S.A. ENGINEERING COLLEGE, CHENNAI -77.

(An Autonomous Institution-Affiliated to Anna University)

B.TECH COMPUTER SCIENCE AND BUSINESS SYSTEMS

REGULATION 2024

CHOICE BASED CREDIT SYSTEM

I SEMESTER CURRICULUM

I SEMESTER

S.NO	Course Code	Course Title	Category	Contact Hours	L	T	P	C
		THEORY						
1	TA3101	Heritage of Tamils	HS	1	1	0	0	1
2	HS3101	Professional English I	HS	3	3	0	0	3
3	MA3101	Matrices and Calculus	BS	4	3	1	0	4
4	PH3101	Engineering Physics	BS	3	3	0	0	3
5	CY3101	Chemistry For Engineers	BS	3	3	0	0	3
6	CS3101	Programming for problem solving using C	PC	3	3	0	0	3
		PRACTICALS						
7	BS3101	Physics and Chemistry Laboratory	BS	4	0	0	4	2
8	CS3102	Programming for problem solving using C Laboratory	PC	4	0	0	4	2
9	GE3201	Engineering Practices Laboratory	ES	4	0	0	4	2
			TOTAL	29	16	1	12	23

		L	T	P	C
		1	0	0	1

TA3101   தமிழர் மரபு

அலகு I   மொழி மற்றும் இலக்கியம்:   **3**

இந்திய மொழிக் குடும்பங்கள் - திராவிட மொழிகள் - தமிழ் ஒரு செம்மொழி - தமிழ் செவ்விலக்கியங்கள் சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை - சங்க இலக்கியத்தில் பகிர்தல் அறம் - திருக்குறளில் மேலாண்மைக் கருத்துக்கள் - தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் - சிற்றிலக்கியங்கள் - தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி - தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு II   மரபு - பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை - சிற்பக் கலை:   **3**

நடுகல் முதல் நவீன சிற்பங்கள் வரை - ஐம்பொன் சிலைகள்- பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் - தேர் செய்யும் கலை - சுடுமண் சிற்பங்கள் தெய்வங்கள் - குமரிமுனையில் திருவள்ளுவர் சிலை - இசைக் கருவிகள் - மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் - தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு III   நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்:   **3**

தெருக்கூத்து, கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு IV   தமிழர்களின் திணைக் கோட்பாடுகள்:   **3**

தமிழகத்தின் தாவரங்களும், விலங்குகளும் - தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் தமிழர்கள் போற்றிய அறக்கோட்பாடு - சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும், கல்வியும் சங்ககால நகரங்களும் துறை முகங்களும் - சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு V   இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு:   **3**

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு - இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் - சுயமரியாதை இயக்கம் - இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு - கல்வெட்டுகள், கையெழுத்துப்படிகள் - தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

TOTAL : 15 PERIODS

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).

2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).

3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)

4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference Book.

| | | L | T | P | C |

HS3101   **PROFESSIONAL ENGLISH I**   L T P C

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COURSE OBJECTIVES:

- To improve the communicative competence of learners

- To learn to use basic grammatical structures in suitable contexts

- To acquire lexical competence and use them appropriately in a sentence and understand

- their meaning in a text

- To help learners use language effectively in professional contexts

- To develop learners' ability to read and write complex texts, summaries, articles, blogs,

- Definitions, essays and user manuals.

UNIT I   INTRODUCTION TO FUNDAMENTALS OF COMMUNICATION   9
Reading - Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails and introduction to effective communication. Listening - Listening for gist, Innovative Video making; Writing - Writing emails, letters in general contexts. Grammar - Content vs Function words; Question types: Wh/ Yes or No/ and Tags. Vocabulary - Sentence Completion; Abbreviations & Acronyms (as used in technical contexts).

UNIT II   NARRATION AND SUMMATION   9
Reading - Reading biographies, travelogues, Excerpts from literature, Writing - Guided writing—Paragraph writing (Analytical, Narrative, Compare & Contrast), Short Report on an event (field trip etc.) Grammar –Tenses (All three tenses) Worksheet 2; and Prepositions. Vocabulary - Word forms (prefixes&; suffixes); Phrasal verbs. Speaking- Asking & Giving Directions. Listening-Listening to INK Talks.

UNIT III   DESCRIPTION OF A PROCESS/PRODUCT   9
Reading – Reading advertisements, gadget reviews and user manuals, reviewing a short story. Writing – Writing definitions; Instructions. Grammar – Subject-Verb agreement; Adjectives; Degrees of comparison; Vocabulary - Compound Nouns, discourse markers (connectives & sequence words).

UNIT IV   CLASSIFICATION AND RECOMMENDATIONS   9
Reading – Newspaper articles and Non Verbal Communication (tables, pie charts etc.) Writing –Note-making / Note-taking (*Study skills to be taught, not tested)Flash Cards; Writing recommendations; Transferring information from non- verbal (chart , graph etc. to verbal mode) Grammar – Articles; Pronouns - Possessive & Relative pronouns. Vocabulary – Collocation and Compound Nouns; Fixed /Semi fixed expressions.

UNIT V   EXPRESSION   9
Reading – Reading Sports Articles; and Opinion Blogs; Writing – Essay Writing (Descriptive or narrative). Grammar –Punctuation; and Simple, Compound & Complex Sentences. Vocabulary - Cause & Effect Expressions. Speaking - PPT preparation and poster presentation

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: To use appropriate words in a professional and general context and read and infer the denotative and connotative meanings of technical contexts.

CO2: To gain understanding of basic grammatical structures and use them in paragraph writing.

CO3: To write definitions, descriptions and narrations.

CO4: To interpret the information in any form and give probable suggestions

CO5: To write essays on various topics

CO6: To Mind-map the ideas and post reviews in blogs, sites

TEXTBOOKS

1. English for Engineers & Technologists Orient Blackswan Private Ltd. Department of English, Anna University, (2020 edition) English for Science & Technology Cambridge University Press, 2021.

2. Authored by Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. K N. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES

1. Technical Communication – Principles And Practices By Meenakshi Raman & Sangeeta Sharma, Oxford Univ. Press, 2016, New Delhi.

2. A Course Book On Technical English By Lakshminarayanan , Scitech Publications (India) Pvt. Ltd.

3. English For Technical Communication (With CD) By Aysha Viswamohan, Mcgraw Hill Education, ISBN : 0070264244.

4. Effective Communication Skill, Kulbhusan Kumar, RS Salaria, Khanna Publishing House.

5. Learning to Communicate – Dr. V. Chellammal, Allied Publishing House, New Delhi, 2003.

6. English Grammar in Use – Raymond Murphy- Cambridge, Fifth edition

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
HS3101.1	0	0	0	0	0	1	3	2	3	3	3	2
HS3101.2	0	0	0	0	0	3	3	1	3	2	2	1
HS3101.3	0	0	0	0	0	1	2	3	3	3	3	2
HS3101.4	0	0	0	0	0	3	3	2	3	2	1	2
HS3101.5	0	0	0	0	0	1	2	3	3	3	3	1
HS3101.6	0	0	0	0	0	2	3	1	3	3	3	3

MA3101   MATRICES AND CALCULUS   L T P C
                                                                       3 1 0 4

COURSE OBJECTIVES:

- To Understand the concepts of Matrices which are needed for practical applications.

- To familiarize the students with differential calculus.

- To make the student acquire sound knowledge of techniques in solving ordinary differential equations of higher order that model in various engineering problems.

- To familiarize the student with functions of several variables that is needed in many branches of engineering.

- To acquaint the student with mathematical tools needed in evaluating multiple integrals and their usage.

