# Semester-I

| B.E/B.TECH | B23MAT101 MATRICES AND DIFFERENTIAL CALCULUS (Common to all Branches) | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

| Course Objectives | |
|---|---|
| 1. | To develop the use of matrices that is needed by engineers for practical applications. |
| 2. | To understand the concept of functions of several variables. |
| 3. | To recognize and classify ordinary differential equations. |
| 4. | To apply the concept of ordinary differential equations in engineering disciplines. |
| 5. | To learn the applications of Laplace transforms in engineering. |

| UNIT – I | MATRICES | 12 |
|---|---|---|
| Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigenvectors – Cayley Hamilton theorem – Quadratic form: Nature, Reduction to canonical form by orthogonal transformation. | | |

| UNIT – II | FUNCTIONS OF SEVERAL VARIABLES | 12 |
|---|---|---|
| Partial differentiation –Total derivative – Jacobians – Taylor‘s series expansion for functions of two variables – Maxima and minima of functions of two variables – Lagrange‘s method of undetermined multipliers. | | |

| UNIT – III | ORDINARY DIFFERENTIAL EQUATIONS | 12 |
|---|---|---|
| Higher order linear ordinary differential equations with constant coefficients - Method of variation of parameters - Simultaneous differential equations. | | |

| UNIT – IV | APPLICATIONS OF ORDINARY DIFFERENTIAL EQUATIONS | 12 |
|---|---|---|
| Solution of specified differential equations connected with electric circuits - Law of Natural growth and decay - Simple harmonic motion (Differential equations and associated conditions need to be given). | | |

| UNIT – V | LAPLACE TRANSFORM | 12 |
|---|---|---|
| Existence conditions - Properties (excluding proofs) - Transform of standard functions -Transforms of derivatives and integrals - Inverse Laplace transform - Applications to solution of linear second order ordinary differential equations with constant coefficients. | | |
| | | **Total Instructional hours : 60** |

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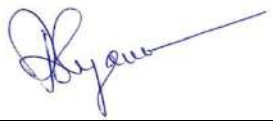
| Course Outcomes : Students will be able to | |
|---|---|
| CO1 | Make use of Eigen values and Eigen vectors to reduce the quadratic form into canonical form and to find the powers of a square matrix. |
| CO2 | Construct maxima and minima problems. |
| CO3 | Solve differential equations which existing in different engineering disciplines. |
| CO4 | Develop the applications of differential equations in various engineering field. |
| CO5 | Apply Laplace transform and inverse transform to solve differential equations with constant coefficients. |

| Text Books | |
|---|---|
| 1. | Grewal B.S.,"Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2015. |
| 2. | Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media -An imprint of Lakshmi Publications Pvt., Ltd., New Delhi, 7th Edition, 2015. |
| 3. | Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2015. |
| 4. | George B. Thomas , Joel Hass , Christopher Heil , Maurice D. Weir, "Thomas' Calculus", Pearson,14th Edition, 2018. |

| Reference Books | |
|---|---|
| 1. | Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2019. |
| 2. | Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015. |
| 3. | Ramana B V., "Higher Engineering Mathematics", Tata Mc Graw Hill Publishing Company, New Delhi, 2017. |
| 4. | Veerarajan T., "Engineering Mathematics for Semester I and II", Tata Mc Graw Hill Publishing Company, New Delhi, 2019. |
| 5. | Gean Duffy., "Advanced Engineering Mathematics with MATLAB", A CRC Press Company, Boca Raton London, New York Washington, D.C, 2nd edition 2009. (Free e- book downloaded from www.EasyEngineering.net.pdf). |



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| B.E / B.Tech | B23MET102 – FUNDAMENTALS OF CIVIL AND MECHANICAL ENGINEERING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

| Course Objectives | |
|---|---|
| 1. | To impart fundamental knowledge on Civil and Mechanical Engineering. |
| 2. | To explain the surveying principle and materials used for the construction of civilized structures. |
| 3. | To understand the fundamentals of building components. |
| 4. | To explain the component of power plant units and detailed explanation to IC engines their working principles. |
| 5. | To explain the Refrigeration and Air-conditioning System. |

| UNIT - I | SURVEYING AND CIVIL ENGINEERING MATERIALS | 9 |
|---|---|---|

**Surveying :** Objects – types – principles

**Civil Engineering Materials :** Bricks – stones – sand – cement – concrete – steel sections

| UNIT - II | BUILDING COMPONENTS AND STRUCTURES | 9 |
|---|---|---|

**Foundations :** Types, Bearing capacity – Requirement of good foundations

**Superstructure :** Brick masonry – stone masonry – beams – columns – lintels – roofing – flooring – plastering – Types of Bridges and Dams – Basics of Interior Design and Landscaping–stress – strain

| UNIT - III | POWER PLANT Engineering | 9 |
|---|---|---|

Introduction, Classification of Power Plants – Working principle of steam, Gas, Diesel, Hydro-electric and Nuclear Power plants – working principle of Single acting Reciprocating pump, Centrifugal Pump and Pelton wheel turbine.

