



R.M.K. ENGINEERING COLLEGE

(An Autonomous Institution)

R.S.M Nagar, Kavaraipettai, Gummidipoondi Taluk, Thiruvallur District, Tamil Nadu- 601206
 Affiliated to Anna University, Chennai / Approved by AICTE, New Delhi/Accredited by NAAC with A+ Grade
 An ISO 9001:2015 Certified Institution / All the Eligible UG Programs are Accredited by NBA, New Delhi

B.E. Electronics and Communication Engineering REGULATIONS – 2022

CHOICE BASED CREDIT SYSTEM

I - II SEMESTER CURRICULUM

SEMESTER – I								
Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY COURSES WITH LABORATORY COMPONENT								
1	22MA101	Matrices and Calculus	BSC	5	3	0	2	4
2	22PH102	Physics for Electronics Engineering	BSC	5	3	0	2	4
3	22CS101	Problem Solving using C++	ESC	5	3	0	2	4
4	22CS102	Software Development Practices	ESC	5	3	0	2	4
5	22EC101	Digital Principles and System Design	PCC	5	3	0	2	4
6	22HS101	Professional Communication	HSMC	4	2	0	2	3
LABORATORY COURSES								
7	22ME111	Product Development Lab - 1	EEC	2	0	0	2	1
MANDATORY COURSES								
8	22CH104	Environmental Sciences and Sustainability (Non Credit)	MC	2	2	0	0	0
		Induction Program (Non Credit)	MC	3 Weeks				
TOTAL				33	19	0	14	24

SEMESTER – II								
Sl No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
THEORY COURSES								
1	22MA201	Transforms and Numerical Methods	BSC	5	3	0	2	4
2	22EC201	Electron Devices and Circuit Theory	PCC	5	3	0	2	4
3	22CH101	Engineering Chemistry	BSC	5	3	0	2	4
4	22CS201	Data Structures	ESC	5	3	0	2	4
5	22CS202	Java Programming	ESC	5	3	0	2	4
LAB INTEGRATED THEORY COURSES								
6	22GE101	Computer aided Engineering Graphics	ESC	3	1	0	2	2
LABORATORY COURSES								
7	22GE211	Product Development Lab -2	EEC	2	0	0	2	1
AUDIT COURSES								
8		Yoga for Stress Management	AC	1	1	0	0	0
TOTAL				31	17	0	14	23

Gradient, divergence and curl (excluding vector identities) – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green's theorem in a plane and Gauss divergence theorem (Statement only) – Simple applications involving cubes and rectangular parallelepipeds.

Experiments using SCILAB:

1. Evaluating gradient.
2. Evaluating directional derivative.
3. Evaluating divergent and curl.

TOTAL: 75 PERIODS

OUTCOMES:

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

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

CO2: determine the evolute of the curve

CO3: apply differential calculus ideas on the function of several variables

CO4: evaluate the area and volume by applying the concept of multiple integration.

CO5: utilize the concept of vector calculus in evaluating integrals.

TEXT BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2014.

REFERENCES:

1. M. K. Venkataraman, "Engineering Mathematics", Volume I, 4th Edition, The National Publication Company, Chennai, 2003 Author, Title, Publisher, Edition, Year
2. Sivaramakrishna Dass, C. Vijayakumari, "Engineering Mathematics", Pearson Education India, 4th Edition, 2019.
3. H. K. Dass, and Er. Rajnish Verma, "Higher Engineering Mathematics", S. Chand Private Limited, 3rd Edition, 2014.
4. B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill Publishing Company, 6th Edition, New Delhi, 2008.
5. S. S. Sastry, "Engineering Mathematics", Vol. I & II, PHI Learning Private Limited, 4th Edition, New Delhi, 2014.
6. James Stewart, "Calculus: Early Transcendentals", Cengage Learning, 7th Edition, New Delhi, 2015.

LIST OF EQUIPMENTS:

1. **SCILAB : Open Source.**

COURSE CODE	COURSE TITLE	L	T	P	C
22PH102	PHYSICS FOR ELECTRONICS ENGINEERING (For First Year B.E. –Electrical and Electronics Engineering and Electronics and Communication Engineering)	3	0	2	4

OBJECTIVES:

The course will enable the learners to:

Educate the fundamental important concepts in Physics and to apply the knowledge insolving scientific and Engineering problems. Impart the basic concepts of light propagation in waveguides, conducting materials, semiconducting materials, opto and nano electronic devices and photovoltaic technology

UNIT I LASER AND FIBRE OPTICS 15

Population of energy levels – Einstein’s A and B coefficients derivation - Resonant cavity - Optical amplification (qualitative) - Semiconductor lasers: homojunction and heterojunction- Engineering applications of lasers in data storage (qualitative).

Fibre optics: Principle and propagation of light through optical fibre - V-number - Types of optical fibres (Material, refractive index and mode) - Losses in optical fibre - Fibre optic communication - Fibre optic sensors (pressure and displacement).

1. Determination of divergence of laser beam
2. Determination of acceptance angle and numerical aperture of an optical fibre

UNIT II ELECTRON THEORIES OF MATERIALS 15

Introduction to Classical, Quantum and Zone theories - Classical free electron theory - Expressions for electrical conductivity and thermal conductivity - Wiedemann-Franz law - Success and failures of CFT- Effect of temperature on Fermi function- Density of energy states and average energy of electron at 0 K - Energy bands in solids.

1. Determination of thermal conductivity of a bad conductor by Lee’s disc method.
2. Measurement of the internal resistance using potentiometer.

UNIT III SEMICONDUCTING MATERIALS 15

Intrinsic Semiconductors – E-k diagram -Direct and indirect band gap semiconductors - Carrier concentration in intrinsic semiconductors- Band gap determination-Extrinsic semiconductors - Carrier concentration in n-type and p-type semiconductors -Electrical conductivity of intrinsic and extrinsic semiconductors -Variation of Fermi level with temperature and impurity concentration - Hall effect and its applications.

1. Bandgap determination of intrinsic semiconductor.
2. Determination of wavelength of semiconductor laser

UNIT IV OPTO AND NANO ELECTRONIC DEVICES 15

Carrier generation and recombination processes in semiconductors (concepts only) –LED- Organic LED- Photodetectors– Electron density in bulk material (qualitative) -Size dependence of Fermi energy- Band gap of nanomaterial -Quantum confinement-Quantum Structures- Density of states in quantum well, quantum wire and quantum dot structures - Quantum dot lasers.

1. Synthesis of nanoparticles by sol-gel method
2. Determination of particle size using laser source
3. Determination of bandgap of an LED

UNIT V PHOTOVOLTAICS 15

Photovoltaic effect- Solar Cell-Parameters of Solar Cells -Solar Cell Technology -Effect of Conversion Efficiency-Input Light- Solar Cell Area, Angle of Light Falling on Solar Cell-Solar Cell Operating Temperature, photovoltaic thermal collectors, organic solar cells-dye sensitized solar cell.