UNIT I   MATRICES   12
Eigen values and Eigen vectors of a real matrix – Properties of Eigen values - Cayley-Hamilton theorem (excluding proof) – Diagonalization of matrices - Reduction of Quadratic form to canonical form by using orthogonal transformation - Nature of a Quadratic form.

UNIT II   DIFFERENTIAL CALCULUS   12
Representation of functions – Limit of a function – Continuity – Derivatives – Differentiation rules Maxima and Minima of functions of one variable.

UNIT III   DIFFERENTIAL EQUATIONS   12
Higher order linear differential equations with constant coefficients- Method of undetermined coefficients - Method of variation of parameters – Homogenous equation of Euler's and Legendre's type – System of simultaneous linear differential equations with constant coefficients.

UNIT IV   MULTIVARIABLE CALCULUS   12
Partial derivatives (excluding Euler's theorem) – Total derivative – Differentiation of implicit functions – Jacobian and properties – Taylor's series for functions of two variables – Maxima and minima of functions of two variables– Lagrange's method of undetermined multipliers.

UNIT V   MULTIPLE INTEGRALS   12
Double integrals – Change of order of integration – Double integrals in polar co-ordinates – Area enclosed by plane curves – Triple integrals – Volume of solids – Change of variables in double and triple integrals.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: Use the matrix algebra methods to diagonalize the matrix.

CO2: Apply differential calculus tools in solving various engineering problems

CO3: Use both the limit definition and rules of differentiation to differentiate functions. Apply differentiation to solve maxima and minima problems.

CO4: The subject helps the students to develop the fundamentals and basic concepts in ODE

CO5: Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.

TEXTBOOKS

1. Grewal, B.S., Higher Engineering Mathematics, 43rd Edition, Khanna Publishers, 2016.

2. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, Inc., 2016.

3. James Stewart, "Calculus : Early Transcendentals", Cengage Learning, 8th Edition, New Delhi, 2015.

REFERENCES

1. Bali, N.P., Goyal, M., Watkins, C., Advanced Engineering Mathematics, Laxmi Publications Pvt. Limited, 2007.

2. Boyce, W.E., andDiPrima, R.C., Elementary Differential Equations and Boundary Value Problems, Wiley India, 2012.

3. Dennis G, Zill, Michael R.Cullen., "Differential Equations with boundary value problems", Cengage Learning, 7th Edition, New Delhi, 2009.

4. GeorgeB.ThomasJr., MauriceD.Weir, JoelR.Hass, Thomas'Calculus:Early Transcendental, 13th Edition, Pearson Education, 2013.

5. O'Neil. P. V., "Advanced Engineering Mathematics", 7th Edition, Cengage Learning India Pvt., Ltd, New Delhi, 2011.

6. T.Veerarajan, Engineering Mathematics, Mc Grawhill Publications, New Delhi 2017.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
MA3101.1	3	3	1	1	1	0	0	0	2	0	2	3
MA3101.2	3	3	1	1	1	0	0	0	2	0	2	3
MA3101.3	3	3	1	1	1	0	0	0	2	0	2	3
MA3101.4	3	3	1	1	1	0	0	0	2	0	2	3
MA3101.5	3	3	1	1	1	0	0	0	2	0	2	3

PH3101	ENGINEERING PHYSICS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To Understand and identify different crystal structures and their imperfections

- To Explain the elastic and thermal properties of materials and understand their significance

- To Provide an overview of the production, detection and applications of ultrasound

- To Explain the origin of laser action, production of laser, fiber optics and their applications

- To Develop an understanding of quantum mechanical phenomena and their applications

UNIT I   CRYSTAL PHYSICS   **9**

Crystalline and Amorphous solids – single crystalline and Polycrystalline solids - Lattice – Unit cell– Bravais lattice – Lattice planes – Miller indices – interplanar spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius –Packing factor for SC, BCC, FCC and HCP structures – Crystal Defects – Point, line and Volume defects.

UNIT II   PROPERTIES OF MATTER AND THERMAL PHYSICS   **9**

Elasticity- Hooke's law - stress -strain diagram– Poisson's ratio –Factors affecting elasticity– Torsional stress & deformations – Twisting couple – Torsion pendulum - theory and experiment - Uniform & Non uniform bending: theory and experiment - I-shaped girders. Modes of heat transfer – conduction, convection and radiation - thermal conductivity–- Lee's disc method – Heat transfer application in Engineering.

UNIT III   ULTRASONICS AND NDT   **9**

Introduction – production – magnetostriction effect – magnetostriction generator – piezoelectric effect – piezo electric generator –properties –detection – cavitation –acoustic grating – velocity measurement – applications –Sonar –velocity of blood flow – NDT –Liquid Penetrant method – Ultrasonic flaw detector – A scan, B scan, C scan – X- ray radiography and fluoroscopy – Thermography- Strategies for minimizing transmission loss using coupling agents

UNIT IV   LASER AND FIBRE OPTICS   **9**

Characteristics of Laser - spontaneous emission - stimulated emission- population inversion – pumping methods - conditions for Laser action - Types of lasers – Nd: YAG, He – Ne, Semiconductor Lasers – Homojunction diode Laser – Heterojunction diode Laser - Industrial and Medical Applications. Principle and propagation of light in optical fibers – Numerical aperture and Acceptance angle - Fibre Optical Communication system (Block diagram) – Mechanisms of Attenuation, Types of losses in fiber optic communication systems, , Applications of fiber optic communication system.

UNIT V   BASIC QUANTUM PHYSICS   **9**

Inadequacy of classical physics- Photons and light waves- Electrons and matter waves- G.P.Thomson Experiment- wave function and physical significance- Schrodinger wave equation (Time dependent and independent forms) – Application of one dimensional of box- Barrier penetration and quantum tunneling(qualitative)- Scanning tunneling microscope.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Analyze the crystal structures and their defects.

CO2: Demonstrate and explain the general concepts of elastic and thermal properties of materials

CO3: Analyze the applications of ultrasonic in engineering and medical disciplines

CO4: Elucidate the principle and working of lasers and optical fibers, and their applications in the field of industry, medicine and telecommunication

CO5: Understand the importance of quantum physics and apply quantum mechanical principles towards material diagnostics

CO6: Demonstrate a strong knowledge in optics.

TEXTBOOKS

1. Gaur R.K and Gupta, S.L, Engineering Physics, Dhanpat Rai Publishers, 2012.

2. Serway R.A and Jewett J.W, Physics for Scientists and Engineers, Cengage Learning, 2010.

REFERENCES

1. Halliday D, Resnick R and Walker J, Principles of Physics, Wiley, 2015.

2. Tipler P.A and Mosca G, Physics for Scientists and Engineers with Modern Physics, WH Freeman, 2007.

3. Avadhanulu M. N and Kshirsagar P. G, A Text Book of Engineering Physics, S. Chand & Co. Ltd., Ninth Revised Edition, 2012.

4. You tube link: https://www.youtube.com/watch?v=XEzJCuWfVuo

5. You tube link: https://www.youtube.com/watch?v=kIVfjRW-INM

6. You tube link: https://www.youtube.com/watch?v=nMfOo7HhybY

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH3101.1	3	1	1	2	0	0	1	0	0	0	0	1
PH3101.2	3	1	1	2	0	0	1	0	0	0	0	1
PH3101.3	3	1	1	2	0	0	1	0	0	0	0	1
PH3101.4	3	1	1	2	0	0	1	0	0	0	0	1
PH3101.5	3	1	1	1	0	0	1	0	0	0	0	1
PH3101.6	3	1	1	2	0	0	1	0	0	0	0	1

CY3101	CHEMISTRY FOR ENGINEERS	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To make the students conversant with hardness, boiler feed water requirements, related problems and water treatment techniques

- To develop an understanding of different advanced polymeric materials.

