolutionary computing techniques in solving complex problems														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	1	1												
CO2	1	2	2				57								

CO3	2	3	2												
CO4	2	2	2												
CO5	1	2	1												
Avg.	1.4	2.0	1.6												

SYLLABUS

UNIT:1 Basics of Soft Computing & Fuzzy Logic (12 Hours)

Introduction to Soft Computing- Components of Soft Computing- Applications of Soft Computing - Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and parameterization. Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules –Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models –Tsukamoto Fuzzy Models.

UNIT:2 Neural Network (10 Hours)

Concepts of Neural Network – Activation Functions – Architecture and characteristics of Neural Network - Supervised Learning Neural Networks – Perceptrons – Backpropagation Multilayer Perceptrons – ADALINE, MADALINE, Radial Basis Function Networks – Unsupervised Learning Neural Networks – Competitive Learning Networks – Kohonen Self-Organizing Networks .

UNIT:3 Genetic Algorithm (10 Hours)

Fundamentals of Genetic Algorithms – Creation of offspring – Encoding – Fitness function – Reproduction – Inheritance operators – Crossover – Inversion and deletion – Mutation - GA – Applications.

UNIT:4 Neuro-Fuzzy Modelling (10 Hours)

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN.

Teaching Methods: Chalk& Board/ PPT/Video Lectures

Text Books:

1. J.S.R.Jang, C.T.Sun and E.Mizutani, “Neuro-Fuzzy and Soft Computing”, Pearson, 2015.
2. Samir Roy, Udit Chakraborty, “Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms”, Pearson, 2013

Reference Books:

1. Davis E.Goldberg, “Genetic Algorithms: Search, Optimization and Machine Learning”, Addison Wesley, 2009
2. Kumar S.Ray, “Soft Computing and Its Applications, Volume Two: Fuzzy Reasoning and Fuzzy Control”, CRC Press, 2014
3. Saroj Kaushik Sunita Tiwari, “ Soft Computing : Fundamentals Techniques & Applications”, Tata McGrawHill, 2018
4. Nunes Silva, I., Hernane Spatti, D., Andrade Flauzino, R., Liboni, L.H.B., dos Reis Alves, S.F., “Artificial Neural Networks - A Practical Course”, Springer, 2017

5. N.P.Padhy, S.P.Simon, “Soft Computing with MATLAB Programming”, Oxford University Press, 2015

6. Chakraverty, Snehashish, Sahoo, Deepti Moyi, Mahato, Nisha Rani, “Concepts of Soft Computing Fuzzy and ANN with Programming”, Springer, 2019.

7. Jamshid Ghaboussi, “Soft Computing in Engineering”, 1st Edition, CRC Press, 2018

V Semester [Third Year]
B. Tech in Computer Science and Engineering (2021 Admission)

SN	CC	Sub Code	Name of the Subject	L	T	P	C	ISA	ESA
THEORY									
1	PC		Computer Networks	3	0	0	3	30	70
2	PC		Formal Language & Automata Theory	3	0	0	3	30	70
3	PC		Software Engineering	3	0	0	3	30	70
4	PC		Data Mining and Data Warehousing	3	0	0	3	30	70
5	PE		PE-III (From Bucket)	3	0	0	3	30	70
6	OE		OE-I (From Bucket)	2	0	2	2	30	70
			TOTAL	17	0	2	17	180	420
PRACTICAL/SESSIONAL									
7	PC		Computer Networks Lab	0	0	2	1	35	15
8	PC		DMDW Lab	0	0	2	1	35	15
9	OE		Advanced Java Lab	0	0	2	1	35	15
10	PST		Minor Project Work-I	0	0	2	2	70	30
11	PST		Summer Industry Internship-II	0	0	2	1	35	15
			TOTAL	0	0	10	6	210	90
			TOTAL	17	0	12	23	390	510

Professional Elective Bucket

Sl. No.	Sem	Professional Elective III
1	V	Cloud Computing
2		Edge Computing
3		Cloud Security

BUCKETS FOR OPEN ELECTIVES

Sl. No.	Sem	Open Elective I
1	V	Advanced Java
2		Web Technology
3		Full Stack Development

Subject Code		Name of the Subject						L	T	P	C				
		Computer Networks						3	0	0	3				
Course Educational Objectives															
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>															
CO1	Understand the basic concepts on data communication layers, protocols and performance														
CO2	Describe the hardware and software commonly used in data communications														
CO3	Analyze the services and features of various layers of data networks														
CO4	Design, implement and analyze simple networks that need data communication														
COURSE EDUCATIONAL OBJECTIVES:															
CEO1	To discuss the digital data communication techniques														
CEO2	Gain knowledge on basic concepts of data communication layers, protocols and performance														
CEO3	Understand a few representative protocols and network components														
CEO4	To introduce the functions of different layers from deployed examples														
CO-PO MAPPING															
Cos	PROGRAMMEOUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1													
CO2	3	1													
CO3	2	2													
CO4	2	3		1											
Avg.															
SYLLABUS															
UNIT:1 (14 Hours)															
Introduction to Computer Networks, Components, Devices, Topology, OSI model, layers in OSI model, TCP/IP Model, Address types (Physical, Logical, Port, Application-Specific Addresses), Analog and Digital Signal. Transmission Media (Guided Media, Unguided Media). Physical Layer: line encoding, Block coding, Binary data to Digital Signal Conversion, Digital to Analog Signal Conversion, Analog to Analog Signal Conversion, Analogue to Digital Signal conversion. Digital Transmission types (Serial and Parallel), Transmission Modes (Simplex, Half-Duplex and Full-Duplex), Multiplexing (FDM, TDM, WDM, CDM).															
UNIT:2 (10 Hours)															
Switching and Types: Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks. Data link layer: Introduction, Error Detection and Correction techniques (Checksum, Cyclic Redundancy Check, Hamming Code (1-bit error rectification)), Framing, HDLC Frame Structure and Types, HDLC (NRM, ABM, ARM), Point to Point Protocol, Flow and Error Control, Noiseless Channels protocols (Simplest, stop-and-Wait), Noisy Channels protocols (Stop-and-Wait ARQ, Go-Back-N ARQ, Selective Repeat ARQ),															
UNIT:3 (11 Hours)															
Medium Access sub layer: Multiple Access - Random Access Protocols (ALOHA, CSMA (non-persistent, 1-persistent, p-persistent), CSMA/CD, CSMA/CA), Controlled Access Protocols (Reservation, Polling, Token Passing), Channelization techniques (FDMA, TDMA, CDMA).															

Network Layer: Internetworking, IP Address, IPv4(Header structure, Class types, subnetting), IPv6 (Header structure, Address structure), IPV4 to IPV6 Address Mapping, Address Resolution Protocol, ICMP.	
UNIT:4	(10 Hours)
Transport Layer: User Datagram Protocol, Transmission Control Protocol, Process-To-Process Delivery, Congestion Control, Quality of Service.	
Application Layer: Domain Name System - Address Resolution, TELNET, E-MAIL (SMTP, POP3), FTP, HTTP, HTTPS, Voice Over IP, Firewall	
Teaching Methods: Chalk& Board/ PPT/Video Lectures	
Text Book: <i>Data Communications and Networking – Behrouz A. Forouzan, Fourth Edition TMH,2006.</i> <i>Computer Networks -- Andrew S Tanenbaum, 4th Edition, Pearson Education.</i>	
Reference Book: <i>An Engineering Approach to Computer Networks-S.Keshav,2nd Edition, Pearson Education</i> <i>Understanding communications and Networks,3rd Edition, W.A.Shay, Cengage Learning.</i> <i>Computer and Communication Networks ,Nader F. Mir, Pearson Education</i> <i>Computer Networking: A Top-Down Approach Featuring the Internet, James F.Kurose, K.W. Ross, 3rd Edition, Pearson Education.</i>	

SUBJECT CODE		SUBJECT NAME								L	T	P	C	
		Formal Language & Automata Theory								3	0	0	3	
Course Educational Objectives:														
CEO 1	To familiarize students to construct regular expressions, regular grammars & to identify non - regular languages													
CEO 2	Teach students to identify context - free languages, to convert the given grammar to various normal forms, & to make use of membership algorithm.													
CEO 3	Teach students to construct Push - Down Automata which represent context - free languages, closure properties, & to identify non - context - free languages.													
CEO 4	To familiarize students to Recursively Enumerable languages, Recursive languages, construction of Turing Machines, PCP, & undecidable problems.													
Course Outcomes: : <i>Upon successful completion of this course, students should be able to:</i>														
CO1	Explain the basic concepts of formal computation and its relationship to language.													
CO2	Classify language into their types and derive its equivalent regular expression.													
CO3	Apply formal reasoning to construct different language and grammar set.													
CO4	Analyze complexity of various problem solving techniques using PDA and TM with recursion.													
CO-PO & PSO Mapping (Articulation Matrix):														
Cos	PROGRAMME OUTCOMES												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	3	1												
CO2	3	2												
CO3	2	3	2											
CO4	2	3												