1. Solar cell characteristics

TOTAL: 75 PERIODS

OUTCOMES:

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

CO1: Discuss the basic principles of working of laser and their applications in fibre optic communication

CO2: Summarize the classical and quantum electron theories and energy band structures

CO3: Describe the conductivity in intrinsic and extrinsic semiconductors and importance of Hall effect measurements

CO4: Associate the properties of nanoscale materials and their applications in quantum computing

CO5: Explain the concepts of photovoltaic technology and its applications.

TEXT BOOKS:

1. **M.N. Avadhanulu and P.G. Kshirsagar**, A text book of Engineering Physics, S. Chand and Company, New Delhi, 2014.
2. **Kasap, S.O.** Principles of Electronic Materials and Devices, McGraw-Hill Education, 2007.
3. **Wahab, M.A.** Solid State Physics: Structure and Properties of MaterialsII. Narosa Publishing House, 2009.
4. **Nelson, J**, The physics of Solar Cells, Imperial College Press, 2003.
5. **Jui Sheng Hsieh**, Solar Energy Engineering, Prentice Hall, 2007

REFERENCES:

1. **R.K. Gaur and S.L. Gupta**, Engineering Physics, Dhanpat Rai Publications (P) Ltd., Eighth Edition., New Delhi, 2001.
2. **Hanson, G.W.**, Fundamentals of Nanoelectronics, Pearson Education, 2009
3. **R. A. Serway and J.W. Jewett**, Physics for Scientists and Engineers, Ninth Edition. Cengage Learning, 2014.
4. **Rogers, B., Adams, J. & Pennathur, S.** Nanotechnology: Understanding Small SystemsII. CRC Press, 2014
5. **A. Marikani**, Materials Science, PHI Learning Private Limited, Eastern Economy Edition, 2017.
6. **R. Wolfson**, Essential University Physics, Volume 1 and 2 with Mastering Physics, Global Edition, 3rd Edition, Pearson 2017.
7. **B.K. Pandey and S. Chaturvedi**, Engineering Physics, Cengage Learning India, 2012.
8. **J. Singh**, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc., 1995.
9. **Garg, H.P.**, Treatise on Solar Energy, John Wiley & Sons, 2006.

LIST OF EQUIPMENTS:

1. Semiconductor Laser
2. Determination of optical fibre parameters
3. Lee's disc apparatus
4. Potentiometer
5. Bandgap determination set up
6. Synthesis of Nanoparticles
7. Bandgap of an LED
8. Solar cell characteristics

COURSE CODE

COURSE TITLE

L T P C

Concepts of Object Oriented Programming – Benefits of OOP – Simple C++ program - Classes and Objects - Member functions - Nesting of member functions - Private member functions - Memory Allocation for Objects - Static Data Members - Static Member functions - Array of Objects - Objects as function arguments - Returning objects - friend functions – Const Member functions - Constructors – Destructors.

List of Exercise/Experiments:

1. Write a program Illustrating Class Declarations, Definition, and Accessing Class Members.
2. Program to illustrate default constructor, parameterized constructor and copy constructors.

UNIT IV OPERATOR OVERLOADING, INHERITANCE AND POLYMORPHISM 15

Operator Overloading - Overloading Using Friend functions – Inheritance – Types of inheritance – Virtual Base Class - Abstract Class – Constructors in Derived Classes - member class: nesting of classes.

Pointer to objects – this pointer- Pointer to derived Class - Virtual functions – Pure Virtual Functions – Polymorphism.

List of Exercise/Experiments:

1. Write a Program to Demonstrate the i) Operator Overloading. ii) Function Overloading.
2. Write a Program to Demonstrate Friend Function and Friend Class.
3. Program to demonstrate inline functions.
4. Program for Overriding of member functions.
5. Write C++ programs that illustrate how the following forms of inheritance are supported:
 - a) Single inheritance
 - b) Multiple inheritance
 - c) Multi level inheritance
 - d) Hierarchical inheritance.

UNIT V I/O, FILES AND EXCEPTIONS 15

C++ Streams – Unformatted I/O - Formatted Console I/O – Opening and Closing File – File modes - File pointers and their manipulations – Templates – Class Templates – Function Templates - Exception handling.

List of Exercise/Experiments:

1. Program to demonstrate pure virtual function implementation.
2. Count the number of account holders whose balance is less than the minimum balance using sequential access file.
3. Write a Program to Demonstrate the Catching of all Exceptions.
4. Mini project.
- 5.

TOTAL: 45+30 = 75 PERIODS

OUTCOMES:

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

CO1: Solve problems using basic constructs in C.

CO2: Implement C programs using pointers and functions.

CO3: Apply object-oriented concepts and solve real world problems.

CO4: Develop C++ programs using operator overloading and polymorphism.

CO5: Implement C++ programs using Files and exceptions

TEXT BOOKS:

1. Herbert Schildt, "The Complete Reference C++", 4th edition, MH, 2015.
2. E Balagurusamy,"Object Oriented Programming with C++", 4th Edition, Tata McGraw-Hill Education, 2008.

REFERENCES:

1. Karl Beecher,"Computational Thinking: A beginner's guide to problem-solving and programming", BCS Learning & Development Ltd, 2017. (Unit 1)
2. Nell Dale, Chip Weems, "Programming and Problem Solving with C++", 5th Edition, Jones and Barklett Publishers, 2010.
3. John Hubbard, "Schaum's Outline of Programming with C++", MH, 2016.
4. Yashavant P. Kanetkar, "Let us C++", BPB Publications, 2020
5. ISRD Group, "Introduction to Object-oriented Programming and C++", Tata McGraw-Hill Publishing Company Ltd., 2007.
6. D. S. Malik, "C++ Programming: From Problem Analysis to Program Design", Third Edition, Thomson Course Technology, 2007.
7. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01297200240671948837_shared/overview

LIST OF EQUIPMENTS:

1. **Standalone desktops with C/C++ compiler (or) Server with C/C++ compiler.**

COURSE CODE	COURSE TITLE	L	T	P	C
22CS102	SOFTWARE DEVELOPMENT PRACTICES (Common to All Branches)	3	0	2	4

OBJECTIVES:

The Course will enable learners to:

- To discuss the essence of agile development methods.
- To set up and create a GitHub repository.
- To create interactive websites using HTML
- To design interactive websites using CSS.
- To develop dynamic web page using Java script.

UNIT I AGILE SOFTWARE DEVELOPMENT AND Git and GitHub 15

Software Engineering Practices – Waterfall Model - Agility – Agile Process – Extreme Programming - Agile Process Models – Adaptive Software Development – Scrum – Dynamic Systems Development Method – Crystal – Feature Driven Development – Lean Software Development – Agile Modeling – Agile Unified Process – Tool set for Agile Process.