- To impart knowledge about the nanomaterial synthesis, properties and applications

- It enables the students to gain information about Electrochemical reaction, corrosion and its prevention.

- To make the students familiar with the different types of Engineering materials.

- To help the students to recognize different categories of sustainable energy sources.

UNIT I   WATER TREATMENT AND TECHNOLOGY   9

Introduction – Water quality parameters - Hardness of water – types – expression of hardness – units – Determination of Hardness by EDTA method. Boiler troubles (scale & sludge - Caustic Embrittlement) - Softening of hard water – external treatment process: Demineralization, internal treatment process: boiler compounds (phosphate, calgon and colloidal conditioning) – Application of Artificial intelligence in water treatment process - Desalination of brackish water by Reverse Osmosis.

UNIT II   ADVANCED POLYMERIC MATERIALS   9

Basics of Polymers -Definition, Classification, Properties. Advanced polymer introduction, preparation, properties and applications of:(1) Conducting Polymer-Nafion; (2) Polymer optical fiber - PMMA; (3) Piezoelectric polymer-PVDF: (4) Intelligent polymers- (a)Shape memory polymer (SMP) –Polyurethane (b) Self-Healing Polymers-Hydrogel (c) Electro active polymer-PANI

UNIT III   NANO CHEMISTRY   9

Introduction to Nanoscience; Scope and General properties of bulk-materials and nanomaterials - Chemical methods of synthesis of Nanomaterials & its advantages - Chemical vapor deposition method, Precipitation method. Properties and applications of Nanowires, Nanorods, Nanotubes and Nanoclusters.; CNTs-Single walled & Multiwalled . CNTs. Nanomaterials for Green systems - Green materials including biomaterials, biopolymers, Bioplastics and composites. Nanotech Materials for Truly Sustainable Construction: Windows, Skylights, and Lighting. Application of Nanomaterials (Medicine, Electronics, Catalyst and Agriculture).

UNIT IV   ELECTROCHEMISTRY AND CORROSION   9

Introduction – Cell terminology –Electrodes–origin of electrode potential–single electrode potential, standard electrode. Electrochemical cells- Electrochemical series and its applications. Electrochemical techniques for corrosion measurement. Corrosion: Dry & wet corrosion – mechanism, Corrosion Control- Material selection and design aspects – corrosion prevention – corrosion inhibitors.

UNIT V   ENGINEERING MATERIALS   9

Alloys-Properties of alloys- Significance of alloying- ferrous alloys (stainless steel and carbon steels) -non-ferrous alloys (brass and bronze) - Special alloys (shape memory alloys). Lubricants - Characteristics of lubricants - viscosity, viscosity index, oiliness, flash point and fire point, cloud point and pour point - solid lubricant (graphite). Role of Machine learning in Materials selection.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Categorize the hardness of water, related problems and its treatment and explore the utilization of AI in water treatment. (Understanding)

CO2: Recognize the characteristics and applications of various polymeric materials.

CO3: Classify the synthesis methods, properties, and applications of nano materials.

CO4: Exemplify electrochemical cells, categorize types of corrosion, and outline methods for corrosion control. (Understanding)

CO5: Select the appropriate materials for Engineering applications.

CO6: Identify the classifications of sustainable energy options.

TEXTBOOKS

1. Jain P.C. and Monica Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2010

REFERENCES

1. Shashi Chawla, "Test book of engineering chemistry" Gagan Kapur publishers, 2020.

2. Shree Meenakshi, "Engineering Chemistry", Bharathi Publishers, Chennai, 2021.

3. Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2010.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CY3101.1	2	1	1	0	0	1	1	0	0	0	0	0
CY3101.2	2	1	1	0	0	1	1	0	0	0	0	0
CY3101.3	2	1	2	0	0	1	0	0	0	0	0	0
CY3101.4	2	1	0	0	0	0	1	0	0	0	0	0
CY3101.5	1	1	1	0	0	1	1	0	0	0	0	0
CY3101.6	1	1	0	0	0	1	1	0	0	0	0	0

CS3101 PROGRAMMING FOR PROBLEM SOLVING USING C **L T P C**

3 0 0 3

COURSE OBJECTIVES:
To develop C Programs with

- Basic programming constructs.

- Arrays and strings.

- Functions and pointers.

- Applications in C using structures.

- Input/output and file handling in C.

UNIT I   INTRODUCTION TO PROGRAMMING AND BASICS OF C PROGRAMMING   **9**
Introduction to programming paradigms. Introduction to components of a computer system, Idea and Representation of Algorithm, From algorithms to programs. Introduction to C, C Programming: Tokens, Identifiers, Keywords, Data Types, Variables, Constants, Input/ Output statements, C Operators, Expressions, Type conversion. Control structures: Decision-making statements, Looping statements, Switch case, Break, Continue, goto statements.

UNIT II   ARRAYS AND STRINGS   **9**
Introduction to Arrays. One dimensional array: Declaration, Initialization, Accessing the elements, Bubble sort, Selection sort, Linear search, Binary search. Two-dimensional arrays: Declaration, Initialization, Accessing the elements, Matrix Operations (Addition, Scaling, Multiplication, Transpose). Strings: Reading, Writing, String handling functions, String Arrays.

UNIT III   FUNCTIONS AND POINTERS   **9**
Introduction to functions: Function prototype, function definition, function call, Built- in functions (string functions, math functions), User defined functions. Recursion, Types of Recursion, Computation of Sine series, Scientific calculator, Scope of variables, Storage Classes. Introduction to Pointers, Declaration, Null Pointers, Arrays of pointers, Parameter passing: Pass by value, Pass by reference.

UNIT IV   STRUCTURES   **9**
Introduction to Structures, Declaration, Initialization, Accessing members. Nested Structures. Arrays of structures. Structures and functions. Pointers to structures. Unions. Programs using structures and Unions, Enumerated data type. Dynamic Memory Allocation.

UNIT V   FILE PROCESSING AND GRAPHICS PROGRAMMING   **9**
Introduction to Files, Types of files: text file, binary file. File operations: open, close, read, write, append. Sequential access file, Random access file, Introduction to Graphics Programming in C basic concepts in graphics programming.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, students would:

CO1: Demonstrate simple applications in C using basic constructs

CO2: Design and implement applications using arrays and strings

CO3: Design and implement applications in C using functions and pointers.

CO4: Develop applications in C using structures.

CO5: Create applications using sequential and random access file Processing.

CO6: Discover the advanced concepts in dynamic memory allocation.

TEXTBOOKS

1. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.

2. Reema Thareja, "Computer fundamentals and programming in C "Second Edition New 2016

3. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2006

REFERENCES

1. Paul Deitel and Harvey Deitel, "C How to Program", Seventh editin, Pearson Publication

2. Juneja, B.L and Anita Seth , "Programming in C", CENGAGE Learning India pvt.Ltd., 2011

3. Pradip Dey , Manas Ghosh, "Fundamentals of Computing and Programming in C", First Edition, Oxford University Press, 2009.

4. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling

5. Kindersley(India)Pvt.Ltd., PearsonEducationinSouthAsia, 2011.

6. Byron S. Gottfried, "Schaum's Outline of Theory and Problems of Programming with C",

7. McGraw-Hill Education, 1996. C", , McGraw-HillEducation, 1996.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS3101.1	3	2	2	0	2	0	0	0	0	0	0	0
CS3101.2	3	1	1	1	1	2	0	0	0	0	0	0
CS3101.3	3	2	2	2	1	3	0	0	0	0	0	0
CS3101.4	3	2	2	2	1	3	0	0	0	0	0	0
CS3101.5	2	1	1	1	1	2	0	0	0	0	0	0
CS3101.6	2	1	1	1	1	1	0	0	0	0	0	1

BS3101	PHYSICS AND CHEMISTRY LABORATORY	L	T	P	C
		0	0	4	2

COURSE OBJECTIVES:

- To acquaint the students with practical knowledge of physics principles in various fields such as optics, thermal physics, and properties of matter for developing basic experimental skills.