| UNIT - IV | INTERNAL COMBUSTION ENGINES | 9 |
|---|---|---|

Components of internal combustion engine – Working principle of four stroke petrol and diesel engines – Working principle of two stroke petrol and diesel engines – Comparison of four stroke and two stroke engines – Concept of Electrical and Hybrid vehicles

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| UNIT - V | REFRIGERATION AND AIR CONDITIONING SYSTEM | 9 |
|---|---|---|
| Terminology of Refrigeration and Air Conditioning. Layout of typical domestic refrigerator – Working Principle of vapour compression and absorption system (Liquid-Ammonia) – Working Principle of Window and Split type room Air conditioner | | |
| | | **Total Instructional hours : 45** |

| **Course Outcomes : Students will be able to** | |
|---|---|
| **CO1** | Explain the principles of surveying, and proper selection of construction materials |
| **CO2** | Summarize the building structures |
| **CO3** | Identify the components using in power plant cycle |
| **CO4** | Demonstrate the working principles of petrol and diesel engines |
| **CO5** | Outline the components of Refrigeration and Air Conditioning cycle |

| **Text Books** | |
|---|---|
| 1. | Shanmugam G and Palanichamy M S, “Basic Civil and Mechanical Engineering”, Tata McGraw Hill Publishing Co., New Delhi, 2016 |
| 2. | Ramesh Babu V, “Basic Civil and Mechanical Engineering”, VRB Publishers Pvt. Ltd., Chennai, 2015 |

| **Reference Books** | |
|---|---|
| 1. | Ramamrutham S., “Basic Civil Engineering”, Dhanpat Rai Publishing Co. (P) Ltd. 2013 |
| 2. | Seetharaman S., “Basic Civil Engineering”, Anuradha Agencies, 2015. |
| 3. | Venugopal K. and Prahu Raja V., “Basic Mechanical Engineering”, Anuradha Publishers, Kumbakonam, 2018. |
| 4. | Shantha Kumar S R J., “Basic Mechanical Engineering”, Hi-tech Publications, Mayiladuthurai, 2015. |

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| B.E / B.Tech | B23MET101 – ENGINEERING GRAPHICS (Common to All) | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 2 | 0 | 4 |

| Course Objectives | |
|---|---|
| 1. | Understand the conventions and method of Engineering drawing. |
| 2. | Construct and interpret the basic Engineering drawings. |
| 3. | Improve their visualization skills so that they can apply these skills in new product development. |
| 4. | Enhance their technical communication skill in the form of communicative drawings. |
| 5. | Comprehend the theory of projection. |

| CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION) | 2 |
|---|---|
| Importance of graphics in Engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning. | |

| UNIT - I | PLANE CURVES AND FREE HANDSKETCHING | 14 |
|---|---|---|
| Basic Geometrical constructions, Curves used in Engineering practices-Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves. Visualization concepts and Free Hand sketching: Visualization principles – Representation of Three-Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects. | | |

| UNIT - II | PROJECTION OF POINTS, LINES AND PLANE SURFACE | 14 |
|---|---|---|
| Orthographic projection- 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 and trapezoidal method and traces Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method. | | |

| UNIT - III | PROJECTION OF SOLIDS | 14 |
|---|---|---|
| Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to both the principal planes by rotating object method and auxiliary plane method. | | |

| UNIT - IV | PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES | 14 |
|---|---|---|
| Sectioning of solids in simple vertical position when the cutting plane is inclined to the 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. | | |

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| UNIT - V | ISOMETRIC AND PERSPECTIVE PROJECTIONS | 14 |
|---|---|---|
| Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-prisms, pyramids and cylinders by visual ray method. | | |

| COMPUTER AIDED DRAFTING | 3 |
|---|---|
| Introduction to drafting packages and demonstration of their use.<br>Basic Geometrical constructions using AUTOCAD. | |
| **Total Instructional hours : 75** | |

| Course Outcomes : Students will be able to | |
|---|---|
| **CO1** | Construct the basic Engineering curves and freehand sketching of basic geometrical constructions and multiple views of objects. |
| **CO2** | Draw problems related to projections of points, straight lines, planes and solids. |
| **CO3** | Build the projection of simple solids. |
| **CO4** | Apply the knowledge acquired on practical applications of sectioning and development of solids. |
| **CO5** | Construct simple solids and its sections in isometric view and projections and to draw its perspective views. |

| Text Books | |
|---|---|
| 1. | K.V.Natarajan, “A text book of Engineering Graphics”, 28th Edition, Dhana Lakshmi Publishers, Chennai, 2015. |
| 2. | N.D. Bhatt and V.M. Panchal, “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2014. |

| Reference Books | |
|---|---|
| 1. | K. Venugopal and V.Prabhu Raja, “Engineering Graphics”, New Age International Publishers, 2017. |
| 2. | K.R.Gopalakrishna., “Engineering Drawing” (Vol. I & II combined) Subhas Publications, Bangalore, 2018. |
| 3. | N.S Parthasarathy and Vela Murali, “Engineering Drawing”, Oxford University Press, 2015. |

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| B.E / B.Tech | B23HST101 - HERITAGE OF TAMILS (Common to all Branches) | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

| UNIT I | LANGUAGE AND LITERATURE | 3 |
|---|---|---|

Language Families in India - Dravidian Languages – Tamil as aClassical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.

| UNIT II | HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE | 3 |
|---|---|---|

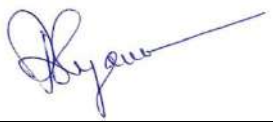
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

| UNIT III | FOLK AND MARTIAL ARTS | 3 |
|---|---|---|

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

| UNIT IV THINAI CONCEPT OF TAMILS | 3 |
|---|---|

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.