Avg.														
Justification of the Mapping: CO 01 – PO 01 substantial: CO 01 – PO 02 slight: CO 02 – PO 01 substantial: CO 02 – PO 02 moderate: CO 03 – PO 01 moderate: CO 03 – PO 02 substantial: CO 03 – PO 01 moderate: CO 04 – PO 01 moderate: CO 04 – PO 02 substantial :														
SYLLABUS														
UNIT:1 (12 Hours) Mathematical preliminaries: Alphabet, String, Languages, Grammars, Strings and operations on strings. Finite Automata: Definition, Basic model, Types of Finite Automata, Design of DFA, Design of NFA, NFA vs. DFA, Eliminating ϵ -transitions from NFA, NFA to DFA conversion, NFA or DFA as a language acceptor, Minimization of Finite Automata. Equivalence of two Finite Automata														
UNIT:2 (16 Hours) Regular Expressions: Regular Set and Regular Expressions. Operators in Regular expressions, Building Finite Automata from Regular expression, Arden's theorem & Building Regular expression from Finite Automata, Pumping Lemma for Regular languages, Closure properties of Regular languages. Grammar: Definition, Regular Grammar, Regular Grammar to Finite Automaton, Finite Automaton to Regular Grammar, Designing Context Free Grammar, String Derivation, Parse Tree Construction, Ambiguous Grammar, Chomsky and Greibach Normal Forms, CYK parsing algorithm, Closure Properties of CFL, Pumping Lemma for CFL, Introducing Non-Context Free Grammar, Chomsky Hierarchy.														
UNIT:3 (12 Hours) Push Down Automata: Basic Model, Components, Moves of a PDA, ID of a PDA, Design of Deterministic PDA and Non-deterministic PDA, PDA to CFG and CGA to PDA conversion. Turing Machines: Basic Model, Components, move of a TM, ID of TM, Design of a TM, Variants Of Turing Machine, Recursively Enumerable Languages, Undecidable problems, Post correspondence problem as an Undecidable Problem. Linear Bounded Automata and Context Sensitive Languages														
UNIT:4 (08 Hours) Primitive Recursive functions: μ - Recursive functions, Cantor and Godel numbering, Ackermann's function, Excursiveness of Ackermann and Turing computable functions. Church Turing hypothesis, Recursive and Recursively Enumerable sets, NP Completeness: P and NP, NP complete and NP Hard problems. Teaching Methods: Chalk& Board/ PPT/Video Lectures Text Books: 1. <i>Introduction to the theory of computation</i> , Michael Sipser, Cengage Learning. <i>Formal Language and Automata Theory</i> , C. K. Nagpal, Oxford University Press.														
Reference Book: 1. Theory of Computer Science: Automata, Languages and Computation by K L PMishra and N Chandrasekaran 2. Introduction to Automata Theory, Languages and Computation: J. E. Hopcroft, J.D Ullman, Pearson Education.														

Subject Code		Name of the Subject										L	T	P	C	
		Software Engineering										3	0	0	3	
Course Educational Objectives																
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>																
CO1	Learn various software development process models and their suitability.															
CO2	Able to apply the methods of requirement elicitation.															
CO3	Learn Conventional Software Management and Evolution of Software Economics.															
CO4	Explain how a software process flows and understand Project Organizations and Responsibilities.															
CO-PO & PSO Mapping																
Cos	PROGRAMMEOUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1		3				2				1	1					
CO2		2		3												
CO3	1		1		2											
CO4		1														
Avg.																
SYLLABUS																
UNIT:1 (10 Hours)																
Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models: The Waterfall Model, Incremental Process Models, The RAD Model, Prototyping Model, V- Model, Spiral Model, Agile and Scrum Model. COCOMO Model																
UNIT:2 (12 Hours)																
Software Requirements: Functional and Non-functional, User requirements, System requirements, Software Requirements Document, Requirement Engineering Process: Feasibility Studies, Requirement elicitation and analysis, Requirement validation, Requirements Management. CASE TOOL: Application on Documentation																
UNIT:3 (12 Hours)																
Design process: Design concepts, Design Model, Design Heuristic Architectural Design: Architectural Mapping using Data Flow Structure Chart design using DFD. Transform Analysis, Transaction Analysis: OOD Modeling Using UML, User Interface Design.																
UNIT:4 (14 Hours)																
Software implementation techniques: coding practices: Refactoring, Code Review, Code Inspection, Driver and Stub Module. Software Testing Fundamentals: Internal and external views of Testing- White Box Testing, Basis path testing, control structure testing. Black Box Testing: Regression Testing, Unit Testing, Integration Testing, Validation Testing, System Testing and Debugging. CASE TOOL: Test-Case Design, Software Reliability Measures and Growth Modeling: SEI CMM: Characteristics of Software Maintenance, Reverse Engineering, Re-engineering.)																
Teaching Methods: Chalk& Board/ PPT/Video Lectures																
Text Book:																
1. Fundamentals of Software Engineering, Rajib Mall, PHI, 2014.																
2. Walker Rayce : Software Project Management, Pearson Education, 2005																
Reference Book																
1. Software Engineering, A Practitioner's Approach, Roger S. Pressman, TMG Hill.																
2. Software Engineering, I. Sommerville, 9th Ed. , Pearson Education																
3. Richard H.Thayer: Software Engineering Project Management, IEEE Computer Society, 1997																

Subject Code		SUBJECT NAME											L	T	P	C
		Data Mining and Data Warehousing											3		1	
Course Educational Objectives																
CEO 01	Understand the concepts of Association Rule Mining, Classification and Clustering algorithms.															
CEO 02	Applying various data mining techniques such as classification, clustering, association rule mining.															
CEO 03	Integrating data mining results into decision support systems and business intelligence applications to support decision-making.															
CEO 04	Apply best practices in data handling, ensuring data privacy and security.															
Course Outcomes: : Upon successful completion of this course, students should be able to:																
CO 01	Understand and learn various Concepts and Techniques for gaining knowledge of fundamentals & techniques used for data mining and data warehouse.															
CO 02	Learn various data mining techniques such as classification, clustering, association rule mining using tools.															
CO 03	Develop skills in implementation of data mining algorithms on different datasets.															
CO 04	Enhance the analytical and decision making abilities based on interesting patterns generated using data mining techniques.															
CO-PO & PSO Mapping (Articulation Matrix):																
COs	PROGRAMME OUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	01	02		
1	2	1	0	0	0	0	0	0	0	2	0	0				
2	2	3	1	0	1	0	0	0	0	1	0	0				
3	1	2	3	3	1	0	0	0	1	0	1	0				
4	1	1	2	2	1	0	0	0	1	0	1	1				
Avg.																
Justification of the Mapping:																
CO	PO	Level	Justification													
1	1	2	Understands the fundamental knowledge of statistics, mathematics, engineering basics on data mining and data warehouse.													
1	2	1	Analyses smaller problems on classification, clustering, association rule mining.													
1	10	2	Communicates using discussion on the different applications of data mining and warehouse in society.													
2	1	2	Allows to learn engineering fundamentals and mathematics to analyse the data, and understand the basic concepts.													
2	2	3	Enables students to identify, formulate, and analyze complex data problems													
2	3	1	Enables students to design solutions for complex problems using classification, clustering, and association rule mining.													
2	5	1	Learning the use of mining techniques and software tools for analysis and predictions.													

2	10	1	Helps students effectively communicate their result findings in group discussions, and design documents.
3	1	1	It allows to understand basic principles and statistical knowledge during implementation of mining algorithms on different datasets.
3	2	2	It involves in analysing and demonstrating the problems using different datasets.
3	3	3	Developing skills for designing solutions for complicated problems for different application areas.
3	4	3	Conducting rigorous investigations, applying research-based knowledge, and experimenting to solve complex problems.
3	5	1	Involves in applying different modern tools, techniques for achieving desired results.
3	9	1	Engages in collaborative learning activities in a team or in individual while working with project problems
3	11	1	Allows a student to demonstrate about their project knowledge as team member or leader through presentations, reflecting foundational proficiency in communication.
4	1	1	Allows to give keen observations on basic concepts during implementations and pattern generations.
4	2	1	Analysing, formulating and reviewing the problem by observing data visualization
4	3	2	Designing solutions for complex problems by enhancing analytical and decision-making abilities through data mining techniques.
4	4	2	Learn investigating complex problems by using experimenting and research based on interesting patterns generated
4	5	1	Involves in utilizing modern tools, techniques, and resources, while actively engaged in analysis of the interesting patterns.
4	9	1	Allows to analyse the decision making patterns with group discussions in a team.
4	11	1	It enables to learn preparing models for decision making, demonstrate project knowledge with team effort, improves presentation skills.
4	12	1	It builds self-confidence and Curiosity to do more projects on predictions for different applications.

Syllabus

UNIT I		12 Hours
Introduction to Data Mining: Data Mining Technologies, Major issues in Data Mining, Data Objects and Attribute Types, Basic Statistical Descriptions of Data Data Preprocessing: Data Integration, Data Cleaning, Data Transformation, Data Reduction, Data Discretization and Data Summarization.		
UNIT II		12 Hours
Introduction to Data Warehousing: The Compelling need of Data Warehousing, Basic Concepts of Data Warehouse, Data Warehouse Architecture, Data Warehouse Models, ETL Operations, Meta Data in the Data Warehouse, Trends in Data Warehousing, Data Warehouse Modelling, OLAP Vs OLTP, Data Cube, Schemas for Multidimensional Data models, Data Warehouse Design and Usage.		
UNIT III		12 Hours
Introduction to Mining Frequent Pattern: Associations, Correlations: Market Basket Analysis, Apriori Algorithm, FP-Growth Algorithm, Mining Various kinds of association rules, from association rule mining to correlation analysis. Classification: Classification by Decision Tree Induction, Bayes Classification Methods, Rule Based Classification, KNN Classifier, Logistic Regression, Support Vector Machine.		