- To impart the knowledge in the quantitative chemical analysis of water.

- To learn about the basics of instrumental analysis-conductivity meter, and potentiometer.

- Examine the chloride content in water sample.

LIST OF EXPERIMENTS (PHYSICS-OUT OF 7 ANY 5)

EXP.I - Determination of Young's modulus of the material of the given beam by uniform bending method.

EXP.II - Determination of rigidity modulus of the material of the given wire using torsion pendulum.

EXP.III - Determination of velocity of sound in the given liquid and compressibility of the liquid using Ultrasonic interferometer.

EXP.IV - Determination of wavelength of laser, Numerical aperture, and acceptance angle of an optical fiber

EXP.V - Determination of energy band gap of the semiconductor.

EXP.VI - Determination of coefficient of thermal conductivity of the given bad conductor using Lee's disc.

EXP.VII - Determination of Solar cell characteristics

LIST OF EXPERIMENTS(CHEMISTRY-OUT OF 7 ANY 5)

EXP. I - Determination of total, temporary & permanent hardness of water by EDTA method.

EXP. II - Determination of DO content of water sample by Winkler's method.

EXP. III - Estimation of sulphate ion in drinking water by Conductivity method

EXP. IV - Estimation of iron content of the given solution using potentiometer.

EXP. V - Determination of molecular weight of polyvinyl alcohol using Ostwald viscometer.

EXP. VI - Conductometric titration of strong acid vs strong base.

EXP. VII - Determination of chloride content of water sample by Argentometric method.

13

TEXTBOOKS

1. J.D. Wilson C.A. Hernandez Hall "Physics Laboratory Experiments" Houghton Mifflin Company, New York, 2010.

2. M.N. Srinivasan, S. Balasubramanian & R. Ranganathan, "Practical Physics", S. Chand & Sons educational publications, New Delhi, 2011.

3. R. Sasikumar, "Practical Physics", PHI Learning Pvt. Ltd., New Delhi, 2011.

REFERENCES

1. https://www.vlab.co.in/broad-area-physical-sciences

2. https://vlab.amrita.edu/?sub=1

3. Dr. D.Reuben Jonathan "Engineering Chemistry Laboratory Manual", 2nd Edition, D.D.Publications (2010)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BS3101.1	3	2	1	1	0	0	0	0	0	0	0	0
BS3101.2	3	3	1	1	0	0	0	0	0	0	0	0
BS3101.3	3	2	1	1	0	0	0	0	0	0	0	0
BS3101.4	2	2	1	1	0	0	0	0	0	0	1	1
BS3101.5	1	1	1	0	0	0	0	0	0	0	0	1
BS3101.6	1	0	0	0	0	0	0	0	0	0	0	1

                                                                                                            0 0 4 2

COURSE OBJECTIVES:
To develop C Programs with

- Basic programming constructs.

- Control Statements

- Arrays, Strings and Pointers

- Functions and structures.

- File Processing.

LIST OF EXPERIMENTS

1. Input and Output statements.

2. Control statements – Branching & Looping.

   - Write a C program to generate Pascal's triangle.

   - Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result. (Consider the operators +, -, *, /, Switch Statement)

   - Write a C program to find the sum of individual digits of a positive integer.

   - A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.

   - Write a C program to generate the first n terms of the sequence.

   - Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

   - Write a C program to swap Numbers Using Temporary Variables.

3. Arrays

   - Write a C program to search an array element using linear search.

   - Write a C program to find both the largest and smallest number in a list of integers.

   - Write a C program that uses functions to perform the following:

   - Addition of Two Matrices

   - Multiplication of Two Matrices

   - Write a C program to implement Bubble Sort.

4. Strings

   - Write a C program that uses functions to perform following operations

     (i) To insert a sub-string in to given main string from a given position.

     (ii) To delete n Characters from a given position in a given string.

   - Write a C program to determine if the given string is a palindrome or not

15

5. Functions & Pointers:

   Write C programs that use recursive functions

   (i) To find factorial of given number

   (ii) To solve Towers of Hanoi Problem.

   (iii) To swap the variables using call by value and call by reference.

6. Generate mark sheet of students using structures.

7. Compute Salary Slip for five employees using structures and functions Insert, Update, delete and append telephone details of an individual or a company into a telephone directory using random access file.

LIST OF EQUIPMENTS FOR A BATCH OF 30 STUDENTS:
HARDWARE: 30 terminals
SOFTWARE:C compiler

TOTAL: 60 PERIODS

COURSE OUTCOMES:
At the end of the course, students would develop C programs with

- Simple applications making use of basic constructs

- Control statements.

- Involving Arrays, strings and pointers.

- Involving functions, and structures.

- Sequential and random access file processing.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CS3102.1	2	3	2	0	0	0	0	0	0	0	0	1
CS3102.2	2	3	2	0	0	0	0	0	0	0	0	0
CS3102.3	2	3	2	0	0	0	0	0	0	0	0	0
CS3102.4	1	3	2	0	0	0	0	0	0	0	0	0
CS3102.5	1	3	2	0	0	0	0	0	0	0	2	0
CS3102.6	1	2	2	0	0	0	0	0	0	0	0	2

ENGINEERING PRACTICES LABORATORY

L	T	P	C
0	0	4	2

COURSE OBJECTIVES:

The main learning objective of this course is to provide hands on training to the students in:

- Drawing pipe line plan; laying and connecting various pipe fittings used in common Household plumbing work; Sawing; planning; making joints in wood materials used in common household wood work.

- Wiring various electrical joints in common household electrical wire work.

- Welding Tee joint, Butt joint and lap job by using arc welding, Machining various process like drilling, Turning, tapping by using Lathe.

- Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB

GROUP – A (CIVIL & ELECTRICAL)

PART I   CIVIL ENGINEERING PRACTICES   **15**

PLUMBING WORK:

a) Connecting various basic pipe fittings like valves, taps, coupling, unions, reducers, elbows and other components which are commonly used in household.

b) Preparing plumbing line sketches.

c) Laying pipe connection to the suction side of a pump

d) Laying pipe connection to the delivery side of a pump.

e) Connecting pipes of different materials: Metal, plastic and flexible pipes used in household appliances.

WOOD WORK:

a) Sawing,

b) Planning and

c) Making joints like T-Joint, Cross-lap joint and Dovetail joint.

Wood Work Study:

a) Studying joints in door panels and wooden furniture

b) Studying common industrial trusses using models.

PART II   ELECTRICAL ENGINEERING PRACTICES   **15**

(a) Introduction to switches, fuses, indicators and lamps - Basic switch board wiring with lamp, fan and three pin socket

(b) Staircase wiring

(c) Fluorescent Lamp wiring with introduction to CFL and LED types.

(d) Energy meter wiring and related calculations/ calibration

(e) Study of Iron Box wiring and assembly

(f) Study of Fan Regulator (Resistor type and Electronic type using Diac/Triac/quadrac)

(g) Study of emergency lamp wiring/Water heater

<div align="center">

GROUP – B (MECHANICAL & ELECTRONICS)

</div>

PART III   MECHANICAL ENGINEERING PRACTICES   **15**

WELDING WORK:

a) Welding of Butt Joints, Lap Joints, and Tee Joints using arc welding.

b) Demonstration of gas welding.

BASIC MACHINING WORK:

a) (simple)Turning.

b) (simple)Drilling.

c) (simple)Tapping.