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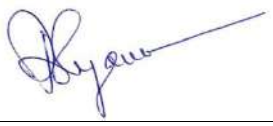
| UNIT V | CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE | 3 |
|---|---|---|
| Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books. | | |
| | **Total Instructional hours : 15** | |

**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 C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & 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.

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| B.E/B.Tech (Except CSBS) | B23ENI101–PROFESSIONAL COMMUNICATION | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

| Course Objectives | |
|---|---|
| 1 | To enhance listening and reading ability of learners to comprehend various forms of speech or conversations. |
| 2 | To develop learners' verbal ability through complex texts and speak effectively in real life and workplace context. |
| 3 | To make use of grammatical knowledge to enhance fluency. |
| 4 | To foster learners' ability to write convincing job applications and effective reports. |
| 5 | To develop learners language proficiency through LSRW skills |

| UNIT-I | 9 |
|---|---|

**Listening:** Listening for general information-specific details- conversation- Audio /video (formal & informal); Telephone conversation

**Speaking:** Self-Introduction; Introducing a friend; - politeness strategies- making polite requests & polite offers.

**Reading:** Introduction to technical texts, scientific texts

**Writing:** Extended definitions, Writing checklists, Recommendation

**Language development:** Gerunds, Infinitives

**Vocabulary development:** Technical vocabulary, abbreviations, British & American spelling

| UNIT-II | 9 |
|---|---|

**Listening:** Listening to podcasts, anecdotes / stories / event narration; documentaries and interviews with celebrities

**Speaking:** Narrating personal experiences / Talking about events and situations

**Reading:** Reading longer technical texts, Summarizing

**Writing:** Interpreting graphical representations, Writing dialogues about formal and informal contexts.

**Language development:** Use of conjunctions and prepositions

**Vocabulary development:** Numerical adjectives, Transitional device

| UNIT-III | 9 |
|---|---|

**Listening:** Listen to a classroom lecture; listening to advertisements about products

**Speaking:** Picture description-describing locations in workplace, Presenting product, describing shape, size and weight- talking about quantities-talking about precautions, discussing advantages and disadvantages-making comparisons

**Reading:** Cause & effect texts, practice in speed reading

**Writing:** Process writing, Use of sequence words, Analytical and issue based essays

**Language development:** Subject verb agreement, Pronoun concord / pronoun antecedent

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| |
|---|
| **Vocabulary development:** Sequence words, Misspelled words, Content v/s Function words. |

| **UNIT-IV** | **9** |
|---|---|
| **Listening:** Listening to TED Talks, Educational videos and completing exercises based on them<br>**Speaking:** Short speech (Just A Minute) -Extempore and persuasive speech, discussing and making plans-talking about tasks-talking about progress.<br>**Reading:** Reading for details in personal and professional emails<br>**Writing:** Drafting personal and professional emails, job application- cover letter, résumé preparation, Internship letter.<br>**Language development:** Clauses, if conditionals<br>**Vocabulary development:** Finding suitable synonyms, Paraphrasing | |

| **UNIT-V** | **9** |
|---|---|
| **Listening:** Listening to debates/ discussions and panel discussions, listening to interviews<br>**Speaking:** Making predictions- talking about a given topic, giving opinions & facts, describing a process, discussing safety issues (making recommendations)<br>**Reading:** Reading and understanding technical articles<br>**Writing:** Writing reports, Minutes of meeting, Writing feasibility, survey and industrial reports<br>**Language development:** Reported speech, Active and Passive voice, Impersonal passive, Idioms.<br>**Vocabulary development:** Verbal analogies, Purpose statements | |
| | **Total Theory Instructional hours:45**<br>**Total Lab Instructional hours:30** |

| **Course Outcomes: Students will be able to** | |
|---|---|
| **CO1** | Develop listening skills to respond appropriately in general and academic purposes |
| **CO2** | Develop strategies and skills to enhance their ability to read and comprehend |
| **CO3** | Apply vocabulary skills to improve their language skills |
| **CO4** | Build the writing skills with specific reference to technical writing |
| **CO5** | Demonstrate language proficiency through LSRW skills |

| **Text Books** | |
|---|---|
| 1. | Board of Editors. Fluency in English A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016 |
| 2. | Sudharshana.N.P and Saveetha. C. English for Technical Communication. Cambridge University Press: New Delhi, 2016. |

| **Reference Books** | |
|---|---|
| 1. | Raman, Meenakshi and Sharma, Sangeetha “Technical Communication Principles and Practice” |