UNIT IV	12 Hours
Introduction to Cluster Analysis: Types of Data in Cluster Analysis Categorization of major clustering methods: K-means Clustering, K-medoid Clustering, Agglomerative Clustering, Hierarchical Clustering, DBSCAN Clustering. Clustering Graph and Network Data, Anomaly Detection: Outlier Analysis, Statistical Analysis, Distance Based Analysis, Clustering Based Analysis, Text Mining: Text Preprocessing, IF-IDF, Text Classification, Text Clustering, Web mining: Web content mining, Web structure mining, Web usage mining, Applications of Data Mining in different area.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert/MOOCs	
Text Books: 1. Data Mining: Concepts and techniques: J. Han, M. Kamber, J. Pei, Elsevier 2. Data Warehousing Fundamentals: Paulraj Ponniah, Willey India.	
Reference Book: 1. Data Mining –A Tutorial based primer by R.J.Roiger, M.W.Geatz, Pearson Education. 2. Data Mining & Data Warehousing Using OLAP: Berson, TMH. 3. Data Warehousing: Reema Thareja, Oxford University Press	

Subject Code		SUBJECT NAME											L	T	P	C
		Cloud Computing											3	0	0	3
Course Educational Objectives																
CEO 01	Understand the rationale behind the cloud computing revolution															
CEO 02	Introduce various models of cloud computing															
CEO 03	Understand how to design applications on cloud and the role of security															
CEO 04	Understand and design distributed systems for scalability															
Course Outcomes: Upon successful completion of this course, students should be able to:																
CO 01	Understand the technical and business rationale behind cloud computing															
CO 02	Outline the model of cloud computing to use for solving a particular problem															
CO 03	Design and Build applications for the cloud and understand the security implications															
CO 04	Understand and Apply the fundamentals of distributed systems design to cloud computing															
CO-PO & PSO Mapping (Articulation Matrix):																
COs		PROGRAMME OUTCOMES												PSOs		
	01	02	03	04	05	06	07	08	09	10	11	12	01	02		
01	3	1	1													
02	3	2	1													
03	3	2														
04	3	3	2													
Avg.																
Justification of the Mapping:																
CO	PO	Level	Justification													
1	1	3	It has the highest significance													
1	2	1	It has the least significance													
1	3	1	It has the least significance													
2	1	3	It has the highest significance													
2	2	2	It has an average significance													
2	3	1	It has the least significance													

3	1	3	It has the highest significance
3	2	2	It has an average significance
4	1	3	It has the highest significance
4	2	3	It has the highest significance
4	3	2	It has an average significance
Syllabus			
UNIT I			12 Hours
Cloud Computing: Introduction, Types of cloud: private, public and hybrid cloud. Hardware and Infrastructure: IaaS, PaaS, SaaS. public vs private clouds, Benefits and challenges of cloud computing, Virtualization : Types of Virtualization, Implementation Levels , Virtualization Structures , Tools and Mechanisms, Virtualization of CPU, Memory, I/O Devices ,Virtual Clusters and Resource management – Virtualization for Data-center Automation.			
UNIT II			14 Hours
Cloud infrastructure: Architectural Design of Compute and Storage Clouds, Layered Cloud Architecture Development, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources. Cloud Applications: Technologies and the processes required when deploying web services; Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages Benefits and challenges to Cloud architecture, Application availability, performance, security and disaster recovery; SLA Management: Types of SLA, Life Cycle of SLA, SLA Management			
UNIT III			10 Hours
Cloud Economics: Economics of choosing a Cloud platform for an organization, based on application requirements, economic constraints and business needs (e.g. Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Redhat); Cloud Simulator: Benefits of CloudSim, Architecture of Cloud Sim, Installation procedures, Types of Scheduling Algorithms used in Cloud resource Management			
UNIT IV			10 Hours
Cloud security: Security Overview, Cloud Security Challenges and Risks, Software-as-a-Service Security, Security Governance, Risk Management, Security Monitoring, Security Architecture Design, Data Security, Application Security, Virtual Machine Security, Identity Management and Access Control, Autonomic Security. Cloud based service, applications and development platform			
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert/MOOCs			
Text Books: 1. Cloud Computing : A Practical Approach by Anthony T. Velte Toby J. Velte, Robert Elsenpeter, 2010 by The McGraw-Hill 2. Gautam Shroff, “Enterprise Cloud Computing Technology Architecture Applications”, Cambridge University Press; 1 edition, [ISBN: 978-0521137355],2010 3. Rajkumar Buyya, Christian Vecchiola, S.Tamarai Selvi, ‘Mastering Cloud Computing’, TMGH, 2013.			

SUBJECT CODE	SUBJECT NAME	L	T	P	C
	Advanced Java Programming	4	0	0	4

Course Educational Objectives

CEO1	Objective of this course is to provide the ability to design console based, GUI based and web based applications. Students will also be able to understand integrated development environment to create, debug and run multi-tier and enterprise-level applications.
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Course Outcomes: : *Upon successful completion of this course, students should be able to:*

CO1	design and develop data driven web applications using JDBC, servlet and JSP API.
CO2	develop MVC based web applications using SpringBoot.
CO3	understand significance of Object Relational Mapping (ORM) in Java context.
CO4	construct ORM-based web applications using Hibernate.

CO-PO & PSO Mapping (Articulation Matrix):

[illegible]

SYLLABUS

UNIT:1

(12 Hours)

Basics of JDBC: Introduction to JDBC, Need of JDBC, JDBC Drivers (4 types), Architecture of JDBC, Components of JDBC (Classes and Interfaces).

Programming with JDBC: Creating a DATABASE (ORACLE) , First Program to connect to the DATABASE created, Loading the Driver, Establishing the Connection, Creating Statements (Statement/ PreparedStatement/ CallableStatement), Executing a SQL Query, Different types of SQL Queries.

JDBC Program to retrieve data from DATABASE: Introduction to Result Set, Result Set with Statement Interface, Result Set with PreparedStatement Interface, Updating and deleting data in database, ResultSetMetadata, Executing Stored Procedures Using Callable Statement.

UNIT:2

(12 Hours)

Web Architecture: Introduction to HTML, Describe the various HTML tags and their usage. Layout Tags, Semantic Tags, HTML table, forms, style, div.

Introduction to Servlets: What is Servlet, Advantage of Servlet Over Applets and CGI, Strengths of Servlet, Architecture of Web Application, Web Servers and its Containers, Role of servlet in Web application development, Understanding servlet-api, Understanding HTTP protocol and communication between HTML-SERVLET.

Getting Deep to Servlets: Types of Servlet, Difference between HttpServlet and GenericServlet, Life cycle of Servlets and different life cycle methods, Difference between doGet() and doPost(), Servlet Generating Html output, Collecting Client submitted data in a Servlet.

Servlet communications: Servlet to DBMS communication using type-4 connection, Servlet to DBMS communication using JDBC connection pooling, Servlet communication with other servlets (Servlet Chaining), Servlet communication with JSP or HTML page (sendRedirect(), Difference between sendRedirect() and RequestDispatcher forward(), Understanding ServletConfig.

Conclusion to Servlets: Servlet Filters and wrappers, Servlet Listeners, Session Tracking, Cookies, HttpSession, HTML hidden form field element, URL rewriting, Annotation based servlet programs.

UNIT:3

(10 Hours)

Java Server Pages: Introduction to JSP, Scope of JSP, Anatomy of a JSP program, execution of a JSP program, Significance of JSP Engine, Built in objects of JSP, Significance of JSP Elements, Scripting

Elements, Scriptlets, Declaration, Expression, Directives and Action Elements, Page Directive, Include Directive, Taglib Directive, Forward action element, Include, Param, useBean with introduction to beans, setProperty, getProperty	
UNIT:4	(14 Hours)
Hibernate : Introduction to Hibernate, Architecture of hibernate, Hibernate O/R mapping, Configuring hibernate development environment, Implementing hibernate O/R Mapping, Introduction to Hibernate Query Language (HQL) Sping and SpringBoot : Spring Basic, Spring IOC, Spring MVC, Spring MVC with Hibernate. Introduction to SpringBoot, SpringBoot Injection, dependency, autowired, SpringBoot JPA, SpringBoot Webapp MVC.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert/MOOCs	
Text Books: 1. Advanced Java Programming, Uttam K. Roy, Oxford University Press.	
Reference Book: 1. Black book, Kogent Learning Solution Inc. 2. Java 2: The Complete Reference by Herbert Schildt, Fifth Edition Paperback	

VI Semester [Third Year]
B. Tech in Computer Science and Engineering (2021 Admission)