SPECIAL MACHINES:

a) Demonstration on VMC Machine

b) Demonstration on CNC Machine

SHEET METAL WORK:

a) Making of a square tray

FOUNDRY WORK:

a) Demonstrating basic foundry operations

PART IV   ELECTRONIC ENGINEERING PRACTICES   **15**

SOLDERING WORK:

a) Soldering simple electronic circuits and checking continuity.

ELECTRONIC ASSEMBLY AND TESTING WORK:

a) Assembling and testing electronic components on a small PCB.

ELECTRONIC EQUIPMENT STUDY:

a) Study an elements of smart phone.

b) Assembly and dismantle of LED TV.

c) Assembly and dismantle of computer/ laptop

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1 Draw pipe line plan; lay and connect various pipe fittings used in common Household plumbing work; Saw; plan;make joints in wood materials used in Common household wood work.

CO2 Wire various electrical joints in common household electrical wire work.

CO3 Ability to weld Tee joint, Butt joint and lap job by using arc welding , Machine various process like drilling, Turning, Tapping by using Lathe and perform sheet metal works.

CO4 Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB

Mapping of CO/PO

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
GE3201.1	2	-	2	1	-	-	-	2	-	-	-	-
GE3201.2	2	1	1	1	1	1	-	2	3	3	2	2
GE3201.3	2	2	2	-	2	-	-	-	2	-	-	-
GE3201.4	0	0	1	1	-	-	-	-	-	-	-	-

S.A. ENGINEERING COLLEGE, CHENNAI -77.

(An Autonomous Institution-Affiliated to Anna University)
B.TECH COMPUTER SCIENCE AND BUSINESS SYSTEMS
REGULATION 2024
CHOICE BASED CREDIT SYSTEM
II SEMESTER CURRICULUM
II SEMESTER

S.NO	Course Code	Course Title	Category	Contact Hours	L	T	P	C
		THEORY						
1	TA3201	Tamils and Technology	HS	1	1	0	0	1
2	HS3201	Professional English II	HS	3	3	0	0	3
3	MA3202	Discrete Mathematics	BS	4	3	1	0	4
4	PH3201	Physics for Information Science	BS	3	3	0	0	3
5	CW3201	Data Structures Design	ES	5	3	0	2	4
6	CS3201	Programming in Python	PC	3	3	0	0	3
7	ME3101	Engineering Graphics	ES	4	2	0	2	2
		PRACTICALS						
8	CS3203	Programming in Python Laboratory	PC	4	0	0	4	2
		MANDATORY COURSE						
9	CY3201	Environmental Science and Sustainability	HS	1	1	0	0	1
			TOTAL	26	19	1	6	23

TA3201   தமிழரும் தொழில்நுட்பமும்   L T P C
                                                                                            1 0 0 1

அலகு I   நெசவு மற்றும் பானைத் தொழில்நுட்பம்   3
சங்க காலத்தில் நெசவுத் தொழில் - பானைத் தொழில்நுட்பம் - கருப்புப் சிவப்பு பாண்டங்கள் -
பாண்டங்களில் கீறல் குறியீடுகள்.

அலகு II   வடிவமைப்பு மற்றும் கட்டிடத் தொழில்நுட்பம்   3
சங்க காலத்தில் கட்டுமான பொருட்களும் நடு கல்லும் - சிலப்பதிகாரத்தில் மேடை வடிவமைப்பு பற்றிய
விவரங்கள், மாமல்லபுரச் சிற்பங்களும் கோவில்களும் - சோழர் காலத்துப் பெருங்கோவில்கள் மற்றும் பிற
வழிபாட்டுத் தலங்கள் - நாயக்கர் கால கோவில்கள், மீனாட்சியம்மன் ஆலயம் மற்றும் திருமலை நாயக்கர்
மஹால் - செட்டிநாட்டு வீடுகள் - பிரிட்டிஷ் காலத்தில் சென்னையில் இந்தோ - சாரோசெனிக் கட்டிடக்கலை.

அலகு III   உற்பத்தி தொழில்நுட்பம்   3
கப்பல் கட்டும் கலை - உலோகவியல் - இரும்புத் தொழிற்சாலை - இரும்பு உருக்குதல், எஃகு - செம்பு மற்றும்
தங்க நாணயங்கள் - நாணயங்கள் அச்சடித்தல் - மணி உருவாக்கம் தொழிற்சாலைகள் – கல் மணிகள்,
கண்ணாடி மணிகள் - சுடுமண் மணிகள் - சங்கு மணிகள் - எலும்பு துண்டுகள்- தொல்லியல் சான்றுகள் -
சிலப்பதிகாரத்தில் மணிகளின் வகைகள்.

அலகு IV   வேளாண்மை மற்றும் நீர்ப்பாசனத் தொழில்நுட்பம்   3
அணை – ஏரி, குளங்கள், மதகு - சோழர்காலக் குமிழித் தூம்பின் முக்கியத்துவம் - கால்நடை பராமரிப்பு -
வேளாண்மை சார்ந்த செயல்பாடுகள் - கடல்சார் அறிவு – மீன்வளம் - முத்து மற்றும் முத்துக்குளித்தல் -
பெருங்கடல் குறித்த பண்டைய அறிவு - அறிவு சார் சமூகம்.

அலகு V   அறிவியல் தமிழ் மற்றும் கணித்தமிழ்   3
அறிவியல் தமிழின் வளர்ச்சி - கணித்தமிழ் வளர்ச்சி - தமிழ் நூல்களை மின்பதிப்பு செய்தல் - தமிழ்
மென்பொருட்கள் உருவாக்கம் - தமிழ் இணையக் கல்விக்கழகம் - தமிழ் மின் நூலகம் - இணையத்தில் தமிழ்
அகராதிகள் - சொற்குவைத் திட்டம்.

                                                                              TOTAL: 45 PERIODS

TEXT – CUM – REFERENCE BOOKS:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும்
   கல்வியியல் பணிகள் கழகம்).

2. கணினித்தமிழ்- முனைவர். இலசுந்தரம் (விகடன்பிரசுரம்).

3. கீழடி - வைகை நதிக்கரையில் சங்க கால நகர நாகரிகம்.(தொல்லியல் துறை வெளியீடு).

4. பொருநை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)

5. Social Life of Tamils (Dr.K.K. Pillay) A joint publication of TNTB ESC and RMRL – (in print)

6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.

7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).

8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)

9. Keeladi - 'Sangam City Civilizationon the banks of river Vaigai'(Jointly Published by: Department of Archaeology Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)

10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)

11. Porunai Civilization (Jointly Published by: Department of Archaeology Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)

12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

HS3201   **PROFESSIONAL ENGLISH – II**   **L T P C**

                                                                                 3 0 0 3

COURSE OBJECTIVES:

- To engage learners in meaningful language activities to improve their LSRW skills

- To enhance learners' awareness of general rules of writing for specific audiences

- To help learners understand the purpose, audience, contexts of different types of writing

- To develop analytical thinking skills for problem solving in communicative contexts

- To demonstrate an understanding of job applications and interviews for internship and placements

UNIT I   MAKING PROFESSIONAL CORRESPONDENCE   9

Listening – Evaluative Listening: Advertisements, Product Descriptions, -Audio/video; Listening and filling a Graphic Organiser (Choosing a product or service by comparison) Speaking – Marketing a product, Persuasive Speech Techniques Reading - Reading advertisements, user manuals, brochure Vocabulary – Contextual meaning of words Writing – Professional Responses for business communication letters- Open ended Essay Grammar – Numerical adjectives, Mixed Tenses, Prepositional phrases.