**Approved by BoS Chairman**

| | |
|---|---|
| | Oxford University Press: New Delhi, 2014. |
| 2. | Kumar, Suresh. E. “Engineering English” Orient Blackswan: Hyderabad, 2015 |
| 3. | Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014. |
| 4 | Davis, Jason and Rhonda LIss. Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006 |
| 5 | Communicative English for Engineers and Professionals- Nitin Bhatnagar & Mamta Bhatnagar |
| 6 | Skills for Success. Listening and Speaking. Level 4- Margret Brooks |
| 7 | Grammar F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011 |


**Exercises for Batch of 30 Students**

1. Listening Comprehension
2. Self- introduction
3. Short presentation
4. Group Discussion



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| B.E / B.Tech | B23CHI101 - ENGINEERING CHEMISTRY<br>(Common to all Branches) | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

| Course Objectives | |
|---|---|
| 1. | To make the students conversant with boiler feed water requirements, related problems, water treatment and inculcate practical skills in the water quality analysis. |
| 2. | To make the students conversant with basics of polymer chemistry. |
| 3. | To make the students conversant with basic of electrochemical reactions, corrosion and induce experimental skills in the electro-analytical techniques. |
| 4. | To make the student acquire sound knowledge of energy devices. |
| 5. | To develop an understanding of the basic concepts of nano materials. |

| UNIT – I | WATER TECHNOLOGY | 17 |
|---|---|---|

**Hardness of water:** Types, expression of hardness and their units, hardness problems, boiler troubles - scale and sludge, caustic embrittlement, boiler corrosion, priming and foaming.

**Treatment of Boiler feed water:** Internal treatment (phosphate, colloidal, sodium aluminate and calgon conditioning).

**External treatment:** Ion exchange process, Zeolite process.

**Desalination of brackish water:** Reverse osmosis - municipal water treatment, break point chlorination.

**Determination of alkalinity in water sample, Determination of total, temporary & permanent hardness of water by EDTA method. Estimation of iron content of the water sample using spectrophotometer.**

| UNIT – II | POLYMERS | 9 |
|---|---|---|

**Polymers:** Definition, polymerization, types - addition and condensation polymerization, free radical mechanism - tacticity – biodegradable polymer (PHBV) and conducting polymer (poly-aniline).

**Plastics:** Classification, preparation, properties and uses of PVC, teflon, nylon-6, 6 and epoxy resin.

**Rubber:** Vulcanization of rubber, synthetic rubbers -n-butyl rubber and SBR.

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**Moulding:** Ingredients - compression and Injection.

| UNIT – III ELECTROCHEMISTRY AND CORROSION | 16 |
|---|---|

**Electrochemistry:** Redox reaction, electrode potential - oxidation potential, reduction potential, Nernst equation (derivation) - measurement and applications - electrochemical series and its significance.

**Corrosion:** causes - types-chemical and electrochemical corrosion (galvanic and differential aeration), corrosion control - electrochemical protection (sacrificial anodic method and impressed current cathodic method).

**Estimation of iron content of the given solution using potentiometer, Conductometric titration of strong acid vs strong base, Estimation of copper in brass.**

| UNIT – IV ENERGY DEVICES | 9 |
|---|---|

**Batteries:** Types of batteries – primary (alkaline battery) and secondary battery (lead acid battery, lithium-ion-battery), Fuel Cells ($H_2$ - $O_2$ fuel cell).

**Super Capacitors:** Principle, construction, working and applications.

**Photo voltaic cell:** Solar cells - principle, construction, working and applications.

| UNIT – V NANOCHEMISTRY | 9 |
|---|---|

**Basics:** Distinction between molecules, nanoparticles and bulk materials- surface area to volume ratio.

**Synthesis:** Top-down process (ball milling) - Bottom-up process (chemical vapour deposition and sol-gel method).

**Properties of nano materials** - Optical, electrical, thermal and mechanical.

**Applications of nano materials** – Medicine, Industries, electronics and biomaterials.

| | |
|---|---|
| | **Total Instructional hours: 60** |

| Course Outcomes: Students will be able to | |
|---|---|
| **CO1** | Determine the characterization of water and quantitative analysis of alkalinity, hardness and Iron. (K5) |

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| | |
|---|---|
| **CO2** | Develop the basics of polymer chemistry. (K3) |
| **CO3** | Interpret the principles of electrochemical reactions, corrosion and estimation of copper in Alloy. (K5) |
| **CO4** | Apply the concepts of energy devices and its engineering applications. (K3) |
| **CO5** | Organize the basics of Nano chemistry and its applications. (K3) |

| **Text Books** | |
|---|---|
| 1. | Dara, S S and Umare, S S, “A Textbook of Engineering Chemistry”, Chand S & Company Ltd., New Delhi, 2015. |
| 2. | Jain, P C and Monika Jain, “Engineering Chemistry” Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 2015 |
| 3. | Vogel’s Textbook of Quantitative Chemical Analysis, 8$^{th}$ edition, 2014. |

| **Reference Books** | |
|---|---|
| 1. | Friedrich Emich, “Engineering Chemistry”, Scientific International Pvt. Ltd., New Delhi, 2014. |
| 2. | Prasanta Rath, “Engineering Chemistry”, Cengage Learning India Pvt. Ltd., Delhi, 2015. |
| 3. | Shikha Agarwal, “Engineering Chemistry - Fundamentals and Applications”, Cambridge University Press, Delhi, 2015. |
| 4. | Charles P. Poole and Frank J. Owens, "Introduction to nanotechnology", John Wiley Sons, New Jersey, 2003. |