Introduction to Git –Setting up a Git Repository - Recording Changes to the Repository - Viewing the Commit History - Undoing Things - Working with Remotes -Tagging - Git Aliases - Git Branching - Branches in a Nutshell - Basic Branching and Merging - Branch Management - Branching Workflows - Remote Branches - Rebasing.

Introduction to GitHub – Set up and Configuration - Contribution to Projects, Maintaining a Project – Scripting GitHub.

List of Exercise/Experiments:

1. Form a Team, Decide on a project:
 - a) Create a repository in GitHub for the team.
 - b) Choose and follow a Git workflow
 - Each team member can create a StudentName.txt file with contents about themselves and the team project
 - Each team member can create a branch, commit the file with a proper commit message and push the branch to remote GitHub repository.
 - Team members can now create a Pull request to merge the branch to master branch or main development branch.
 - The Pull request can have two reviewers, one peer team member and one faculty. Reviewers can give at least one comment for Pull Request updating.
 - Once pull request is reviewed and merged, the master or main development branch will have files created by all team members.
2. Create a web page with at least three links to different web pages. Each of the web pages is to be designed by a team member. Follow Git workflow, pull request and peer reviews.
3. Form a Team, Decide on a project:
 - c) Create a repository in GitHub for the team.
 - d) Choose and follow a Git workflow
 - Each team member can create a StudentName.txt file with contents

using JavaScript.

UNIT V JAVASCRIPT OBJECTS

15

Objects – Math, String, and Date, Boolean and Number, document Object – Using JSON to Represent objects – DOM: Objects and Collections – Event Handling.

List of Exercise/Experiments:

1. Implement Event Handling in the web pages.

Mini Projects-Develop any one of the following web applications (not limited to one) using above technologies.

- a. Online assessment system
- b. Ticket reservation system
- c. Online shopping
- d. Student management system
- e. Student result management system
- f. Library management
- g. Hospital management
- h. Attendance management system
- i. Examination automation system
- j. Web based chat application

TOTAL: 75 PERIODS

OUTCOMES:

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

CO1: Apply agile development methods in software development practices.

CO2: Set up and create a GitHub repository.

CO3: Develop static and dynamic webpages using HTML.

CO4: Design interactive personal or professional webpages using CSS.

CO5: Develop web pages using Java script with event-handling mechanism.

TEXT BOOKS:

1. Roger S. Pressman, "Software Engineering: A Practitioner's Approach", McGraw Hill International Edition, Ninth Edition, 2020.
2. Scott Chacon, Ben Straub, "Pro GIT", Apress Publisher, 3rd Edition, 2014.
3. Deitel and Deitel and Nieto, "Internet and World Wide Web - How to Program", Pearson, 5th Edition, 2018.

REFERENCES:

1. Roman Pichler, "Agile Product Management with Scrum Creating Products that Customers Love", Pearson Education, 1 st Edition, 2010.
2. Jeffrey C and Jackson, "Web Technologies A Computer Science Perspective", Pearson Education, 2011.
3. Stephen Wynkoop and John Burke, "Running a Perfect Website", QUE, 2nd Edition, 1999.
4. Chris Bates, "Web Programming – Building Intranet Applications", 3rd Edition, Wiley Publications, 2009.
5. Gopalan N.P. and Akilandeswari J., "Web Technology", Second Edition, Prentice Hall of India, 2014.
6. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview
7. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0130944214274703362099_shared/overview

LIST OF EQUIPMENTS:

Systems with either Netbeans or Eclipse

Java/JSP/ISP Webserver/Apache

Tomcat / MySQL / Dreamweaver or

Equivalent/ Eclipse, WAMP/XAMP

2. Basic memory structure ROM: PROM – EPROM – EEPROM –RAM – Static and dynamic RAM – Programmable Logic Devices: Programmable Logic Array (PLA) – Programmable Array Logic (PAL) – Implementation of combinational logic circuits using PLA, PAL

TOTAL : 45 Theory + 30 Lab = 75 PERIODS

OUTCOMES:

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

- CO1: Implement digital circuits using simplified Boolean functions.
CO2: Realize Combinational circuits for a given function using logic gates.
CO3: Demonstrate the operation of various counters and shift registers using Flip Flops.
CO4: Analyze Synchronous Sequential circuits.
CO5: Summarize the various types of memory devices.
CO6: Design the Combinational circuits using Programmable Logic Devices.
CO7: Perform practical exercises as an individual and / or team member to manage the task in time.
CO8: Express the experimental results with effective presentation and report.

TEXT BOOKS:

1. M. Morris Mano and Michael D. Ciletti, Digital Design, With an Introduction to the Verilog HDL, VHDL, and System Verilog, 6th Edition, Pearson, 2018.
2. S.Salivahanan and S.Arivazhagan, Digital Circuits and Design, 5th Edition, Oxford University Press, 2018.

REFERENCES:

1. A.Anandkumar, Fundamental of digital circuits, 4th Edition, PHI Publication, 2016.
2. William Kleitz, Digital Electronics-A Practical approach to VHDL, Prentice Hall International Inc, 2012.
3. Charles H.Roth, Jr. and Larry L. Kinney, Fundamentals of Logic Design, 7th Edition, Thomson Learning, 2014.
4. Thomas L. Floyd, Digital Fundamentals, 11th Edition, Pearson Education Inc, 2017.
5. John.M Yarbrough, Digital Logic: Applications and Design, 1st Edition, Cengage India, 2006

NPTEL LINK: <https://nptel.ac.in/courses/108/105/108105132/>

LIST OF EQUIPMENTS:

IC Trainer Kit	-15 Nos
ICs each 7400/ 7404 / 7486 / 7408 / 7432 / 7483 / 7473 / 7411/ 7474	- 30 Nos

COURSE CODE	COURSE TITLE	L	T	P	C
22HS101	Professional Communication (Common to Branches...)	2	0	2	3

OBJECTIVES:

The Course will enable learners to:

- Strengthen basic **reading and writing** skills.
- Comprehend **listening contexts** competently.
- Inculcate **reading habit** and develop **effective reading** skills.
- Improve **active and passive vocabulary**.
- Acquire speech clarity with right pronunciation.
- Develop **vocabulary** of a general kind and enhance **grammatical accuracy**.
- Imbibe Content and Language Integrated Learning (CLIL).

UNIT I FORMAL AND INFORMAL COMMUNICATION 12

Listening: Short Texts, Short Formal and Informal Conversations

Speaking: Self-Introduction, Exchanging Personal Information

Reading: Practice in Skimming, Scanning and Predicting, Reading Comprehension

Writing: Free Writing, Hints Development

Grammar: Parts of Speech, Prepositions.