UNIT II   USING APPROPRIATE FORMS OF WORDS VOICES   9

Listening - Listening to longer technical talks and completing– gap filling exercises. Listening technical information from podcasts – Listening to process/event descriptions to identify cause effects Speakin – Describing and discussing the reasons of accidents or disasters based on news reports Reading - Reading longer technical texts–Extracts from Literature – Essays, Short stories, Biography Writing-Minutes of Meeting Grammar - Active Passive Voice transformations, Infinitive and Gerunds Vocabulary – Word Formation (Noun-Verb-Adj-Adv), Adverbs.

UNIT III   PROBLEM SOLVING   9

Listening – Listening to / Watching movie scenes / documentaries depicting a technical problem and suggesting solutions Speaking – Group Discussion (based on case studies) – Techniques and Strategies Reading - Technical case studies in General News reports news reports etc.   Writing – Checklists, Conversations about problems and solutions Grammar – Error correction, conditional sentences Vocabulary – Compound Words, Sentence Completion.

UNIT IV   REPORTING OF EVENTS AND RESEARCH   9

Listening – Listening Comprehension based on news report and domentaries – Precis writing, Summarising Speaking – Interviewing, Presenting an oral report, Mini presentations on select topics Reading – Research Articles Writing – Transcoding, Accident Report, Survey Report Grammar – Reported Speech, Modals Vocabulary – Conjunctions - use of prepositions.

UNIT V   THE ABILITY TO PUT IDEAS OR INFORMATION COGENTLY   9

Listening – Listening to TED Talks, Presentations, Formal job interviews, (analysis of the interview performance); Speaking – Participating in a Role play, (interview/telephone interview), virtual interviews, Making presentations with visual aids; Reading – Company profiles, Statement of Purpose, (SOP), an excerpt of interview with professionals; Writing –Job/Internship application – Cover letter Resume; Grammar – Relative Clauses Vocabulary – Idioms

                                                                        TOTAL: 45 PERIODS

COURSE OUTCOMES:
At the end of the course, learners will be able to

CO1: Compare and contrast products and ideas in technical texts.

CO2: Identify cause and effect in events, industrial processes through technical texts

CO3: Analyze problems in order to arrive at feasible solutions and communicate them.

CO4: Prepare a report of events and the processes of technical and industrial nature.

CO5: Express their opinions in a planned and logical manner and draft effective job application letters and resumes in context of job search.

TEXTBOOKS

1. English for Engineers Technologists (2020 edition) Orient Blackswan Private Ltd. Department of English, Anna University.

2. English for Science Technology Cambridge University Press 2021.Dr. Veena Selvam, Dr. Sujatha Priyadarshini, Dr. Deepa Mary Francis, Dr. K. N. Shoba, and Dr. Lourdes Joevani, Department of English, Anna University.

REFERENCES

1. Raman. Meenakshi, Sharma. Sangeeta (2019). Professional English. Oxford university press. New Delhi.

2. Improve Your Writing ed. V. N. Arora and Laxmi Chandra, Oxford Univ. Press, 2001, New Delhi.

3. Learning to Communicate – Dr.V. Chellammal. Allied Publishers, New Delhi, 2003

4. Business Correspondence and Report Writing by Prof. R.C. Sharma Krishna Mohan, Tata McGraw Hill Co. Ltd., 2001, New Delhi.

5. Developing Communication Skills by Krishna Mohan, Meera Bannerji –Macmillan India Ltd. 1990, Delhi.

	L	T	P	C

MA3202   **DISCRETE MATHEMATICS**   **L   T   P   C**

                                                                                    3   1   0   4

COURSE OBJECTIVES:

- To extend student's logical and mathematical maturity and ability to deal with abstraction.

- To establish a solid foundation in set theory, lattices, and Boolean algebra.

- To introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

- To understand the basic concepts of combinatorics and graph theory.

- To familiarize the applications of algebraic structures.

UNIT I   LOGIC AND PROOFS   **12**
Propositional logic – Propositional equivalences - Predicates and quantifiers – Nested quantifiers – Rules of inference – Normal form - Introduction to proofs – Proof methods and strategy.

UNIT II   SET THEORY   **12**
Basic concepts – Algebra of sets – Types of relations and their properties – Relational matrix and the graph of a relation – Equivalence relations – Partial ordering – Poset – Hasse diagram – Lattices and their properties – Sub lattices – Boolean algebra – Homomorphism.

UNIT III   COMBINATORICS   **12**
Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications

UNIT IV   GRAPHS   **12**
Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths – Dijkstra's shortest path algorithm – Trees and their Properties.

UNIT V   ALGEBRAIC STRUCTURES   **12**
Algebraic systems – Definitions-Examples-Properties-Semi groups and monoids – Homomorphism's- Groups – Subgroups – Normal subgroup and cosets – Lagrange's theorem – Codes and group codes – Basic notions of error correction-Error recovery in group codes.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

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

CO1: • Construct mathematical arguments using logical connectives and quantifiers.

CO2: • Employ the concept of lattice to solve the problems in data mining.

CO3: • Apply properties of combinatorial structures and properties – know the basic techniques in combinatorics and counting.

CO4: • Identify the graphs and apply appropriate graph algorithms for solving computing problems.

CO5: • Implement the concepts of group structures in coding theory .Apply set theory and algebraic structures to solve real-world problems in cryptography, computer networks, and database theory.

TEXTBOOKS

1. Rosen, K.H., "Discrete Mathematics and its Applications", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 7th Edition, Special Indian Edition, 2011.

2. Tremblay, J.P., and Manohar, R., "Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Publishing Co. Ltd., New Delhi, 30th Reprint, 2nd Edition, 2011.

REFERENCES

1. Grimaldi, R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, Delhi, 2007.

2. Lipschutz, S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

3. Koshy, T., "Discrete Mathematics with Applications", Elsevier Publications, 1st Edition, 2006.

PH3201   PHYSICS FOR INFORMATION SCIENCE   L T P C
                                                                                  3 0 0 3

COURSE OBJECTIVES:

- Understand the transport properties of conducting materials and their modelling using classical and quantum theories.

- Acquire knowledge on basics of semiconductor physics and its application in various devices.

- Understand the origin of magnetism and data storage principles.

- Study the fundamentals of optical materials and their applications to display devices.

- Understand the basics of basics of quantum structures and their applications and basics of quantum computing.

UNIT I   ELECTRICAL PROPERTIES OF MATERIALS   9
Classical free electron theory – Expression for electrical conductivity – Thermal conductivity – deduction of Wiedemann - Franz law – Success and drawbacks of classical free electron theory – Electrons in metals – Particle in a three-dimensional box – degenerate states – Fermi - Dirac statistics – Density of energy states and carrier concentration in metals.

UNIT II   SEMICONDUCTOR PHYSICS   9
Intrinsic Semiconductors – Energy band diagram (qualitative) – Direct and indirect band gap semiconductors – Carrier concentration in intrinsic semiconductors – Variation of carrier concentration with temperature - extrinsic semiconductors - N type and P type semiconductors (qualitative) – Hall Effect and Hall devices.

UNIT III   MAGNETIC MATERIALS AND DATA STORAGE PRINCIPLES   9
Magnetism- Magnetic dipole moment – magnetic permeability and susceptibility – Magnetic material classification: dia, para and ferromagnetism – antiferromagnetism – ferrimagnetism – Domain Theory - M versus H behaviour – Hard and soft magnetic materials – Magnetic principle in computer data storage – Magnetic hard disc (GMR sensor)- CD-ROM-WORM-Holographic optical data storage.

UNIT IV   OPTICAL MATERIALS AND DISPLAYDEVICES   9
Classification of optical materials – carrier generation and recombination processes – Absorption emission and scattering of light in metals, insulators, and semiconductors (concepts only) – LED – OLED - Photo detectors– Photo diodes and Photo conductors (concepts only) –Solar cell – Liquid crystal display - Charged Coupled Devices.