SN	CC	Sub Code	Name of the Subject	L	T	P	C	ISA	ESA
THEORY									
1	PC	21BCSPC36001	Internet of Things	3	0	0	3	30	70
2	PC	21BCSPC36003	Artificial Intelligence and ML	3	0	0	3	30	70
3	PC	21BCSPC36002	Microprocessors and Microcontrollers	3	0	0	3	30	70
4	PC	21BCSPC36004	Compiler Design	3	0	0	3	30	70
5	PE	21BCSPE36001	PE-IV (From Bucket)	3	0	0	3	30	70
6	OE	21BCSOE36001	OE-II (From Bucket)	2	0	2	3	30	70
			TOTAL	17	0	2	18	180	420
PRACTICAL/SESSIONAL									
7	PC		Internet of Things Lab	0	0	2	1	35	15
8	PC		Microprocessors and Microcontrollers Lab	0	0	2	1	35	15
9	PST		Minor Project Work-II	0	0	2	2	70	30
			TOTAL	0	0	6	4	140	60
			TOTAL	17	0	8	22	320	480

Professional Elective Bucket

Sl. No.	Sem	Professional Elective IV
1	VI	Introduction to Digital Signal Processing
2		Pattern Recognition
3		Digital Image Processing

BUCKETS FOR OPEN ELECTIVES

Sl. No.	Sem	Open Elective II
1	VI	Android Application Development using Kotlin
2		Mobile Computing
3		IOS Development

Subject Code	Name of the Subject										L	T	P	C	
	Artificial Intelligence & Machine Learning										3	0	0	3	
Course Educational Objectives															
CEO1: Students will learn the basic concepts and techniques of Artificial Intelligence.															
CEO2: Recognize the limitations and challenges associated with AI, such as ethical concerns, biases, and potential job displacement.															
CEO3: The students will understand the basics of Machine Learning.															
CEO4: They will also learn and will be able to apply different machine learning models to various datasets.															
Course Outcomes: : Upon successful completion of this course, students should be able to:															
CO1	Define the fundamental concepts, principles, and components of artificial intelligence														
CO2	Understand and analyze different AI related state space search techniques for problem solving														
CO3	Utilize Search in Concept Learning and Design Learning Systems for Concept Learning Tasks														
CO4	Analyze and evaluate various Machine Learning models														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3					2		1							
CO2	3	2	3	1											
CO3	3	2	3	1											
CO4	3	3	2		2										
Avg.															
SYLLABUS															
UNIT:1 (12 Hours)															
Module 1: Introduction															
Artificial Intelligence and its applications, Artificial Intelligence Techniques, Level of models, criteria of success, Intelligent Agents, Nature of Agents, Learning Agents. AI Techniques, advantages, and limitations of AI, Impact and Examples of AI, Application domains of AI.															
UNIT:2 (10 Hours)															
Module 2: Problem solving techniques															
State space search, control strategies, heuristic search, problem characteristics, production system characteristics, Generate and test, Hill climbing, best first search, A* search, Constraint satisfaction problem, Mean-end analysis, Min-Max Search, Alpha-Beta Pruning, Additional refinements, Iterative Deepening.															
UNIT:3 (12 Hours)															
Introduction to Machine Learning- How machines learn, Applications of Machine Learning - Machine Learning types, designing a Learning System, Concept Learning Task, Concept learning as search, Version Spaces and Candidate Elimination Algorithm															
Evaluation of Classifiers- SSE, MME, R2, confusion matrix, precision, recall, F-Score, ROC-Curve, K-fold cross validation, Boot strapping															
UNIT:4 (12 Hours)															
Regression- Univariate linear regression, Multivariate linear regression, Polynomial Regression. Logistic Regression, Regularization techniques, Ridge Regression, Lasso regression, Multi-collinearity and Variation Inflation Factor.															

Ensemble Approaches: Combining multiple learners, Ways to achieve diversity, Model combination schemes, Voting, Bagging, Random Forests, Boosting: Adaboost, Gradient boosting.

Teaching Methods: Chalk& Board/ PPT/Video Lectures

Text Books/Suggested References:

1. Machine Learning, *Tom M. Mitchell*, (2013), McGraw-Hill Education (INDIAN EDITION)
2. Hands-On Machine Learning with Scikit-Learn and TensorFlow, *Aurélien Geron*, (2017) O'Reilly
3. Machine Learning for Dummies, *By John Paul Mueller and Luca Massaron*, For Dummies, 2016.
4. Introduction to Machine Learning with Python A guide for data scientists, *Andreas, C. Muller & Sarah Guido*, (2016) O'Reilly
5. A Classical Approach to Artificial Intelligence, *M.C. Trivedi*, Khanna Book Publishing, 2019.
6. Artificial Intelligence by Rich and Knight, *The McGraw Hill*, 2017.
7. Artificial Intelligence: A modern approach by Stuart Russel, Pearson Education, 2010.

Additional Resources:

- ✓ <https://www.edx.org/course/artificial-intelligence-ai>
- ✓ <https://www.udemy.com/course/artificial-intelligence-az/>
- ✓ <https://www.udacity.com/course/intro-to-machine-learning--ud120>
- ✓ <https://www.coursera.org/learn/machine-learning-duke>

Alternative NPTEL/SWAYAM Course (if any):

S. No	NPTEL Course Name	Instructor	Host Institute
1.	An Introduction to Artificial Intelligence	Prof. Mausam	IIT Delhi
2.	Artificial Intelligence	Prof. Sudeshna Sarkar	IIT Kharagpur
3.	Introduction to Machine Learning	Prof. Balaraman Ravindran	IIT Madras
4.	Machine Learning	Prof. Carl Gustaf Jansson	KTH, The Royal Institute of Technology

Subject Code		Name of the Subject		L	T	P	C	QP
BOECS6040		Android App Development Using		4	0	1	4	A
Course Educational Objectives								
CEO1	This course covers the fundamentals of Kotlin Programming and Android programming using the Android SDK. Topics discussed in this course include: fundamental concepts in Android programming - activities and intents, designing user interface using views, data persistence, content providers, messaging and networking, location-based services, and developing android services.							
Course Outcomes: Upon successful completion of this course, students should be able to:								
CO1	demonstrate their understanding of Kotlin Programming.							
CO2	demonstrate their understanding of the fundamentals of Android operating systems, development trends and Android platform.							

CO3	Design kotlin based stand android application.														
CO4	Develop android application using API and database.														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES														
	1	2	3	4	5	6	7	8	9	10	11	12			
CO1	3	1			1							1			
CO2	2	3	1	3	2							1			
CO3	2	3	3	3	2				1		1	2			
CO4	2	3	3	3	2				1		1	2			
Avg.															
SYLLABUS															
UNIT:1 (8 Hours)															
Introduction to Kotlin: Kotlin Architecture, Basic syntax, Kotlin Comments, Kotlin Keywords, Defining variable, Use of variables, Data types- (Booleans, Strings, Arrays, Ranges), Operators, Control Flow, if... else expression, for loops, While loops, Break and Continue, functions in Kotlin, user defining functions. Kotlin Collections (Lists, Sets, Maps), Kotlin objects and Classes, Constructors, Inheritance, Interface, Visibility Control, Extension, Data Classes, Sealed Class, Generics, Delegation, Destruction, Exception Handling.															
UNIT:2 (15 Hours)															
Introduction to Android: Introduction to Android Operating System, Android Architecture, Core Building Blocks, Android Emulator, Application Structure, Setting up development environment, Dalvik Virtual Machine & .apk file extension, AndroidManifest.xml, uses-permission & uses-sdk, Resources & R.java o Assets, Layouts & Drawable Resources, Fundamentals: 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), User Interface Architecture: Application context, intents, Activity life cycle, Services, Android widgets, UI widgets, Working with Buttons, Toast, Custom Toast, Toggle Button, Check Button, Custom Check Button, Radio Button, Dynamic Radio button, Alert Dialog, Android Views: Text view, Autocomplete Text view, List View, Custom List View, Rating Bar, WebView Seek Bar, Date Picker, Time Picker, Analog and Digital, Progress Bar, Android Layouts: Linear Layout, Relative Layout, Table Layout, Table Layout with Frame Layout, Search View, Search View on Toolbar, Edit Text with Text Watcher. Switchers: Switch, Dynamic Switch, Text Switcher, Dynamic Text Switcher, Image Switcher, Dynamic Image Switcher. Spinner: Spinner, Dynamic Spinner, Dynamic TextClock, Chronometer, Dynamic Chronometer, Notifications, Android Toast, Dynamic RadioGroup, Android Slide Up/Down in Kotlin, Scroller: Vertical Scroll, View Horizontal Scroll View, Image Switcher, Image Slider, View Stub, XML Parsing using DOM Parser, XML Parsing using SAX Parser, Kotlin Android XMLPullParserer															
UNIT:3 (10 Hours)															
Menu : Option menu, Context menu, Sub menu, menu from xml, menu via code, Examples. Navigation: Create a fragment, Define navigation paths, Start an external activity, Kotlin Regex: Regular Expressions, Kotlin Annotations, Adapters, Android Recycler View, Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.															
UNIT:4 (10 Hours)															
Data Storage: Shared Preferences, Android File System, Internal storage, External storage, SQLite Firebase. Common Android APIs: Using Android Data and Storage APIs etc.															
Teaching Methods: Chalk& Board/ PPT/Video Lectures															
Text Books:															

1. Bruce Eckel and Svetlana Isakova (2021), “Atomic Kotlin”, Mindview LLC, Crested Butte, CO
2. WeiMeng Lee (2012), “Beginning Android Application Development”, Wrox Publications (John Wiley, New York) (For 1 to 5 units).