Vocabulary: Compound Nouns, Technical Words. (Theory 6)

List of Exercise/Experiments

1. Familiarization of Vowel Sounds-Monophthongs, Diphthongs and Consonant Sounds
2. Listening to Formal Conversations in British and American Accents
3. Guided Writing (Laboratory 6)

UNIT II GRAMMAR AND LANGUAGE DEVELOPMENT 12

Listening: Telephonic Conversations.

Speaking: Sharing information of a personal kind - Greetings – Taking leave.

Reading: Short comprehension passages - Pre-reading and Post-reading (multiple choice questions, short questions / open and close ended questions)

Writing: Instructions, Recommendations, Checklists

Grammar: Tenses, Framing 'Wh' & 'Yes' or 'No' questions

Vocabulary: Numerical Adjectives, Collocations (Theory 6)

List of Exercise/Experiments

1. Communication Etiquettes
2. Self -Introduction using SWOT Analysis (Laboratory 6)

UNIT III BASIC TECHNICAL WRITING AND STUDY SKILLS 12

Listening: Listening to longer texts and filling up the tables

Speaking: Asking about routine actions and expressing opinions

Reading: Short texts (Cloze Test)
Writing: Formal letters, E-mail writing, Interpretation of Charts and Graphs
Grammar: Cause and Effect expressions, Conditional Clauses
Vocabulary: Often misspelled and confusing words (Theory 6)

List of Exercise/Experiments
1. Mechanics of Reading Skills
2. News Reading–Cloze Tests (Laboratory 6)

UNIT IV GROUP DISCUSSION AND JOB APPLICATIONS 12

Listening: Listening to recorded dialogues of conversations and completing exercises based on them
Speaking: Discussion on Social issues.
Reading: Reading text from magazines
Writing: Purpose Expressions, Letter of Application, Minutes of Meeting.
Grammar: Modal Verbs, Subject-Verb agreement
Vocabulary : Sequence Words (Theory 6)

List of Exercise/Experiments
1. Group Presentation, Group Discussion: Do's and Don'ts of Group Discussion
2. Discussions on failure and success in interviews of famous personalities
3. Spotting Errors (Laboratory)

UNIT V ART OF REPORTING 09

Listening: Listening to TED talks
Speaking: Debate & Presentations
Reading: Biographies
Writing: Definitions (Single line & Extended), Report Writing (Industrial visit, Accident and Feasibility reports)
Grammar: Reported speech
Vocabulary : Verbal Analogies (Theory 6)

List of Exercise/Experiments
1. Writing based on listening to academic lectures and discussions
2. Leadership skills, Negotiation skills
3. Mechanics of Report Writing (Laboratory 6)

TOTAL : 60 PERIODS

OUTCOMES:

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

CO1: Comprehend conversations and short talks delivered in English

CO2: Participate efficiently in informal conversations and develop an awareness of the self and apply well-defined techniques

CO3: Read articles of a general kind in magazines and newspapers efficiently

CO4: Write short general essays, personal letters and E-mails in English

CO5: Develop vocabulary of a general kind by enriching reading skills

TEXT BOOKS:

1. **Kumar, Suresh E, & Sreehari, P.** *Communicative English*. Orient Black Swan, 2007.

2. **Richards, Jack C.** *Interchange Students' Book-2* New Delhi: CUP, 2015

REFERENCES:

1 **Bailey, Stephen.** *Academic Writing: A practical guide for students*. New York: Rutledge, 2011.

2. **Dhanavel, S P.** *English and Soft Skills, Volume Two*, Orient Black Swan.

COURSECODE	PRODUCT DEVELOPMENT LAB –1	L	T	P	C
22GE111	(Common to all Branches)	0	0	2	1

The students may be grouped into 3 to 4 and work under a project supervisor. The device/system/component/prototype Idea to be developed by the students and a final presentation to be done by the students about the idea generated at the end of the semester.

Students completing this course are expected to

OBJECTIVES:

Students completing this course are expected to

- Understand the functionalities and limitation of various machine/equipment
- Demonstrate various operations that can be performed to machines
- Summarize the basic principles of machines to convert their ideas into products

LIST OF EXPERIMENTS

- I 1. Study of Manufacturing Processes (Carpentry, Plumbing, Machines and Welding).
- 2. Study of fundamental operations of 3D Printer and Scanner with Software.
- 3. Study of Smart Machining (CNC and Laser cutting) and Engraving Techniques.
- II 1. Study of Fundamental of Circuit Design.
- 2. Study of PCB Milling Machine.
- 3. Study of Soldering and Desoldering.
- III 1. Study of Computer Peripheral Devices (Processing Information Devices)
- IV 1. Present the Product Idea Presentation - Phase – I

TOTAL: 30 PERIODS

Note: The students can select the prototype to be made of their choice after learning the above exercises.

OUTCOMES

After successful completion of the course the students will be able to do

- CO1 Understand the concept of manufacturing processes.
- CO2 Describe the working of the machine element.
- CO3 Discuss the various applications of engineering materials
- CO4 Summarize the basics of core engineering concepts.
- CO5 Describe the process for converting ideas into products

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. No	Equipment Name	Quantity
1	CNC Router	1 No
2	3D Printer	1 No
3	3D Scanner	1 No
4	Laser cutting Machine	1 No
5	Centre lathe	2 Nos
6	Arc welding transformer with cables and holders	2 Nos
7	Plumbing tools	2 Sets
8	Carpentry tools	2 Sets
9	Multimeter	10 Nos
10	Drilling Machine	1 No
11	Solder Stations	5 Sets
12	Desoldering Machine	1 No
13	PCB Milling Machine	1 No
14	Variable Power Supply	1 No
15	Electronic Components like Resistors, Transistors, Diode, Inductor, Capacitor, etc.	10 Sets
16	Personal Desktop Computers	30 Nos

COURSE CODE	COURSE TITLE	L	T	P	C
22CH104	ENVIRONMENTAL SCIENCE AND SUSTAINABILITY (Common to all the Branches)	2	0	0	MC

OBJECTIVES:

The Course will enable learners to:

- To gain knowledge of the environment and various natural resources.
- To identify the Scientific and Technological solutions to pollution issues and waste management.
- To understand the significance of the conservation of biodiversity.
- To recognize the needs and benefits of sustainability and its management.
- To comprehend the effects of human population on the environment

UNIT I NATURAL RESOURCES 07

Definition, scope and importance of environment – need for public awareness. Introduction to natural resources - Types - Forest resources: Use and over-exploitation, deforestation and its impacts, Food resources: effects of modern agriculture, organic farming, Renewable energy sources - Solar, Wind, Geothermal, Tidal, OTE and Biomass.

Field activity -Tree plantation

UNIT II POLLUTION AND WASTE MANAGEMENT 07

Pollution - Definition –causes, effects and control measures of (a) Air pollution (b) Water pollution (c) Soil pollution (d) Noise pollution (e) Nuclear hazards - nuclear accidents and holocaust - Role of an individual in prevention of pollution –Case studies.