**Equipment Needed for 30 Students**

1. Conductivity Meter-10
2. Potentiometer-10
3. Spectrophotometer-02
4. Electronic Balance-01

**Approved by BoS Chairman**

| B.E. / B.Tech | B23MEP101 - ENGINEERING PRACTICES LABORATORY (GROUP - A & B)<br>(Common to all Branches) | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

| Course Objectives | |
|---|---|
| 1. | 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. |
| 2. | Welding various joints in steel plates using arc welding work; machining various simple processes like turning, drilling, tapping in parts; assembling simple mechanical assembly of common household equipments, making a tray out of metal sheet using sheet metal work. |
| 3. | To provide exposure to the students with hands on experience on various basic Engineering practices in Electrical Engineering. |
| 4. | To provide exposure to the students with hands on experience on various basic Engineering practices in Electronics Engineering. |

**GROUP – A (CIVIL & MECHANICAL)**

| I | Civil Engineering Practices | 12 |
|---|---|---|

**Plumbing Works**

Making basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings.

**Carpentry**

Preparation of wooden joints by sawing, planning and cutting

| | |
|---|---|
| 1. | Planning & Polishing operation |
| 2. | Half lap joint |
| 3. | Cross lap joint |

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| II | Mechanical Engineering Practices | 18 |
|---|---|---|
| **Welding Workshop**<br>Study of welding tools andequipment's - Study of various welding methods - Instruction of BI standards and reading of welding drawings. | | |
| **Exercise in arc welding for making** | | |
| 1. | Lap joint | |
| 2. | Butt joint | |
| 3. | Demonstration of gas welding and cutting. | |
| **Machine Shop** | | |
| 1. | Drilling and Tapping | |
| 2. | Lathe Exercise – Facing operation | |
| 3. | Lathe Exercise – Straight turning and Chamfering | |
| **Sheet metal** | | |
| Making of small parts using sheet metal | | |
| 1. | Making of Square Tray | |



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| GROUP – B (ELECTRICAL & ELECTRONICS) | 30 |
|---|---|

| Expt. No. | Description of the Experiments |
|---|---|
| 1. | Residential house wiring using switches, fuse, indicator, lamp and energy meter. |
| 2. | Fluorescent lamp and Stair case wiring. |
| 3. | Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit. |
| 4. | Measurement of energy using single phase energy meter. |
| 5. | Measurement of resistance to earth of an electrical equipment. |
| 6. | Study of Electronic components and equipment's – Resistor color coding |
| 7. | Measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO. |
| 8. | Study of logic gates AND, OR, EX-OR and NOT. |
| 9. | Soldering & desoldering practices. |
| 10. | Study of Fan, Iron Box, Emergency Lamp, Telephone and FM Radio. |
| | **Total Instructional hours : 60** |

| Course Outcomes : Students will be able to | |
|---|---|
| **CO1** | Explain the pipe connections and identify the various components used in plumbing. |
| **CO2** | Develop simple wooden joints using wood working tools and simple components using lathe and drilling machine. |
| **CO3** | Construct simple lap, butt and tee joints using arc welding equipment and simple parts using sheet metal. |
| **CO4** | Construct Residential house wiring, Fluorescent lamp wiring and Stair case wiring. |
| **CO5** | Measure electrical quantities such as voltage, current, power & power factor in RLC Circuit, resistance to earth, AC signal parameter (peak-peak, RMS period, frequency) and ripple factor. |
| **CO6** | Examine logic gates (AND, OR, EX-OR and NOT), Electronic components and equipment's. |

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| LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS | | | |
|---|---|---|---|
| GROUP – A (CIVIL & MECHANICAL) | | | |
| **Sl. No.** | **Description of Equipment** | | **Quantity required** |
| 1. | Assorted components for plumbing, Consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings. | | 15 |
| 2. | Carpentry vice (fitted to work bench) | | 15 |
| 3. | Standard woodworking tools | | 15 |
| 4. | Models of industrial trusses, door joints, furniture joints | | 5 |
| 5. | Power Tools: | | |
| | (a) | Rotary Hammer | 2 |
| | (b) | Demolition Hammer | 2 |
| | (c) | Circular Saw | 2 |
| | (d) | Planer | 2 |
| | (e) | Hand Drilling Machine | 2 |
| | (f) | Jigsaw | 2 |
| 6. | Arc welding transformer with cables and holders | | 5 |
| 7. | Welding booth with exhaust facility | | 5 |
| 8. | Welding accessories like welding shield, chipping hammer, wire brush, etc. | | 5 |
| 9. | Oxygen and acetylene gas cylinders, blow pipe and other welding outfit. | | 2 |
| 10. | Centre lathe | | 2 |
| 11. | Hearth furnace, anvil and smithy tools | | 2 |
| 12. | Moulding table, foundry tools | | 2 |
| 13. | Power Tool: Angle Grinder | | 2 |
| 14. | Study-purpose items: Centrifugal pump, Airconditioner | | 1 |