Subject Code		Name of the Subject										L	T	P	C	
BPCCS5030		Compiler Design										3	0	0	3	
Course Educational Objectives																
CEO1	To introduce the major concept areas of language translation and compiler design.															
CEO2	To enrich the knowledge in various phases of compiler and its use.															
CEO3	To provide practical programming skills necessary for constructing a compiler															
Course Outcomes: : <i>Upon successful completion of this course, students should be able to:</i>																
CO1	Understand and describe compiler and its features.															
CO2	Use the knowledge of patterns, tokens and regex for parsing of strings.															
CO3	Optimize the performance of a program in terms of speed and space.															
CO4	Use different powerful compiler generation tools and derive the machine dependent code.															
CO-PO & PSO Mapping																
Cos	PROGRAMME OUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2														
CO2	3	1	1													
CO3	2	1		2												
CO4	2				1											
Avg.																
SYLLABUS																
UNIT:1 (12 Hours)																
Introduction: Overview and phases of compilation. Lexical Analysis: Non-deterministic and deterministic finite automata (NFA & DFA), regular grammar, design of a lexical analyzer, lexical analyzer generator. Lex and flex Syntax Analysis:Role of a parser, context free grammars and context free languages, parse trees and derivations, ambiguous grammar. Top Down Parsing: Recursive descent parsing, LL(1) grammars, non-recursive predictive parsing, error reporting and recovery.																
UNIT:2 (12 Hours)																
Bottom Up Parsing: Handle pruning and shift reduces parsing, SLR parsers and construction or SLR parsing tables, LR(1) parsers and construction of LR(1) parsing tables, LALR parsers and construction of efficient LALR parsing tables, parsing using ambiguous grammars, error reporting and recovery, parser generator. Syntax Directed Translation: Syntax directed definitions (SDD), inherited and synthesized attributes, dependency graphs, evaluation orders for SDD, semantic rules, application of syntax directed translation. ⁷⁴																

UNIT:3 (10 Hours)	
Symbol Table: Structure and features of symbol tables, symbol attributes and scopes. Intermediate Code Generation: DAG for expressions, three address codes - quadruples and triples, types and declarations, translation of expressions, array references, type checking and conversions, translation of Boolean expressions and control flow statements, back patching, intermediate code generation for procedures. Run Time Environment: storage organizations, static and dynamic storage allocations, stack allocation, handlings of activation records for calling sequences.	
UNIT:4 (10 Hours)	
Code Generations: Factors involved, registers allocation, simple code generation using stack allocation, basic blocks and flow graphs, simple code generation using flow graphs .Elements of Code Optimization: Objective, peephole optimization, concepts of elimination of local common sub-expressions, redundant and un-reachable codes, basics of flow of control optimization.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert	
Text Books:	
1. <i>Compilers – Principles, Techniques and Tools</i> Authors: Alfred V. Aho, Monica S. Lam, Ravi Sethi and Jeffrey D. Ullman Publisher: Pearson	
Reference Books:	
1. <i>Morden Compiler Design</i> , D. Galles, Pearson Education.	
2. <i>Compiler Design in C</i> , Allen I. Holub, PHI	

Subject Code		Name of the Subject						L	T	P	C				
BPCCS6020		Microprocessors and Microcontrollers						3	0	2	4				
Course Educational Objectives															
CEO1	To Develop assembly language programs and basic concepts of the microprocessor and microcontroller														
CEO2	To provide solid foundation on interfacing the external devices to the microprocessor & microcontroller according to the user requirements in order to create novel products and solutions for the real time problems														
CEO3	To Familiar and Design of any type of embedded systems related to industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.														
CEO4	To assist the students with an academic environment aware of excellence guidelines and lifelong learning needed for a successful professional carrier in the field embedded systems.														
Course Outcomes: Upon successful completion of this course, students should be able to:															
CO1	Understand the architecture of 8085, 8086 & 8051														
CO2	Understand and analyze different data transfer schemes and its applications														
CO3	To design circuits and Implement programs using microcontrollers.														
CO4	Understand the need & use of Interrupt structure in 8085, 8086 & 8051.														
CO-PO & PSO Mapping															
Cos	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	1													
CO2	3	2													
CO3	2	2	1												
CO4	3	2													
Avg.															
SYLLABUS															

UNIT:1	(10 Hours)
Introduction to 8 bit Microprocessors	
Introduction to 8085 microprocessor, Architecture, Signal Descriptions ,Buses-Address bus ,data bus and control Bus ,Instruction format ,Instruction sets ,addressing Modes, Assembly Language Programming ,Timing diagram, stack and sub routine, Data Transfer Schemes ,Memory Interfacing and 8085 interrupts.	
UNIT:2	(12 Hours)
Advanced Microprocessor	
Introduction to 8086 microprocessor, 8086 Architecture, Register Organization, signal descriptions, Memory Segmentation. Physical memory organization. Addressing Modes, instruction Set .Minimum and Maximum mode operation, Bus Cycle of minimum mode and maximum mode. Interrupts of 8086, Memory interfacing & Assembly Language Program.	
UNIT:3 Peripheral Devices	(10 Hours)
Programmable Peripheral Interface (8255), Programmable Interval Timer (8254) Programmable Interrupt Controller (8259A) - Programmable DMA Controller(8257),Programmable Communication Interface (8251A) – Programmable Keyboard and Display Controller (8279).	
UNIT:4	(12 Hours)
8051 Microcontroller	
Overview of 8051 microcontroller. Architecture. I/O Ports. Memory organization, Addressing modes, data transfer instructions, Logical instructions, Arithmetic instructions, Branching (Jump & Call) instructions, Bit addressable instructions and special instructions, Interrupts and interrupt handler sub routines (Interrupt Service Routines).Assembly language program.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures	
Text Books:	
1. <i>Microprocessor Architecture, Programming and application with 8085</i> , R.S. Gaonkar, PRI Penram International publishing PVT. Ltd., 5thEdition	
2. <i>Advanced Microprocessors and Peripherals</i> - A. K. Ray and K.M. Bhurchandani, TMH, 2nd edition 2006.	
3. <i>The 8051 Microcontroller and Embedded Systems</i> , Muhammad Ali Mazidi, Janice Gillispie Mazidi, Rolin D.M C Kinlay, Pearson Education, Second Edition, 2008.	
Reference Books:	
1. <i>Microprocessors and Microcontrollers Architecture, programming and system design using 8085, 8086, 8051 and 8096</i> , Krishna Kant, PHI Publication, 2007.	
2. <i>Microprocessors and Interfacing, Programming and Hardware</i> , Douglas V Hall, TMH Publication, 2006.	
3. <i>Microprocessors and Interfacing</i> , N. Senthil Kumar, M. Saravanan, S. Jeevananthan and S.K. Shah, Oxford University Press.	

Subject Code	Name of the Subject	L	T	P	C	
BOEEC5060	Introduction to Digital Image Processing	3	0	0	3	
Course Educational Objectives						
CEO1: To provide deep understanding of basic concepts of digital image acquisition						
CEO2: T provide deep Understanding of various digital image enhancement techniques						
CEO3: Understand image restoration and segmentation methods						
CEO4: To provide understanding and implementation of image compression techniques						
Course Outcomes: : Upon successful completion of this course, students should be able to:						
CO1	Understand basics of digital images and tools for image processing					
CO2	Learn and implement image Enhancement techniques					
CO3	Understand and Learn image Restoration and Segmentation Methods					