Waste management- Municipal solid wastes, e- waste, plastic waste.

Field study – Solid waste management of the institution

UNIT III BIODIVERSITY AND ITS CONSERVATION 06

Biodiversity: types – values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity – endangered and endemic species, extinct, rare, vulnerable species of India – conservation of biodiversity: In-situ and ex-situ method.

Field study – Biodiversity of the institution

UNIT IV SUSTAINABILITY AND MANAGEMENT 05

Sustainability-concept, needs and challenges- Circular economy - Sustainable Development Goals- Concept of Carbon footprint, Environmental Impact Assessment, Clean Development Mechanism, solutions.

Field study – Carbon footprint of the institution

UNIT V HUMAN POPULATION

05

Introduction - Population growth, variation among nations, population explosion, Environment and human health – endemic/epidemic/pandemic – Role of information technology in environment and human health.

Case Study – Pandemics of 21st century

TOTAL : 60 PERIODS

OUTCOMES:

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

CO1: Investigate and use conservational practices to protect natural resources.

CO2: Identify the causes of pollutants and illustrate suitable methods for pollution abatement.

CO3: Adapt the values of biodiversity and its conservation methods.

CO4: Recognize suitable sustainable development practices and apply it in day-to-day life.

CO5: Assess the impacts of human population and suggest suitable solutions

TEXT BOOKS:

1. Anubha Kaushik and C.P. Kaushik, "Perspectives in environmental studies", New Age International Publishers, 2nd edition, 2021.
2. Benny Joseph, Environmental Science and Engineering, Tata McGraw-Hill, New Delhi, 1st edition, 2017.
3. Gilbert M. Masters, Introduction to Environmental Engineering and Science, Pearson Education, 3rd edition, 2014.
4. Erach Bharuch, Textbook of Environmental Studies for Undergraduate Courses, Universities Press(I) Pvt. Ltd., Hyderabad, 3rd Edition, 2021.

REFERENCES:

1. William P. Cunningham & Mary Ann Cunningham Environmental Science: A Global Concern, McGraw Hill, 14th edition, 2017.
2. Rajagopalan, R, Environmental Studies-From Crisis to Cure, Oxford University Press, 3rd edition, 2015.
3. G. Tyler Miller and Scott E. Spoolman, —Environmental Science, Cengage Learning India Pvt, Ltd., Delhi, 14th edition, 2014.
4. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Prentice Hall, 1st edition, 2012.
5. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, Cengage learning, 1st edition, 2015.
6. Environment Impact Assessment Guidelines, Notification of Government of India, 2006 and subsequent amendments, 2022

COURSE CODE	COURSE TITLE	L	T	P	C
22MA201	Transforms and Numerical Methods	3	0	2	5
	(Common to All Branches except CSBS)				

OBJECTIVES:

The Course will enable learners to:

- introduce the concepts of Laplace transforms and Z-transforms.
- illustrate the application of transforms in solving differential and difference equations.
- explain the Numerical methods for handling algebraic and transcendental equations.
- introduce the numerical techniques for interpolation, differentiation and integration.

UNIT I	LAPLACE TRANSFORMS	15
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Laplace transforms – Sufficient condition for existence – Transform of elementary functions – Basic properties – Transforms of derivatives and integrals of functions – Derivatives and integrals of transforms – Transforms of unit step function and impulse functions – Transform of periodic functions. Inverse Laplace transform – Convolution theorem (Statement only).

Experiments using SCILAB:

1. Finding Laplace transform of a function.
2. Finding inverse Laplace Transforms.
3. Determine the input for given output function of Laplace Transform.

UNIT II	Z – TRANSFORMS	15
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Z-transforms – Elementary properties – Inverse Z-transforms – partial fractions method – residues method – Convolution theorem.

Experiments using SCILAB:

1. Finding Z –transform of a sequence.
2. Finding convolution of two sequences.
3. Plotting the input and output function of Z transform.

UNIT III	SOLUTION OF DIFFERENTIAL AND DIFFERENCE EQUATIONS	15
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Solution of linear ordinary differential equation of second order with constant coefficients and first order simultaneous equations with constant coefficients using Laplace transform. Formation of difference equations – Solution of first and second order difference equations with constant coefficients using Z-transform.

Experiments using SCILAB:

1. Solving second order Ordinary Differential Equation.
2. Finding the Laplace transform and its inverse of a function numerically.
3. Finding the Z-transform numerically

UNIT IV	SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS	15
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Solution of algebraic and transcendental equations by Newton Raphson method - Solution of linear system of equations – Gauss elimination method – Gauss Jordan method – Gauss Seidel Iterative method– Eigenvalues of a matrix by Power method.

Experiments using SCILAB:

1. Finding the real roots of algebraic and transcendental equations using Newton Raphson method.
2. Finding the largest Eigenvalue by power method.
3. Solving system of linear equations using Gauss Seidel Method.

UNIT V	NUMERICAL DIFFERENTIATION AND INTEGRATION	05
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Finite differences – Forward and Backward differences – Interpolation – Newton's forward and backward interpolation formulae - Lagrange's interpolation for unequal intervals - Numerical Differentiation - Newton's and Lagrange's formulae - Numerical integration using Trapezoidal and Simpson's 1/3 rules – Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

Experiments using SCILAB:

1. Finding approximately the missing value using Lagrange interpolation.
2. Evaluating line integrals by trapezoidal rule.
3. Evaluating line integrals by Simpson's rule

TOTAL : 75 PERIODS

OUTCOMES:

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

CO1: determine Laplace transform and inverse transform of simple functions.

CO2: determine Z-transform and inverse transform of simple functions.

CO3: solve ordinary differential equations using Laplace transform and difference equation using Z-transform.

CO4: compute the solutions of algebraic, transcendental and the system of equations.

CO5: appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.

TEXT BOOKS:

1. Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media (An imprint of Lakshmi Publications Pvt., Ltd.), New Delhi, 7th Edition, 2009.
2. Grewal, B.S., and Grewal, J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th Edition, New Delhi, 2015.

REFERENCES:

1. Erwin. Kreyszig, "Advanced Engineering Mathematics", John Wiley and Sons, 10th Edition, New Delhi, 2016.
2. Jain R.K. and Iyengar S. R. K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 3rd Edition, 2007.
3. Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics", Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012.
4. Mathews, J.H. "Numerical Methods for Mathematics, Science and Engineering", 2nd Edition, Prentice Hall, 1992.
5. Sastry S.S, "Introductory Methods of Numerical Analysis", PHI Learning Pvt. Ltd, 5th Edition, 2015.