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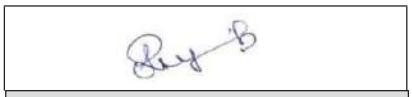
| GROUP – B (ELECTRICAL & ELECTRONICS) | | |
|---|---|---|
| **Sl. No.** | **Description of Equipment** | **Quantity required** |
| 1. | Assorted Electrical Components for House Wiring | 15 sets |
| 2. | Electrical Measuring Instruments | 10 sets |
| 3. | Iron Box | 1 |
| 4. | Fan and Regulator | 1 |
| 5. | Emergency Lamp | 1 |
| 6. | Megger | 1 |
| 7. | Digital Live Wire Detector | 2 |
| 8. | Soldering Guns | 10 |
| 9. | Assorted Electronic Components for Making Circuits | 50 |
| 10. | Multipurpose PCBs | 10 |
| 11. | Multi Meters | 10 |
| 12. | Telephone | 2 |
| 13. | FM radio | 2 |
| 14. | Regulated Power Supply | 2 |
| 15. | CRO (30MHz) | 2 |
| 16. | Bread board | 10 |
| 17. | Digital IC types (IC 7432, IC 7408, IC 7400, IC 7404, IC 7402, IC 7486) | Each 10 |





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# Semester-II

| B.E/B.Tech (Except CSBS) | B23ENT101–PROFESSIONAL ENGLISH | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 0 | 2 |

| Course Objectives | |
|---|---|
| 1. | To develop the listening and reading skills of first year engineering and technology students. |
| 2. | To help learners' develop vocabulary through reading skills. |
| 3. | To enhance learners' grammatical knowledge. |
| 4. | To enhance the learners' ability of writing different complex texts. |
| 5. | To develop the competency of learners through LSRW skills. |

| UNIT-I | 6 |
|---|---|
| **Listening:** Listening to voicemail & messages; Listening and contextualizing.<br>**Speaking:** Replying to polite requests and offers, understanding basic instructions.<br>**Reading:** Short comprehension passages, practice in skimming & scanning<br>**Writing:** Writing Instructions<br>**Language development:** Parts of Speech, Wh - Questions, yes or no questions, Question tags<br>**Vocabulary development:** Prefixes-suffixes | |

| UNIT-II | 6 |
|---|---|
| **Listening:** Listening commentaries and announcements<br>**Speaking:** Role Play exercises based on workplace contexts.<br>**Reading:** Comprehension questions including dialogues and conversations<br>**Writing:** Writing different types of Paragraph<br>**Language development:** Regular & Irregular Verbs, Tenses<br>**Vocabulary development:** Understanding contextual meaning, Synonyms | |

| UNIT-III | 6 |
|---|---|
| **Listening :** Listening to a product launch-sensitizing leaners to the nuances of persuasive communication<br>**Speaking :** Debate-discussion on current issues<br>**Reading :** Short texts and longer passages-note making<br>**Writing :** Understanding text structure, use of reference words and discourse markers, jumbled sentences<br>**Language development:** Idioms and Phrases, Degrees of comparison<br>**Vocabulary development:** One word substitutes | |

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| UNIT-IV | 6 |
|---|---|
| **Listening :** Listening to short academic videos<br>**Speaking :** Making short presentation through short films<br>**Reading :** Intensive and Extensive reading-reading different types of magazines<br>**Writing :** Letter writing- formal and informal<br>**Language development:** Direct/indirect questions<br>**Vocabulary development:** Phrasal verbs | |

| UNIT-V | 6 |
|---|---|
| **Listening :** Listening to talks/lectures by specialists on specific topics<br>**Speaking :** Discussion on general and current topics<br>**Reading :** Longer texts-cloze reading<br>**Writing :** Writing short essays, developing outline, identifying main and subordinate ideas, Dialogue writing<br>**Language development:** Spelling and Punctuations, Modal verbs<br>**Vocabulary development:** Collocations | |
| | **Total Instructional hours:30** |

| Course Outcomes: Students will be able to | |
|---|---|
| **CO1** | Develop listening and reading skills for effective communication |
| **CO2** | Develop vocabulary skills |
| **CO3** | Build grammatical understanding |
| **CO4** | Explain opinions efficiently in writing formal and informal contexts |
| **CO5** | Develop knowledge through LSRW skills |

| Text Books | |
|---|---|
| 1. | Board of Editors Using English, “A Course book for Undergraduate Engineers and Technologists”, Orient Black Swan Limited,Hyderabad:2015 |
| 2. | Richards,C.Jack,“ Interchange StudentsBook-2”, New Delhi,CUP,2015. |

| Reference Books | |
|---|---|
| 1. | Bailey, Stephen, “A practical guide for students”, New York Rutledge, 2011. |
| 2. | Raman, Meenakshi and Sharma, Sangeetha “Technical Communication Principles and Practice” Oxford University Press: New Delhi, 2014. |
| 3. | Dutt P.Kiranmai and Rajeevan Geeta, “Basic Communication Skills”, Foundation Books, 2013. |