CO4	Understand and implement Image Compression techniques														
CO-PO & PSO Mapping															
Cos	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2													
CO2	3	2	2												
CO3	3	3													
CO4	2	3													
Avg.															
SYLLABUS															
UNIT:1(14 Hours) Introduction, Origin- Steps in Digital Image Processing, Components, Elements of Visual Perception, Image Sensing and Acquisition, Image Sampling and Quantization, Relationships between pixels, Introduction to Image processing toolbox in MATLAB, Tool box practice, Exploring functions, Introduction to Spatial Domain, Gray level transformations, Histogram processing, Basics of Spatial Filtering, Smoothing and Sharpening Spatial Filtering, Frequency Domain: Basics of filtering, Smoothing and Sharpening frequency domain filters, Smoothing and Sharpening frequency domain filters, MATLAB code for histogram equalization, MATLAB code for spatial and frequency domain filter.															
UNIT:2 (12 Hours) Noise models – Mean Filters – Order Statistics, Adaptive filters – Band reject Filters – Band pass Filters, Inverse Filtering – Wiener filtering Segmentation, Point, Line, and Edge Detection, Marr-Hildreth & Canny edge detector, Edge Linking and Boundary detection, Local & Regional processing-Region based segmentation, Morphological processing- Watershed segmentation algorithm, MATLAB code for restoring an image after degradation using adaptive and wiener filter, Edge detection operators.															
UNIT:3(14 Hours) Wavelets – Subband coding – Multiresolution expansions, Fundamentals of Compression – Image Compression methods - Error Free Compression, Variable Length Coding – Bit-Plane Coding – Lossless Predictive Coding, Lossy Compression – Lossy Predictive Coding, Compression Standards-Huffman, Arithmetic coding, LZW coding, Run Length Encoding, Compression Standards, Huffman, Arithmetic coding, LZW coding, Run Length Encoding, Block Transform coding, Wavelet coding, JPEG standard, MATLAB code for image compression: Huffam coding, Arithmetic coding, wavelet coding.															
UNIT:4(10 Hours) Boundary representation – Chain Code, Polygonal approximation, signature, boundary segments, Boundary description – Shape number Fourier Descriptor, Regional Descriptor, Topological - Texture – Patterns and Pattern classes, Recognition based on matching, MATLAB code for image representation, MATLAB code for image recognition, MATLAB practice exercise.															
Teaching Methods: Chalk& Board/ PPT/Video Lectures															
Text Books: 1.Rafael C. Gonzales, Richard E. Woods, “Digital Image Processing”, Third Edition, Pearson Education, 2010.															
Reference Books: 1. Rafael C. Gonzalez, Richard E. Woods, Steven L. Eddins, “Digital Image Processing Using MATLAB”, Third Edition Tata Mc Graw Hill Pvt. Ltd., 2011. 2. Anil Jain K. “Fundamentals of Digital Image Processing”, PHI Learning Pvt. Ltd., 2011. 3. Willliam K Pratt, “Digital Image Processing”, John Willey, 2002.															

Subject Code		Name of the Subject									L	T	P	C	
BPCCS5020		Internet of Things									3	0	2	4	
Course Educational Objectives															
CEO1	The objective of this course is to impart necessary and practical knowledge of components of Internet of Things and develop skills required to build real-life IoT based projects.														
Course Outcomes: Upon successful completion of this course, students should be able to:															
CO1	Understand internet of Things and its hardware and software components.														
CO2	Interface I/O devices, sensors & communication modules.														
CO3	Remotely monitor data and control devices.														
CO3	Develop real life IoT based projects.														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES														
	1	2	3	4	5	6	7	8	9	10	11	12			
CO1	3	1			1							1			
CO2	2	3	1	3	2							1			
CO3	2	3	3	3	2				1		1	2			
CO4	2	3	3	3	2				1		1	2			
Avg.	2.25			3											
SYLLABUS															
UNIT:1 (8 Hours)															
Introduction to IoT: - Architectural Overview, Design principles and needed capabilities, IoT Applications, Sensing, Actuation, Basics of Networking, M2M and IoT Technology Fundamentals- Devices and gateways, Data management, Business processes in IoT, Everything as a Service(XaaS), Role of Cloud in IoT, Security aspects in IoT. Domain-Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.															
UNIT:2 (9 Hours)															
Elements of IoT: - Hardware Components- Computing (Arduino, Raspberry Pi), Communication, Sensing, Actuation, I/O interfaces. Software Components- Programming API's (using Python/Node.js/Arduino) for Communication Protocols-MQTT, ZigBee, Bluetooth, CoAP, UDP, TCP.															
UNIT:3 (18 Hours)															
IoT Application Development: - Solution framework for IoT applications- Implementation of Device integration, Data acquisition and integration, Device data storage- Unstructured data storage on cloud/local server, Authentication, authorization of devices.															
UNIT:4 (10 Hours)															
IoT Case Studies: - IoT case studies and mini projects based on Industrial automation, Transportation, Agriculture, Healthcare, Home Automation															
Teaching Methods: Chalk& Board/ PPT/Video Lectures															
Text Books:															
1. VijayMadiseti, Arshdeep Bahga," Internet of Things A Hands- On- Approach",2014,ISBN:978 0996025515.															
2. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs.															
3. Pethuru Raj and Anupama C. Raman, "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", CRC Press.															

4. Jeeva Jose, <i>“Internet of Things”</i> , Khanna Publishing House, Delhi.
Reference Books: 5. AdrianMcEwen, <i>“Designing the Internet of Things”</i>, Wiley Publishers, 2013, ISBN:978-1-118-43062-0 . 6. Daniel Kellmereit, <i>“The Silent Intelligence: The Internet of Things”</i>. 2013, ISBN:0989973700 7. Adrian McEwen, <i>“Designing the Internet of Things”</i>, Wiley. Raj Kamal, <i>“Internet of Things: Architecture and Design”</i>, McGraw Hill. 8. Cuno Pfister, <i>“Getting Started with the Internet of Things”</i>, O Reilly Media.
e-Books: 9. <i>Designing for the Internet of Things</i>, O'Reilly, February 2015. 10. <i>Getting Started with the Internet of Things</i>, O'Reilly 4th edition, October, 2015.

VII Semester [Fourth Year]
B. Tech in Computer Science and Engineering (2021 Admission)

SN	CC	Sub Code	Name of the Subject	L	T	P	C	ISA	ESA
THEORY									
1	PC		Computer Graphics	3	0	0	3	30	70
2	PE		PE-V (From Bucket)	3	0	0	3	30	70
3	OE		OE-III (From Bucket)	3	0	0	3	30	70
4	HS		Entrepreneurship Development / Human Resource Management	2	1	0	3	30	70
			TOTAL	11	1	0	12	120	280
PRACTICAL/SESSIONAL									
5	PST		Major Project Work-I	0	0	6	3	70	30
6	PST		Summer Industry Internship-III	0	0	2	1	35	15
			TOTAL	0	0	8	4	105	45
			TOTAL	11	1	8	16	225	325

BUCKETS FOR PROFESSIONAL ELECTIVES

Sl. No.	Semester	Professional Elective V
1	VII	Cryptography and Network Security
2		Information Security
3		Database Security

BUCKETS FOR OPEN ELECTIVES

Sl. No.	Semester	Open Elective III
1	VII	Data Analytics
2		Computer Vision
3		Intrusion Detection

Subject Code			Subject Code								L	T	P	C	
BCSPC7010			Computer Graphics								3	0	0	3	
Course Educational Objectives															
CEO1	Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis.														
CEO2	Introduce the use of geometric transformations on graphics objects and their application in composite form														
CEO3	Impart frame extraction with different clipping algorithms and transformation to a graphics display device.														
CEO4	Introduce projections and visible surface detection techniques for display of 3D scene on 2D screen and rendering of projected objects to naturalize the scene in 2D view.														
Course Outcomes: : Upon successful completion of this course, students should be able to:															
CO1	To <i>explain</i> the structure of modern computer graphics systems and <i>implement</i> its primitives														
CO2	To <i>design, develop</i> and <i>model</i> key algorithms for modeling and .														
CO3	Apply Graphics in greater depth to more complex courses like Image Processing, Virtual, Augmented Reality, etc														
CO4	To <i>visualize</i> surface detection and Virtual reality for a better visual effects.														
CO-PO & PSO Mapping															
Cos	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1	2	1												
CO2	3	3	1	1											
CO3	1	1													
CO4	1	2													
Avg.															
SYLLABUS															
UNIT:1 (10 Hours)															
Overview of Graphics System: Video Display Units, Raster-Scan and Random Scan Systems, Graphics Input and Output Devices, monitor and work station. Graphics output Primitives: point and line, drawing Algorithms: DDA and Bresenham’s, Circle drawing Algorithms: Midpoint Circle and Bresenham’s filled area primitives.															
UNIT:2 (12 Hours)															
Two Dimensional Geometric Transformations: Translation, rotation, Scaling, Reflection, Shear, Matrix Representation, Composite Transformations, Transformation between coordinate systems. Window-to- View port Coordinate Transformation. Line Clipping (Cohen-Sutherland Algorithm) and Polygon Clipping (Sutherland Hodgeman Algorithm).															
Three Dimensional Geometric and Modeling Transformations: Translation Rotation, Scaling, Reflections, shear, Composite Transformation. Projections: Parallel Projection and Perspective Projection.															
UNIT:3 (10 Hours)															
Object representation: Spline Representation, Bezier Curves and B-Spline Curves. Fractal Geometry: Fractal Classification and Fractal Dimension. Visible Surface Detection Methods: Back-face Detection, Depth Buffer, A- Buffer, Scan- line Algorithm and Painters Algorithm.															
UNIT:4 (12 Hours)															
Light pattern and Illumination Models: Aliasing and Anti aliasing, Half toning, Thresholding and Dithering, Basic Models, Displaying Light Intensities. Surface Rendering Methods: Polygon Rendering Methods: Gouraud Shading and Phong Shading.															