LIST OF EQUIPMENTS:

SCILAB : Open Source

COURSE CODE	COURSE TITLE	L	T	P	C
22EC201	ELECTRON DEVICES AND CIRCUIT THEORY	3	0	2	4

OBJECTIVES:

- To discuss the behavior of semiconductor diodes in various applications.
- To familiarize the operation of BJT and FET.
- To construct simple electronic circuits using special semiconductor devices.
- To understand the fundamental laws of electric circuits.
- To analyze the response of electric circuits using network theorems.

UNIT I SEMICONDUCTOR DIODES 09

PN junction diode, Current equations, Energy Band diagram, Diffusion and drift current densities, forward and reverse bias characteristics, Transition and Diffusion Capacitances, Switching Characteristics, Breakdown in PN Junction Diodes, Zener diode and its applications.

Experiments

1. VI characteristics of PN diode
2. VI characteristics of Zener diode.

UNIT II TRANSISTORS 09

Bipolar Junction Transistor - NPN -PNP – Operations - Early effect – Current Equations - Input and Output characteristics of CE, CB, CC – Field Effect Transistors - JFET, MOSFET- D-MOSFET, E-MOSFET- Characteristics.

Experiments

1. Input and output characteristics of CE Configuration.
2. 4. Characteristics of JFET.

UNIT III SPECIAL SEMICONDUCTOR DEVICES AND APPLICATIONS 09

Tunnel diode,Varactor diode, UJT, SCR, DIAC, TRIAC, Power BJT- Power MOSFET- DMOS-VMOS. LED, Photo transistor, Opto Coupler.

Experiments

1. VI characteristics of UJT.
2. VI characteristics of SCR

UNIT IV BASIC CIRCUIT ANALYSIS 09

Resistive elements - Ohms Law- Kirchhoff’s current and voltage laws - series and parallel connection of independent sources - R, L and C, source transformation, Mesh current and Node voltage with AC and DC Analysis - methods of analysis, star delta conversion. Transient response of RL,RC and RLC circuits using Laplace Transform for DC input and AC sinusoidal input.

Experiments

7(a). Verification of Kirchhoff's current law.

1. 7(b). Verification of Kirchhoff's voltage law..

UNIT V NETWORK THEOREMS

09

Thevenin and Norton Theorems - Superposition Theorem - Maximum power transfer theorem - Reciprocity Theorem - Millman's theorem.

Experiments

1. Verification of superposition theorem.
2. Verification of Thevenin's theorem.
3. 10. Verification of Norton's theorem.

TOTAL: 45 Theory + 30 Lab = 75 PERIODS

OUTCOMES:

Upon Completion of the course, the students will be able to:

CO1: Examine the performance of electronic circuits using PN junction diode and Zener diode.

CO2: Construct electronic circuits using BJT and FET to sketch the input and output characteristics.

CO3: Demonstrate the behavior of special semiconductor devices in various applications.

CO4: Comprehend the impact of voltage and current in electric circuits using Mesh & Nodal methods.

CO5: Relate various network theorems to determine the response of the electric circuits.

CO6: Perform practical exercises as an individual and / or team member to manage the task in time.

CO7: Express the experimental results with effective presentation and report.

TEXT BOOKS:

1. Charles K. Alexander, Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 7th Edition, McGraw Hill, 2022.
2. Robert L. Boylestad, Louis Nashelsky, Electronic Devices and Circuit Theory, 11th Edition, 2017.

REFERENCES:

1. W.H.Hayt, J.E.Kemmerly&S.M.Durbin, Engineering Circuit Analysis, 9th Edition, McGraw Hill Education, New Delhi, India,2019.
2. Joseph Edminister and MahmoodNahvi, —Electric Circuits, Schaum'sOutlineSeries, 5th Edition Reprint,Tata McGraw Hill Publishing Company, New Delhi, 2016.
3. David A Bell, Electric Circuits and Electronic Devices, Oxford University Press, 2010
4. Thomas L.Floyd,Electronic Devices,9th Edition, Pearson,2017

5. Donald A Neaman, Semiconductor Physics and Devices, 4th Edition, McGraw Hill, 2017
6. Dr.R.S. Sedha, A Textbook of Applied Electronics, S Chand and company limited, 2019

NPTEL LINK:https://onlinecourses.nptel.ac.in/noc22_ee93/preview

NPTEL LINK:https://onlinecourses.nptel.ac.in/noc20_ee64/preview

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

BC 107, BC 148, 2N2646, BFW10	- 25 each
1N4007, Zener diodes	- 25 each
Bread Boards	-15 Nos
CRO (30MHz)	- 10 Nos
Signal Generator /Function Generators (3 MHz)	- 15 Nos
Transistor/FET/SCR/UJT (BJT-NPN-PNP and NMOS/PMOS)	- 25 Nos
Dual power supply/ single mode power supply	- 15 Nos
Multimeter	-15 Nos
Ammeter(0-50)mA	-15 Nos
Voltmeter(0-30)V	-15 Nos

COURSE CODE	COURSE TITLE	L	T	P	C
22EC201	ENGINEERING CHEMISTRY (Common to all except CE, ME and CB)	3	0	2	4

OBJECTIVES:

The Course will enable learners to:

- To understand the water quality criteria and interpret its applications in water purification.
- To gain insights into the basic concepts of electrochemistry and implement its applications in chemical sensors.
- To acquire knowledge on the fundamental principle of energy storage devices and relate it to electric vehicles.
- To identify the different types of smart materials and explore their applications in Engineering and Technology.
- To assimilate the preparation, properties and applications of nanomaterials in various fields.

UNIT I WATER TECHNOLOGY 15

Sources of water – Impurities - Drinking water quality parameters – Hardness and its types, problems - Municipal water treatment and disinfection (chlorination - breakpoint chlorination, UV, Ozonation). **Boiler troubles** - Scales and sludges, Boiler feed water: Requirements - Internal treatment (phosphate, colloidal, sodium aluminate and Calgon conditioning). External treatment – Ion exchange demineralization - Principle, process and fouling.

Desalination of brackish water: Reverse osmosis – principle -types of membranes, process and fouling.

List of Experiments

1. Determination of total, temporary and permanent hardness of water by EDTA method.
2. Determination of chloride content of water sample by argentometric method.
3. Determination of alkalinity in water sample.
4. Estimation of iron content of the water sample using spectrophotometer (1,10-phenanthroline/thiocyanate method)

UNIT II ELECTROCHEMISTRY AND SENSORS 15

Introduction- Conductance- factors affecting conductance – Electrodes – origin of electrode potential – single electrode potential, standard electrode potential – measurement of single electrode potential –over voltage - reference electrodes (standard hydrogen electrode, calomel electrode)-ion selective electrode- glass electrode - Nernst equation (derivation), numerical problems, Electrochemical series and its applications.

Chemical sensors – Principle of chemical sensors – Breath analyzer – Gas sensors – CO₂ sensors- Sensor for health care – Glucose sensor.

List of Experiments

1. Determination of the amount of NaOH using a conductivity meter.
2. Determination of the amount of acids in a mixture using a conductivity meter.
3. Determination of the amount of given hydrochloric acid using a pH meter.