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| B.E/B.TECH | B23MAT201 INTEGRAL CALCULUS AND COMPLEX ANALYSIS (Common to all Branches) | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

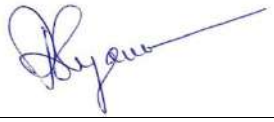
| Course Objectives | |
|---|---|
| 1. | To recognize various techniques of integration. |
| 2. | To apply integration techniques in evaluating area and volume of solids. |
| 3. | To develop the use of Vector calculus in two and three dimensional spaces. |
| 4. | To demonstrate understanding of the basic concepts of complex differentiation. |
| 5. | To understand Cauchy theorem and Cauchy integral formulae and apply these to evaluate complex contour integrals. |

| UNIT – I | INTEGRAL CALCULUS | 12 |
|---|---|---|
| Riemann sum – Definite and Indefinite integrals - Substitution rule (Exponential, logarithmic, Trigonometric functions) – Integration by parts – Integration of Rational functions by Partial fraction. | | |

| UNIT – II | MULTIPLE INTEGRALS | 12 |
|---|---|---|
| Double integrals: – Double integrals in Cartesian coordinates - Double integrals in Polar coordinates – Area enclosed by plane curves – Triple integrals: Evaluation of triple integrals - Volume as triple integral (Simple problems). | | |

| UNIT – III | VECTOR CALCULUS | 12 |
|---|---|---|
| Gradient and directional derivative - Divergence and curl - Solenoidal and Irrotational vector fields - Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proofs) – Verification of theorem and applications (for cubes and rectangular parallellopipeds). | | |

| UNIT – IV | COMPLEX DIFFERENTIATION | 12 |
|---|---|---|
| Analytic functions - Cauchy-Riemann equations (excluding proof) – Properties of analytic function – Harmonic conjugate- Construction of analytic function by Milne Thomson method – Bilinear transformation. | | |



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| UNIT – V | COMPLEX INTEGRATION | 12 |
|---|---|---|
| Cauchy‘s integral theorem – Cauchy‘s integral formula – residues - Cauchy‘s Residue theorem – Evaluation of real integrals – Stereographic projection – Use of circular contour and semicircular contour (excluding poles on real axis). | | |
| | | **Total Instructional hours : 60** |

| **Course Outcomes : Students will be able to** | |
|---|---|
| **CO1** | Develop Fundamental Theorem of Calculus, techniques of Integration such as substitution, partial fractions and integration by parts. |
| **CO2** | Make use of integration to compute area and volume. |
| **CO3** | Apply the line, surface and volume integrals for verification of Green‘s, Gauss and Stokes theorems. |
| **CO4** | Develop an understanding of the standard techniques of complex variable theory in particular analytic function |
| **CO5** | Identify contour integrations with the help of residue theorem. |

| **Text Books** | |
|---|---|
| 1. | Grewal B.S.,”Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014. |
| 2. | Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2015. |
| 3. | George B. Thomas , Joel Hass , Christopher Heil , Maurice D. Weir, “Thomas' Calculus”, Pearson, 14th Edition, 2018. |

| **Reference 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, 2015. |
| 2. | Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, |

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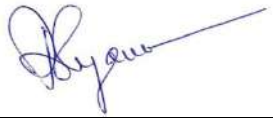
| | |
|---|---|
| | New Delhi, 5th Edition 2019. |
| 3. | O'Neil, P.V.,"Advanced Engineering Mathematics", Cengage Learning India Pvt. Ltd, New Delhi, 7th Edition 2017. |
| 4. | Sastry, S.S, "Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014. |
| 5. | Wylie, R.C. and Barrett, L.C., "Advanced Engineering Mathematics", (Tata McGraw Hill Education Pvt. Ltd), 6th Edition, New Delhi, 2012. |
| 6. | Gean Duffy., "Advanced Engineering Mathematics with MATLAB", A CRC Press Company, Boca Raton London, New York Washington, D.C, 2nd edition 2009. (Free e- book downloaded from www.EasyEngineering.net.pdf) |



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| B.E | B23EET201 – ELECTRIC CIRCUIT ANALYSIS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

| Course Objectives | |
|---|---|
| 1. | To learn circuit laws, theorems and circuit analysis techniques. |
| 2. | To understand the concepts of network reduction techniques. |
| 3. | To educate on obtaining the transient response of circuits. |
| 4. | To be able to analyze resonant circuits & coupled circuits. |
| 5. | To analyze three phase circuits and understand the safety practices. |

| UNIT-I | BASIC CIRCUIT ANALYSIS | 12 |
|---|---|---|

Circuit elements: R, L and C- Series parallel combination of R, L and C Components, DC Series-Parallel Circuits - sources: Independent and dependent voltage and current sources, Circuit laws – Voltage and current division – Use of source transformations – Mesh and Nodal analysis – Network reduction by delta- star transformations. Sinusoidal voltages and currents: Average and RMS Values, peak and form factors - impedance and admittance - Real, reactive and apparent power – Power factor and its practical importance.