Computer Animation: Types of Animation, Key frame Vs. Procedural Animation, methods of controlling Animation, Morphing. Virtual Reality: Types of Virtual reality systems, Input and Output Virtual Reality devices
Teaching Methods: Chalk& Board/ PPT
Text Books: 2. <i>Computer Graphics with Virtual Reality System</i>, Rajesh K.Maurya, WileyDreamtech. 3. <i>Computer Graphics</i>, D. Hearn and M.P. Baker (C Version), Pearson Education
Reference Book: 1. <i>Computer Graphics Principle and Practice</i> , J.D. Foley, A.Dam, S.K. Feiner, Addison, Wesley 2. <i>Procedural Elements of Computer Graphics</i>- David Rogers (TMH) 3. <i>Computer Graphics: Algorithms and Implementations</i> – D.P Mukherjee &Debasish Jana (PHI) 4. <i>Introduction to Computer Graphics & Multimedia</i> – AnirbanMukhopadhyay

Subject Code		Subject Code								L	T	P	C		
BCSPE7034		Cryptography and Network Security								3	0	0	3		
Course Educational Objectives															
CEO1	Provide an Overview of Security Architecture and Number Theory used in Cryptography.														
CEO2	Introduce and Explain Different Security Algorithms and their Implementation.														
CEO3	Demonstrate Real-Time Security Threats & Security Types.														
CEO4	Identification of different key Security Issues in Email, IP & Web Security and Its Solution.														
Course Outcomes: : <i>Upon successful completion of this course, students should be able to:</i>															
CO1	Explain and use the concept of Number Theory in Cryptography.														
CO2	Design and implement of various Cryptography Algorithms.														
CO3	Interpret and Compare Different types of Authentication Application.														
CO4	Identify and Examine Key Security Issues in Email, IP and Web security.														
CO-PO & PSO Mapping															
Cos	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2													
CO2	3	2	2	3											
CO3	2	2	3	2											
CO4	3	2	2												
Avg.															
SYLLABUS															
UNIT:1 (10 Hours)															
INTRODUCTION & NUMBER THEORY: Services, Mechanisms and attacks-the OSI security architecture-Network security model-Classical Encryption techniques (Symmetric cipher model, substitution techniques, transposition techniques, steganography).FINITE FIELDS AND NUMBER THEORY: Groups, Rings, Fields-Modular arithmetic-Euclid's algorithm-Finite fields- Polynomial Arithmetic –Prime numbers-Fermat's and Euler's theorem-Testing for primality-The Chinese remainder theorem- Discrete logarithms.															
UNIT:2 (14 Hours)															
BLOCK CIPHERS & PUBLIC KEY CRYPTOGRAPHY: Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm. Public key cryptography: Principles of public key															

cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange-Elliptic curve arithmetic-Elliptic curve cryptography.	
HASH FUNCTIONS AND DIGITAL SIGNATURES: Authentication requirement- Authentication function – MAC – Hash function – Security of hash function and MAC –MD5-SHA-HMAC–CMAC-Digital signature and authentication protocols–DSS–ElGamal–Schnorr.	
UNIT:3	(12 Hours)
SECURITY PRACTICE & SYSTEM SECURITY: Authentication applications – Kerberos – X.509 Authentication services - Internet Firewalls for Trusted System: Roles of Firewalls – Firewall related terminology- Types of Firewalls - Firewall designs - SET for E-Commerce Transactions. Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security.	
UNIT:4	(10 Hours)
E-MAIL, IP & WEB SECURITY: E-mail Security: Security Services for E-mail-attacks possible through E-mail - establishing keys privacy-authentication of the source-Message Integrity-Non-repudiation-Pretty Good Privacy-S/MIME. IP Security: Overview of IPsec - IP and IPv6-Authentication Header-Encapsulation Security Payload (ESP)-Internet Key Exchange (Phases of IKE, ISAKMP/IKE Encoding). Web Security: SSL/TLS Basic Protocol-computing the keys- client authentication-PKI as deployed by SSL Attacks fixed in v3- Exportability-Encoding-Secure Electronic Transaction (SET).	
Teaching Methods: Chalk& Board/ PPT/Video Lectures	
Text Books:	
1. “Cryptography and Network Security: Principles and Practice” by William Stallings 2. Cryptography and Network Security”by Behrouz A.Forouzan,Debdeep Mukhopadhyaya	

Subject Code		Name of the Subject						L	T	P	C	QP			
BCSPC6020		Data Analytics						3	0	0	3	A			
Course Educational Objectives															
CEO1	Provide an insight into Data pre-processing, summarization, and visualization techniques.														
CEO2	Teach role of data analytics in business decision making.														
CEO3	Teach Model building and validation using various techniques.														
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>															
CO1	Understand and build regression models and use them for prediction														
CO2	Analyze data to infer underlying patterns and formulate recommendations.														
CO3	Outline the scope and limitations of several state-of-the-art data analytics methods.														
CO4	Implement different data analytics models in a business environment.														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3													
CO2	3	3	2												
CO3	3	3	3												
CO4	3	2	3	2	2										
Avg.															
SYLLABUS															
UNIT:1															
(10 Hours)															

Predictive Analytics: Linear Methods for Regression and Classification: Overview of supervised learning, Linear regression models and least squares, Multiple regression, Multiple outputs, Subset selection, Ridge regression, Lasso regression , Linear Discriminate Analysis , Logistic regression, Perception learning algorithm.	
UNIT:2	(10 Hours)
Neural Networks (NN), Support Vector Machines (SVM) and K-nearest Neighbor: Fitting neural networks, Back propagation, Issues in training NN, SVM for classification, Reproducing Kernels, SVM for regression, K-nearest-Neighbor classifiers (Image Scene Classification).	
UNIT:3	(10 Hours)
Unsupervised Learning and Random forests: Association rules, Cluster analysis, Principal Components, Random forests and analysis.	
Inferential Statistics and Prescriptive analytics Assessing Performance of a classification Algorithm (t-test, McNemar's test, Paired t-test, paired F-test), Analysis of Variance, Creating data for analytics through designed experiments. Introduction to big data and Challenges for big data analytics.	
UNIT:4	(10 Hours)
Implementation of following methods using R or Mat lab (One of the class tests with a weight age of 15 marks be used to examine these implementations): Simple and multiple linear regression, Logistic regression, Linear discriminate analysis, Ridge regression, Cross-validation and boot strap, Fitting classification and regression trees, K-nearest neighbors, Principal component analysis, K-means clustering.	
Teaching Methods: Chalk& Board/ PPT/Video Lectures	
Text Books:	
1. Trevor Hastie, Robert Tibshirani,Jerome Friedman , <i>The Elements of Statistical Learning-Data Mining, Inference,and Prediction,Second Edition , Springer Verlag, 2009.</i> 2. G.James,D.Witten,T.Hastie,R.Tibshirani-<i>An introduction to statistical learning with applications in R,Springer,2013.</i> 3. E.Alpaydin, <i>Introduction to Machine Learning, Prentice Hall Of India,2010.</i>	
Reference Books:	
1. C.M.Bishop –<i>Pattern Recognition and Machine Learning,Springer,2006</i> 2. L.Wasserman-<i>All of statistics</i>	

Subject Code		Subject	L	T	P	C	QP
BEEPE7042		Entrepreneurship Development	3	0	0	3	
Course Educational Objectives							
CEO1	Explore the entrepreneurial mindset and culture that has been developing in						
CEO2	Examine the entrepreneurial process involved in both pursuing an entrepreneurial venture within a large company and the creating and managing a new enterprise for implementation of an entrepreneurial venture.						
CEO3	Discuss the dynamics of participating on a business team and the power inherent in a team relative to individual effort						
CEO4	Provide the background and tools necessary to understand and participate in the entrepreneurial process within a large company, in a new venture or as an investor						
Course Outcomes							
CO1	Understand the concepts of entrepreneurship and skills required to be an entrepreneur						
CO2	Identify the Business Opportunities to and evaluate the feasibilities of the Project;						
CO3	Understand the formalities for setting up of a new venture and know the concepts of						
CO4	Evaluate different financial institutions supporting small scale industry.						
CO5	Develop skills of managing Finanace, Marketing and HR of a business organization						
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CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1						3									
CO2						0		3			3				
CO3						0			2		2				
CO4						0					3				
CO5						0			3						
AVG						0.6		0.6	1		1.6				
SYLLABUS															
Unit – I													[10Hrs]		
Concept of Entrepreneurship, Motivation for Economic Development and Entrepreneurial Achievement, Enterprise and Society Why and how to start Business – Entrepreneurial traits and skills, Mind Vrs Money in Commencing New Ventures, Entrepreneurial success and failures, Environmental dynamics and change. Entrepreneurial Process Step by step approach to entrepreneurial start up Decision for Entrepreneurial start up.															
Unit - II													[10Hrs]		
Identifying the Business opportunity - Business opportunities in various sectors, formalities for setting up small enterprises in manufacturing and services, Environmental pollution and allied regulatory and non-regulatory clearances for new venture promotion in SME sector. Writing a Business plan, components of a B-Plan, determining Bankability of the project.															
Unit – III													s[10 Hrs]		
Central / State level Institution promoting SME. Financial Management in small business. Marketing Management, problems & strategies Problems of HRM – Relevant Labour – laws. Sickness in Small Enterprises. Causes and symptoms of sickness – cures of sickness. Govt. policies on revival of sickness and remedial measures.															
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert/MOOCs															
Text Book:															
1. Robert Hisrich, & Michael Peters: Entrepreneurship, TMH, 2009.Dollinger: Entrepreneurship, Pearson, 2009.															
Reference Book:															
1. Agarwal: Indian Economy, WishwaPrakashan 2009.															
2. Dutt&Sundaram: Indian Economy,S.Chand, 2009															
3. B D Singh.:Industrial Relations &Labour Laws, Excel, 2009.															
4. ArunaKaulgud: Entrepreneurship Management by, Vikas publishing house, 2009.															
5. Essential of entrepreneurship and small business management by Thomas W.Zimmerer& Norman M.Searborough, PHI-2009.															
6. ND Kapoor: Industrial Law, Sultan Chand & Sons, 2009															