UNIT III ENERGY STORAGE DEVICES AND ENERGY SOURCES 15

Batteries – Primary alkaline battery - Secondary battery - Pb-acid battery, Fuel cell - H₂ – O₂ fuel cell.

Batteries used in E- vehicle: Ni-metal hydride battery, Li-ion Battery, Li-air Battery

Nuclear Energy – Nuclear fission, fusion, differences, characteristics – nuclear chain reactions – light water nuclear reactor – breeder reactor.

List of Experiments

1. Determination of single electrode potential of the given electrode.
2. Estimation of the iron content of the given solution using a potentiometer.
3. Determination of electrochemical cell potential (using different electrodes/ different concentrations of electrolytes)

UNIT IV SMART MATERIALS FOR ENGINEERING APPLICATIONS 15

Polymers – Definition – Classification – smart polymeric materials - Preparation, properties and applications of Piezoelectric polymer - Polyvinylidene fluoride (PVDF), Electroactive polymer- Polyaniline (PANI) and Biodegradable polymer - Polylactic acid (PLA).

Polymer composites: Definition, Classification – FRP's – Kevlar.

Shape Memory Alloys: Introduction, Shape memory effect – Functional properties of SMAs – Types of SMA - Nitinol (Ni-Ti) alloys - applications.

Chromogenic materials: Introduction – Types - applications.

List of Experiments

1. Determination of the molecular weight of polymer using Ostwald viscometer.
2. Application of polymeric fibers in 3D printing.

UNIT V NANOCHEMISTRY 15

Introduction – synthesis – top-down process (laser ablation, chemical vapor deposition), bottom-up process (precipitation, electrochemical deposition) – properties of nanomaterials – types – nanotubes -carbon nanotubes, applications of CNT - nanocomposites – General applications of nanomaterials in electronics, information technology, medical and healthcare, energy, environmental remediation, construction and transportation industries.

List of Experiments

1. Determination of concentration of BaSO₄ nanoparticles by conductometric titrations.

Preparation of ZnO nanocrystal by precipitation method.

TOTAL: 75 PERIODS

OUTCOMES:

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

CO1: Interpret the water quality parameters and explain the various water treatment methods.

CO2: Construct the electrochemical cells and sensors.

CO3: Compare different energy storage devices and predict their relevance in electric vehicles.

CO4: Classify different types of smart materials, their properties and applications in Engineering and Technology.

CO5: Integrate the concepts of nanochemistry and enumerate its applications in various fields.

TEXT BOOKS:

1. P. C. Jain and Monika Jain, "Engineering Chemistry", Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 17th Edition, 2022.
2. Sivasankar B., "Engineering Chemistry", Tata McGraw-Hill Publishing Company Ltd., New Delhi, Second reprint, 2012

REFERENCES:

1. S.S. Dara and S.S. Umare, "A Textbook of Engineering Chemistry", S. Chand & Company, New Delhi, 12th Edition, 2013.
2. V.R. Gowarikar, Polymer Science, New Age International Publishers, 2nd edition, 2021.
3. J. C. Kuriacose and J. Rajaram, "Chemistry in Engineering and Technology", Volume - 1 & Volume -2, Tata McGraw-Hill Education Pvt. Ltd., 2010.
4. Geoffrey A. Ozin, Andre C. Arsenault and Ludovico Cademartiri, "Nanochemistry: A Chemical Approach to Nanomaterials", 2nd Edition, RSC publishers, 2015.
5. Prasanna Chandrasekhar, "Conducting polymers, fundamentals and applications—Including Carbon Nanotubes and Graphene", Springer Science & Business Media, New York, 2nd Edition, 2019.
6. J. Mendham, R. C. Denney, J. D. Barnes, M. J. K. Thomas and B. Sivasankar, "Vogel's Quantitative Chemical Analysis", Pearson Education Pvt. Ltd., 6th edition, 2019.

LIST OF EQUIPMENTS:

1. Conductivity meter
2. pH meter
3. Potentiometer

HANDLING

Inheritance: Inheritance basics, Using super, Method Overriding, Using Abstract Classes, Using final with Inheritance - Package and Interfaces: Packages, Packages and member access, Importing Packages, Interfaces, Static Methods in an Interface – Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions.

List of Exercise/Experiments:

1. Develop a Java application with Employee class with Emp_name, Emp_id, Address, Mail_id, Mobile_no as members. Inherit the classes, Programmer, Assistant Professor, Associate Professor and Professor from employee class. Add Basic Pay (BP) as the member of all the inherited classes with 97% of BP as DA, 10 % of BP as HRA, 12% of BP as PF, 0.1% of BP for staff club fund. Generate pay slips for the employees with their gross and net salary.
2. Design a Java interface for ADT Stack. Implement this interface using array and built-in classes. Provide necessary exception handling in both the implementations.
3. Write a Java Program to create an abstract class named Shape that contains two integers and an empty method named print Area(). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains the methods print Area () that prints the area of the given shape and Numberofsides() that prints the number of sides of the given shape.
4. 4. Write a Java program to apply built-in and user defined exceptions.

UNIT III MULTITHREADING, I/O AND GENERIC PROGRAMMING 15

Multithreaded Programming: Creating a Thread, Thread Priorities, Synchronization, Interthread Communication – I/O: I/O Basics, Reading Console Input, Writing Console Output, Reading and Writing Files – Generics: Introduction, Generic class, Bounded Types, Generic Methods, Generic Interfaces, Generic Restrictions.

List of Exercise/Experiments:

1. Write a Java program that correctly implements producer consumer problem using the concept of inters thread communication.
2. Write a Java program to read and copy the content of one file to other by handling all file related exceptions.

UNIT IV STRING HANDLING AND COLLECTIONS 15

Lambda Expressions - String Handling – Collections: The Collection Interfaces, The Collection Classes – Iterator – Map - Regular Expression Processing.

List of Exercise/Experiments:

1. String Manipulation:

- a. Reversing a set of words and count the frequency of each letter in the string.
 - b. Pattern Recognition - Find the number of patterns of form 1[0]1 where [0] represents any number of zeroes (minimum requirement is one 0) there should not be any other character except 0 in the [0] sequence in a given binary string.
 - c. Remove all the occurrences of string S2 in string S1 and print the remaining.
 - d. Find the longest repeating sequence in a string
 - e. Print the number of unique string values that can be formed by rearranging the letters in the string S.
2. Collections:
- a. Write a program to perform string operations using ArrayList. Write functions for the following
 - i. Append - add at end
 - ii. Insert – add at particular index
 - iii. Search
 - iv. List all string starts with given letter
 - b. Find the frequency of words in a given text.