UNIT V   NANODEVICES AND QUANTUM COMPUTING   9
Introduction – quantum confinement – quantum structures: quantum wells, wires, and dots – band gap of nanomaterials. Tunnelling – Single electron phenomena: Coulomb blockade – tunnelling diode – single electron transistor (SET)– quantum system for information processing – quantum states – classical bits– quantum bits or qubits – multiple qubits- quantum gates – advantage of quantum computing over classical computing.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the transport properties of conducting materials through classical and quantum theories, including the Wiedemann-Franz law and Fermi-Dirac statistics.

CO2: Recall and explain the fundamental concepts of intrinsic and extrinsic semiconductors, energy band diagrams, and the Hall effect.

CO3: Understand the principles of magnetism, the classification of magnetic materials, and their role in data storage technologies.

CO4: Comprehend the behavior of optical materials and their applications in display devices such as LEDs, OLEDs, and liquid crystal displays.

CO5: Recognize the basics of quantum structures, tunneling phenomena, and the foundational concepts of quantum computing, including qubits and quantum gates.

TEXTBOOKS

1. Adaptation by Balasubramanian, R, Callister's Material Science and Engineering, Wiley India Pvt .Ltd., 2ndEdition, 2014.

2. Kasap, S.O., Principles of Electronic Materials and Devices, (Special Indian Edition) McGrawHill Education, 3rd Edition, 2017.

3. 3. Parag K. Lala, Quantum Computing: A Beginner's Introduction, McGraw-Hill Education (Indian Edition), 2020.

4. Jasprit Singh, "Semiconductor Devices: Basic Principles", Wiley (Indian Edition), 2007.

REFERENCES

1. Pallab Bhattacharya, Semiconductor Optoelectronic Devices, Pearson, 2ndEdition, 2017.

2. Umesh K Mishra Jasprit Singh, Semiconductor Device Physics and Design, Springer, 2008.

3. Wahab, M.A., Solid State Physics: Structure Properties of Materials, Narosa Publishing House, 2009.

4. Gaur, R.K. Gupta, S.L., Engineering Physics, Dhanpat Rai Publishers, 2012.

5. Salivahanan, S., Rajalakshmi, A., Karthie, S., Rajesh, N.P., Physics for Electronics Engineering Information Science, McGraw Hill (India) PrivateLimited, 2018.

CW3201	DATA STRUCTURE DESIGN (LAB INTEGRATED)	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

- To Study the concepts of ADTs
- To design linear data structures – lists, stacks, and queues
- To understand sorting, searching and hashing algorithms
- To apply Tree and Graph structure

UNIT I   ABSTRACT DATA TYPES 9

Abstract Data Types (ADTs) – ADTs and classes – introduction to OOP – classes in Python – inheritance – namespaces – shallow and deep copying Introduction to analysis of algorithms – asymptotic notations – recursion – analyzing recursive algorithms.

UNIT II   LINEAR STRUCTURES 9

List ADT – array-based implementations – linked list implementations – singly linked lists – circularly linked lists – doubly linked lists – applications of lists – Stack ADT – Queue ADT – double ended queues.

UNIT III   SORTING AND SEARCHING 9

Bubble sort – selection sort – insertion sort – merge sort – quick sort – linear search – binary search –hashing – hash functions – collision handling – load factors, rehashing, and efficiency.

UNIT IV   TREE STRUCTURES 9

Tree ADT – Binary Tree ADT – tree traversals – binary search trees – AVL trees – heaps – multiway search trees.

UNIT V   GRAPH STRUCTURES 9

Graph ADT – representations of graph – graph traversals – DAG – topological ordering – shortest paths – minimum spanning trees.

TOTAL: 45 PERIODS

LIST OF EXPERIMENTS

1. Implement simple ADTs as Python classes
2. Implement recursive algorithms in Python
3. Implement List ADT using Python arrays
4. Linked list implementations of List
5. Implementation of Stack and Queue ADTs
6. Applications of List, Stack and Queue ADTs
7. Implementation of sorting and searching algorithms
8. Implementation of Hash tables
9. Tree representation and traversal algorithms
10. Implementation of Binary Search Trees
11. Implementation of Heaps
12. Graph representation and Traversal algorithms
13. Implementation of single source shortest path algorithm
14. Implementation of minimum spanning tree

TOTAL: 75 PERIODS

COURSE OUTCOMES:

CO1: Design and implement various mobile applications using emulators.

CO2: Implement ADTs as Python classes.

CO3: Design, implement, and analyse linear data structures, such as lists,queues, and stacks, according to the needs of different applications.

CO4: Design, implement, and analyse efficient tree structures to meet requirements such as searching, indexing, and sorting.

CO5: Model problems as graph problems and implement efficient graph algorithms to solve theme.

TEXTBOOKS

1.

2. Michael T. Goodrich, Roberto Tamassia, and Michael H. Goldwasser, "Data Structures and Algorithms in Python" (An Indian Adaptation), Wiley, 2021.

3. Lee, Kent D., Hubbard, Steve, "Data Structures and Algorithms with Python" Springer Edition 2015.

4. Narasimha Karumanchi, "Data Structures and Algorithmic Thinking with Python" Careermonk, 2015

REFERENCES

1. Rance D. Necaise, "Data Structures and Algorithms Using Python", John Wiley & Sons, 2011.

2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning, 2010.

3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", Fourth Edition, Pearson Education, 2014.

4. Aho, Hopcroft, and Ullman, "Data Structures and Algorithms", Pearson Education India, 2002.

CS3201   **PROGRAMMING IN PYTHON**   **L   T   P   C**

                                                                                             3   0   0   3

COURSE OBJECTIVES:

- To know the basics of python Programming

- To read and write simple Python programs.

- To develop Python programs with conditionals and loops.

- To define Python functions and call them.

- To use Python data structures — lists, tuples, dictionaries.

- To use Object Oriented Programming concepts in Python.

UNIT I   INTRODUCTION TO PYTHON PROGRAMMING   9

Introduction to Python, Program Verses Script, Compiler Verses Interpreter, Tokens in Python – Variables, Keywords, Comments, Literals, Data types, Indentation, Operators and its precedence, Expressions, Input and Print functions. String: Formatting, Comparison, Slicing, Splitting. Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points, exponentiation.

UNIT II   CONTROL STRUCTURES AND FUNCTIONS   9

Selective statements – Iterative statements - Function: definition, call, return statement, parameters and arguments types (required, keyword, default, variable length), local and global scope, function composition, recursion, lambda functions. Illustrative programs: square root, gcd, sum an array of numbers, linear search, binary search.

UNIT III   LISTS, TUPLES, DICTIONARIES AND SET   9

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; advanced list processing - list comprehension; Tuples: tuple assignment, tuple as return value; Dictionaries: operations and methods; Set operations. Illustrative programs: Students marks statement, Retail bill preparation, Intersection, Union, Symmetric Difference between sets.

UNIT IV   FILES AND EXCEPTION   9

Files and exceptions: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, multiple except block, modules, packages; Illustrative programs: word count, copy file, Voter's age validation, Marks range validation.

UNIT V   INTRODUCTION TO OBJECT ORIENTED PROGRAMMING USING PYTHON   9

Introduction, Features of Object Oriented Programming, Merits and Demerits of Object Oriented Programming Language. Class and Objects: Defining classes, object creation, variables, public and private data members, class methods, static methods; Illustrative programs: Display student information using class and object, Deposit or Withdraw money in a bank account.

                                                                                  TOTAL: 45 PERIODS

COURSE OUTCOMES:

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

CO1: Understand the basics of Python Programming.

CO2: Be familiar with data expressions and statements.

CO3: Recognize control flow and function problems.

CO4: Comprehend lists, tuples and dictionaries.

CO5: Read and write data from/to files and exceptions in Python Programs.