VIII Semester [Fourth Year]
B. Tech in Computer Science and Engineering (2021 Admission)

SN	CC	Sub Code	Name of the Subject	L	T	P	C	ISA	ESA
THEORY									
1	PE		PE-VI (From Bucket)	3	0	0	3	30	70
2	OE		OE-IV (From Bucket)	3	0	0	3	30	70
3	HS		Human Resource Management / Entrepreneurship Development	2	1	0	3	30	70
			TOTAL	8	1	0	9	90	210
PRACTICAL/SESSIONAL									
4	PST		Major Project Work-II	0	0	16	4	70	30
5			Technical Seminar	0	0	2	1		50
			TOTAL	0	0	18	5	70	80
			TOTAL	8	1	18	14	160	290

BUCKETS FOR PROFESSIONAL ELECTIVES

Sl. No.	Semester	Professional Elective VI
1	VIII	Block Chain Technology
2		Malware Analysis
3		Cyber Law

BUCKETS FOR OPEN ELECTIVES

Sl. No.	Semester	Open Elective IV & V
1	VIII	Real Time Systems
2		Embedded Systems
3		E-Commerce & ERP
4		Cyber Security
5		Digital Forensics

Subject Code		Name of the Subject										L	T	P	C	
		Malware Analysis										3	0	0	3	
Course Educational Objectives																
CEO1: Understand the fundamentals of Dynamic and Static analysis & Gain knowledge about running malware in a virtual environment.																
CEO2: Study about disassembly constructs and their structures.																
CEO3: Study about new processors and file types using the IDA SDK																
CEO4: Explore popular plug-ins that make writing IDA scripts easier, allow collaborative reverse engineering & understand how to best approach the subject of Android malware threats and analysis.																
Course Outcomes: <i>Upon successful completion of this course, students should be able to:</i>																
CO1	Gain knowledge about the different forms of malware.															
CO2	Set up a safe virtual environment to analyze malware & navigate, comment, and modify disassembly															
CO3	Use code graphing to quickly make sense of cross-references and function calls & Use IDA's built-in debugger to tackle hostile and obfuscated code.															
CO4	Learn procedures for recognizing and analyzing Android malware threats quickly and effectively.															
CO-PO & PSO Mapping																
Cos	PROGRAMME OUTCOMES												PSOs			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2														
CO2	3	2	2													
CO3	3	3														
CO4	2	3														
Avg.																
SYLLABUS																
UNIT:1 (14 Hours) The Goals of Malware Analysis, Malware Analysis Techniques, Types of Malware, General Rules for Malware Analysis, Antivirus Scanning, Hashing- Fingerprint for Malware, Finding Strings, Packing Files, Detecting Packers with PEiD, Portable Executable File Format, Static, Runtime, and Dynamic Linking, Exploring Dynamically Linked Functions with Dependency Walker, Imported and Exported Functions, PotentialKeylogger.exe: An Unpacked Executable, Examining PE Files with PEview, Viewing the Resource Section with Resource Hacker, Using Other PE File Tools, PE Header Summary.																
UNIT:2 (12 Hours) The Structure of a Virtual Machine, Creating Your Malware Analysis Machine, Using Malware Analysis Machine, The Risks of Using VMware for Malware Analysis, Record/Replay: Running Your Computer in Reverse, Sandboxes: The quick-and-dirty Approach, Running Malware, Monitoring with Process Monitor, Viewing Processes with process Explorer, Comparing Registry Snapshots with Regshot, Faking a Network, Packet Sniffing with Wireshark, Using INetSim, Basic Dynamic tools in practice, Reverse-Engineering, The x86 Architecture, Recognizing C Code Construct in Assembly.																
UNIT:3 (12 Hours) Disassembly Theory, The Why and how of Disassembly, Reversing and Disassembly tools, Getting started with IDA, IDA Data Displays, Disassembly Navigation, Disassembly																

Unit – I [12 Hrs] ERP and Related Technologies: Overview of enterprise, Related Technologies, Business intelligence, Business process reengineering, Data warehousing, Data mining, Online analytical processing, Product life cycle management, Supply chain management, Customer relationship management, Management information system, Decision support system, Executive information system. ERP Implementation: Implementation Challenges, Strategies, Life Cycle, Pre-implementation Tasks, Requirements Definition, Methodologies, Package selection, Project Teams, Process Definitions, Vendors and Consultants, Data Migration, Project management, Post Implementation Activities.
Unit - II [10 Hrs] ERP in Action and Business Modules: Operation and Maintenance, Performance, Maximizing the ERP System, benefits of ERP Business Modules: Finance, Manufacturing, Human Resources, Plant maintenance, Materials Management, Quality management, Marketing, Sales, Distribution and service.
Unit – III [10 Hrs] Introduction to ERP tools: Marketplace, Dynamics, SAP AG, Oracle, PeopleSoft, JD Edwards. ERP Case studies: E-Commerce to E-business, E-Business structural transformation, Flexible business design, Customer experience, Create the new techno enterprise, New generation ebusiness leaders, Memo to CEO, Empower your customer, Integrate Sales and Service, Integrated enterprise applications.
Unit – IV [10 Hrs] Introduction to E-Commerce: Business models, Revenue models and business processes, Opportunities and nature of ecommerce, Internet protocols, Internet and semantic web, Selling on the Web and Marketing on the Web, Business to Business Strategy from Electronic Data Interchange to E-Commerce. E-Commerce Software and Payment Systems: Web hosting alternatives, Basic and advance functions of e-commerce software, Software for small, Mid-size and large businesses, Online payment basic, Payment cards, Electronic cash, Electronic wallets, Stored value cards, Internet technologies and banking.
Teaching Methods: Chalk& Board/ PPT/Video Lectures/Lecture by Industry Expert/MOOCs
Text Book: 1. Alexis Leon, “Enterprise Resource Planning”, 2nd edition, Tata McGraw Hill. 2. Alexis Leon, “Enterprise Resource Planning – Diversified”, 2nd edition, TMH.
Reference Book: 1. Ravi Shankar & S. Jaiswal, “Enterprise Resource Planning”, Galgotia. 2. Schneider, “E-commerce”, 7th edition, Course Technology of Thomson Learning. 3. Ravi Kalakota, “Frontiers of e-commerce”, 1st edition, Pearson

Subject Code	Name of the Subject										L	T	P	C	
	Human Resource Development										3	0	0	3	
Course Outcomes: : Upon successful completion of this course, students should be able to:															
CO1	Knowledge of basic Human Resource Practices														
CO2	Make suitable career plan and development														
CO3	Understand the impacts of performance appraisal and compensation														
CO4	Implement competency mapping, training and development, employee management etc.														
CO-PO & PSO Mapping															
COs	PROGRAMME OUTCOMES												PSOs		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	3	3	3	3	-	-	-	3	2	2	3	3	3	3
CO2	3	3	3	3	3	-	-	-	3	2	2	3	3	3	3
CO3	3	1	2	3	3	-	-	-	3	2	2	3	3	3	3
CO4	3	3	3	3	3	-	-	-	3	2	2	3	3	3	3
Avg.															
SYLLABUS															
UNIT:1 (12 Hours)															
Concept, Definitions and Objectives of Human Resource Management (HRM); Functions of HRM; Process of HRM; Relationship between HRM and HRD.															
The challenges for HRM – Environmental, organizational and Individual. Role and functions of HR managers in the changing business scenario. Human Resources Planning – Meaning and Process.															
UNIT:2 (12 Hours)															
Recruitment – concept, objectives, legal framework regulating recruitment in India, Selection – Objectives and methods, Test and interviews, Induction and orientation, validity and reliability of Tests and interviews.															
Career Planning – concept, objectives. Different stages of career and its implications, Methods of career planning and development, Promotion – types and process, Transfer – types. Separations including lay off and retrenchment															
UNIT:3 (10 Hours)															
Training & Development: Concept, Training need analysis and Methods of training (on-the-job and off-the-job training), Evaluation of Training effectiveness;															
Performance Appraisal – concept objectives and methods – management by objectives (MBO), Assessment centre, 360 degree feedback. Appraisal errors. Competency mapping – concept, objectives and the process.															
UNIT:4 (12 Hours)															
Compensation Management – Meaning of Compensation; Types of compensation, objectives and principles. wage & salary. Wage concept – minimum wage, Fair wage, living wage. nominal wage and real wage.															
Components of wages, methods of wage determination, Methods of job evaluation, wage differentials and its functions															
Teaching Methods: Chalk& Board/ PPT/Video Lectures															
Text Books:															
1.Garry Dessler – Human Resource Management, Pearson / PHI															
2. V.S.P. Rao – Human Resource Management, Excel Books															
3. Personnel & HRM – P. subha Rao, Himalaya Publishing House.															
Reference Books:															
1. HRM - Text and cases – Aswathappa, THM															