UNIT V

JDBC CONNECTIVITY

15

JDBC – DataSource, Configurations, Connection, Connection Pools, Driver Types, ResultSet, Prepared Statement, Named Parameter, Embedded SQL (Insert, Update, Delete, Join, union etc), ResultSet Navigation, Connection Close and Clean up.

List of Exercise/Experiments:

Mini Project (using JDBC)

TOTAL: 75 PERIODS

OUTCOMES:

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

CO1: Understand the object oriented programming concepts and fundamentals of Java.

CO2: Develop Java programs with the packages, interfaces and exceptions.

CO3: Build Java applications with I/O streams, threads and generics programming.

CO4: Apply strings and collections in developing applications.

CO5: Implement the concepts of JDBC.

TEXT BOOKS:

Herbert Schildt, “Java: The Complete Reference”, 11th Edition, McGraw Hill Education, 2019

REFERENCES:

1. Cay S. Horstmann, Gary Cornell, “Core Java Volume – I Fundamentals”, 11th Edition, Prentice Hall, 2019.

2. Paul Deitel, Harvey Deitel, Java SE 8 for programmers, 3rd Edition, Pearson, 2015.
3. Steven Holzner, Java 2 Black book, Dream tech press, 2011.
4. Timothy Budd, Understanding Object-oriented programming with Java, Third Edition, Pearson Education, 2008.
5. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_2995947394736727000_0_shared/overview

LIST OF EQUIPMENTS:

Systems with either Netbeans or Eclipse, JDK 1.7 and above, Linux and MySQL

COURSE CODE	COURSE TITLE	L	T	P	C
22GE211	PRODUCT DEVELOPMENT LAB –2 (Common to all Branches)	0	0	2	1

The students may be grouped into a batch of strength 3 or 4 to work under a project supervisor. The student batches should study the device/system/component and will do literature review to develop prototype idea. Further at the end of the semester they will make a final presentation to exhibit the conceptual design skills and the process to develop a product.

OBJECTIVES:

Students completing this course are expected to

- Use the innovative design methodology to articulate the product concepts.
- Summarize the requisite Engineering Principles for transforming concepts into products.
- Conduct basic tests to extract the qualitative and quantitative performance factors.

EXERCISES:

1. Study of Basic Engineering Design Concepts.
2. Conduct a literature survey on the implementation of the design concepts.
3. Prepare the design concepts for an identified literature gap.

Present the Product Idea Presentation – Phase II.

TOTAL: 30 PERIODS

OUTCOMES:

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

CO1 Understand the working and capacity of various engineering systems.

CO2 Infer the outcomes in the product development process.

CO3 Perform basic engineering and material characterization tests.

CO4 Demonstrate the ability to provide conceptual design strategies for a product.

CO5 Implement the Science, Engineering, Technology and Mathematics (STEM) for product design..

COURSE CODE	COURSE TITLE	L	T	P	C
22GE202	COMPUTER AIDED ENGINEERING GRAPHICS Laboratory Course with Theory Component (Common to I Semester CSE, CSE (CS), ADS and II Semester ECE)	1	0	2	1

OBJECTIVES:

- To help students understand universal technical drawing standards.
- To provide training on drafting software to draw part models.
- To demonstrate the concepts of orthographic and isometric projections.
- To use drawing skills for communicating concepts, ideas for engineering product design.
- Use pictorial views to visualize and draw the isometric view of the objects

UNIT I INTRODUCTION TO CONVENTIONS IN ENGINEERING DRAWING AND CONIC SECTIONS 09

Introduction to Engineering Drawing - Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning. Conic curves - Ellipse, Parabola and Hyperbola by Eccentricity method. (Theory - 3)

Experiments Using CAD Software:

1. Drawing of a title block with necessary text, projection symbol and lettering using drafting software.

Drafting of Conic curves - Ellipse, Parabola and Hyperbola (Laboratory - 6)

UNIT II ORTHOGRAPHIC PROJECTION 09

Visualization concepts and Orthographic Projection - Layout of views – Orthographic Projection- Conversion of pictorial diagram into orthographic views. (Theory - 3)

Experiments Using CAD Software:

1. Drawing orthographic view of simple solids like Prism, Pyramids, Cylinder, Cone, etc, and dimensioning.
2. Drawing of orthographic views from the given pictorial diagram. (Laboratory -6)

UNIT III PROJECTION OF PLANES 09

Projection of planes (polygonal and circular surfaces) inclined to both the planes by rotating object method. (Theory - 3)

Experiments Using CAD Software:

1. Drawing of plane Surface inclined to HP.

Drawing of plane Surface inclined to VP. (Laboratory -6)

UNIT IV PROJECTION OF SOLIDS 09

Double integrals – Change of order of integration – Area enclosed by plane curves – Triple integrals – Projection of simple solids like Prisms, Pyramids, Cylinder and Cone when the axis is inclined to HP by rotating object method. (Theory - 3)

Experiments Using CAD Software:

1. Drawing of simple solids like prism and pyramids when the axis is inclined to HP.
2. Drawing of simple solids like cylinder and cone when the axis is inclined to HP.

(Laboratory -6)

UNIT V ISOMETRIC DRAWING 15

Principles of isometric view – Isometric view of simple solids – Prism, Pyramid, Cylinder and Cone. (Theory - 3)

Experiments Using CAD Software:

1. Drawing isometric projection of simple solids.
2. Modeling of 2D to 3D objects using drafting software.

(Laboratory -6)

OUTCOMES

After successful completion of the course, the students will be able to.

- CO1 Explain the various engineering standards required for drafting and explore knowledge in conic sections.
 CO2 Draw the orthographic views of 3D primitive objects.
 CO3 Describe the projection of plane surfaces by the rotating plane method.
 CO4 Apply the projection concepts and drafting tools to draw projections of solids.
 CO5 Sketch the pictorial views of the objects using CAD tools.

TEXT BOOKS:

1. Natarajan K.V., "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 33rd Edition, 2020.
2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age International (P) Limited, 15th Edition, 2019

REFERENCES:

1. Bhatt N.D. "Engineering Drawing", Charotar Publishing House, 53rd edition, 2019.
2. Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 3rd Edition, 2019.
3. Engineering Drawing Practice for Schools and Colleges BIS SP46:2003 (R2008), Published by Bureau of Indian Standards (BIS), 2008.
4. Parthasarathy. N.S and Vela Murali, "Engineering Graphics", Oxford University, Press, New Delhi, 2019.
5. Gopalakrishna. K.R., Engineering Drawing Vol. 1 & 2, Subhas Publications, 27th Edition, 2017.
6. R.S Khurmi and J K Gupta, Textbook of Refrigeration and Air-conditioning (M.E.), S Chand & Co, 2006

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

S. No.	Description of Equipment	Quantity
1	Computer nodes or systems with suitable graphics facility	30 No
2.	Software for Drafting and Modelling	30 No
3.	Laser Printer or Plotter to print / plot drawings	1 No