TEXTBOOKS

1. Reema Thareja, "Problem Solving and Programming with python", 2ndedition, Oxford University press, 2019.

2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd edition, Updated for Python Shr off/ O'Reilly Publishers, 2016(http://greenteapress.com/wp/thinkpython/)

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

REFERENCES

1. Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem- Solving Focus, Wiley India Edition, 2013.

2. John V Guttag, "Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press, 2013.

3. Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012.

4. Paul Gries, Jennifer Campbell and Jason Montojo, "Practical Programming: An Introduction to Computer Science using Python 3", Second edition, Pragmatic Programmers, LLC, 2013.

5. Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd., 2016.

6. Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd., 2015.

ME3101	ENGINEERING GRAPHICS	L	T	P	C
		2	0	2	3

COURSE OBJECTIVES:

- To develop in students, graphic skills for communication of concepts, ideas and design of engineering products.

- To expose them to existing national standards related to technical drawings

UNIT I   PLANE CURVES AND FREE HAND SKETCHING   12

Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method– construction of cycloid– Drawing of tangents and normal to the above curves. Visualization principles – Layout of views- Orthographic projection of multiple views from pictorial views of objects-Principal planes.

UNIT II   PROJECTION OF POINTS STRAIGHT LINES AND PLANE SURFACES   12

Orthographic projections-principles-Principal planes-First angle projection-Projection of points - Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method. Projection of planes (polygonal and circular surfaces) inclined to one of the principal planes.

UNIT III   PROJECTION OF SOLIDS   12

Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one of the principal planes by rotating object method.

UNIT IV   PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES   12

Sectioning of Prisms, pyramids, cylinders and cones in simple vertical position - the cutting plane is inclined to one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids, cylinders and cones.

UNIT V   ISOMETRIC AND PERSPECTIVE PROJECTIONS   12

Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

On successful completion of this course, the Students will be able to

CO1: Familiarize with the fundamentals and standards of Engineering graphics

CO2: Project orthographic projections of lines and plane surfaces.

CO3: Apply the principles of projections to draw projections of solids and development of surfaces.

CO4: Visualize and to project isometric and perspective projections of simple solids.

CO5: Perform the basic geometrical constructions and multiple views of objects.

TEXTBOOKS

1. NatrajanK.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2009.

2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 2008.

REFERENCES

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50th Edition, 2010.

2. N S Parthasarathy and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2015.

3. Gopalakrishna K.R., "Engineering Drawing" (Vol. III combined), Subhas Stores, Bangalore, 2007.

4. Luzzader, Warren.J. and Duff, John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern Economy Edition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.

5. Shah M.B., and Rana B.C., "Engineering Drawing", Pearson, 2nd Edition, 2009.

6. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.

COURSE OBJECTIVES:

- To study python programs with conditionals and loops

- To use functions for python structured programs.

- Use strings for structuring Python programs.

- Represent compound data using Python lists, tuples and dictionaries.

- To read and write data from and to files in python.

LIST OF EXPERIMENTS

1. Write a program to display the largest number among three numbers.

2. Write a program to display the Fibonacci series by using looping constructs.

3. Write a function to compute the GCD of two numbers.

4. Explore String Functions

5. With the help of strings, array or list, display a simple calendar in python program without using the calendar module.

6. With the help of list perform linear search and Binary search.

7. Create a text file using python file I/O. Read the content of the file and change them from lower to upper case characters.

8. Programs that take command line arguments (word count)

9. Find the most frequent words in a text read from a file.

10. Write a program using Dictionaries to compute the following.

    i) Students marks statement,

    ii) Retail bill preparation,

11. Write a program using sets to compute the following.

    i) Intersection,

    ii) Union,

    iii) Symmetric Difference between sets.

12. Write a program using exceptions to calculate the following.

    i) Voter's age validation,

    ii) Marks range validation (0-100).

13. Write a program to Display student information using class and object.

14. Write a program to Deposit or Withdraw money in a bank account using class and objects

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

    HARDWARE: 30 terminals

    SOFTWARE: Python 3 interpreter for Windows/Linux

TOTAL: 60 PERIODS

COURSE OUTCOMES:

    At the end of the course the student should be able to

- Design simple programs using conditionals and loops.

- Write functions to solve mathematical problems

- Use strings for structuring Python programs.

- Represent compound data using Python lists, tuples and dictionaries.

- Identify to read and write data from and to files in python.

CY3201	ENVIRONMENTAL SCIENCE AND SUSTAINABILITY	L	T	P	C
		1	0	0	1

COURSE OBJECTIVES:

- To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize on the biodiversity of India and its conservation.

- To impart knowledge on the causes, effects and control or prevention measures of environmental pollution and natural disasters.

- To facilitate the understanding of global and Indian scenario of renewable and non-renewable resources, causes of their degradation and measures to preserve them.

- To familiarize the concept of sustainable development goals and appreciate the interdependence of economic and social aspects of sustainability, recognize and analyse climate changes, concept of carbon credit and the challenges of environmental management.

- To inculcate and embrace sustainability practices and develop a broader understanding on green materials, energy cycles and analyze the role of sustainable urbanization.

UNIT I   ENVIRONMENT AND BIODIVERSITY   14

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– ecological succession. Types of biodiversity: genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, Human-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In- situ and ex-situ.

UNIT II   ENVIRONMENTAL POLLUTION   8

Causes, Effects and Preventive measures of Water, Soil, Air and Noise Pollutions. Artificial intelligence in pollution monitoring and management. Solid and E-Waste management. Disaster management –Flood, Land slide and Earth quake. Case studies.

UNIT III   RENEWABLE SOURCES OF ENERGY   10

Energy management and conservation, New Energy Sources: Need of new sources. Different types new energy sources. Applications of- Hydrogen energy, Ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy, Solar and wind energy.

UNIT IV   SUSTAINABILITY AND MANAGEMENT   7

Sustainability- concept, needs and challenges-Economic and Social aspects of sustainability-from unsustainability to sustainability-millennium development goals, Sustainable Development Goals, Climate change-Green house effect, Global warming and Acid rain. Concept of Carbon Credit, Carbon Footprint. Environmental management in industry-A case study.

UNIT V   SUSTAINABILITY PRACTICES   6

Zero waste and R concept, Circular economy, ISO 14000 Series, Material Life cycle assessment, Environmental Impact Assessment. Sustainable habitat: Green buildings, Green materials, Sustainable development index, Sustainable transports. Sustainable energy: Green Engineering: Sustainable urbanization- Socio- economical and technological change.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1: Recognize and infer the functions of environment, ecosystems and biodiversity and their conservation.

CO2: Identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.

CO3: Identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.

CO4: Analyse the different goals of sustainable development and apply them for suitable technological advancement and societal development.

CO5: Appreciate sustainability practices, identify green materials and the role of sustainable urbanization.

TEXTBOOKS

1. Anubha Kaushik and C. P. Kaushik's Perspectives in Environmental Studies‖, 7th Edition, New Age International Publishers , 2021.

2. Benny Joseph, ̲Environmental Science and Engineering‗, Tata McGraw-Hill, New Delhi, 2016.

3. Gilbert M.Masters, ̲Introduction to Environmental Engineering and Science‗, 2nd edition, Pearson Education, 2004.

4. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall. 1st Edition 2011.

5. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, engage learning.

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1. Cunningham, W.P. Cooper, T.H. Gorhani, Environmental Encyclopedia‗, Jaico Publ., House, Mumbai, 2001.

2. Rajagopalan, R, Environmental Studies-From Crisis to Cure‗, Oxford University Press, Third Edition, 2015.

3. Erach Bharucha ―Textbook of Environmental Studies for Undergraduate Courses‖ Orient Blackswan Pvt. Ltd. 2013.