| UNIT-II | NETWORK THEOREMS | 12 |
|---|---|---|

Network Theorems: Superposition theorem, Thevenin's Theorem, Norton's Theorem, Reciprocity theorem and Maximum power transfer theorem, Application to DC and AC Networks.

| UNIT-III | TRANSIENT RESPONSE ANALYSIS | 12 |
|---|---|---|

L and C elements -Transient response of RL, RC and RLC Circuits using Laplace transform for DC input and A.C. sinusoidal input.

| UNIT-IV | RESONANCE AND COUPLED CIRCUITS | 12 |
|---|---|---|

Series and parallel resonance – Frequency response- Quality factor and Bandwidth. Magnetically coupled circuits: self and mutual inductances - Dot rule – Analysis of coupled circuits.

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| UNIT-V | THREE PHASE CIRCUITS AND SAFETY PRACTICES | 12 |
|---|---|---|
| Three phase circuits: generation of 3 - phase voltages - star and delta connection - relation between phase and line quantities - balanced and unbalanced 3 - phase loads - power measurement by two wattmeter method - Electrical Safety Practices.. | | |
| | | **Total Instructional hours:60** |

| **Course Outcomes: Students will be able to** | |
|---|---|
| **CO1** | Apply Circuit laws & Network reduction techniques to solve the given electric circuits. |
| **CO2** | Apply network theorems to solve DC and AC circuits. |
| **CO3** | Solve the Transient response of RLC circuits using Laplace Transform. |
| **CO4** | Analyze series and parallel resonant circuits and coupled circuits. |
| **CO5** | Analyze three phase circuits and Safety practices. |

| **Text Books** | |
|---|---|
| 1. | William H. Hayt Jr, Jack E. Kemmerly and Steven M. Durbin, “Engineering Circuits Analysis”, McGraw Hill publishers, edition, New Delhi, 2013. |
| 2. | Charles K. Alexander, Mathew N.O. Sadiku, “Fundamentals of Electric Circuits”, Second Edition, McGraw Hill, 2013. |
| 3. | Peter E. Sutherland, ‘Principles of Electrical Safety’, John Wiley & Sons, 2014. |

| **Reference Books** | |
|---|---|
| 1. | Richard C. Dorf and James A. Svoboda, “Introduction to Electric Circuits”, 7th Edition,John Wiley & Sons, Inc. 2015. |
| 2. | Jegatheesan, R., “Analysis of Electric Circuits,” McGraw Hill, 2015. |
| 3. | Bhattacharya S.K. Basic Electrical and Electronics Engineering, Pearson India, 2011. |

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| B.E / B.Tech | B23HST201- TAMILS AND TECHNOLOGY (Common to all Branches) | L | T | P | C |
|---|---|---|---|---|---|
| | | 1 | 0 | 0 | 1 |

| UNIT –I | WEAVING AND CERAMIC TECHNOLOGY | 3 |
|---|---|---|

**Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.**

| UNIT -II | DESIGN AND CONSTRUCTION TECHNOLOGY | 3 |
|---|---|---|

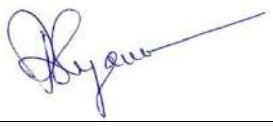
**Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.**

| UNIT III | MANUFACTURING TECHNOLOGY | 3 |
|---|---|---|

**Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting,steel -Copper and goldCoins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.**

| UNIT IV | AGRICULTURE AND IRRIGATION TECHNOLOGY | 3 |
|---|---|---|

**Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.**



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| UNIT V | SCIENTIFIC TAMIL & TAMIL COMPUTING | 3 |
|---|---|---|
| **Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.** | | |
| | | **Total Instructional hours : 15** |

**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 C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & 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.


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| B.E / B.Tech | B23PHI101 - ENGINEERING PHYSICS (Common to all Branches) | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

| Course Objectives | |
|---|---|
| 1. | To gain knowledge on the basics of properties of matter, its applications and inculcate practical skills in the determination of elastic property of the materials. |
| 2. | To acquire knowledge & experimental skills on the concepts of Photonics and their applications in fiberoptics. |
| 3. | To have adequate knowledge on the concepts of electrical, magnetic properties of materials and enhance the practical skills in determination of electrical properties of the materials. |
| 4. | To get knowledge on advanced physics concepts of quantum theory and its applications in SEM, TEM and induce practical skills in microscope. |
| 5. | To enhance the fundamental knowledge of students in Crystal Physics and its Applications relevant to various streams of Engineering and Technology. |

| UNIT – I | PROPERTIES OF MATTER | 14 |
|---|---|---|

**Elasticity**-Modulus, types of modulii of elasticity, Stress-strain diagram and its uses-factors affecting elastic modulus and Twisting couple, torsion pendulum; theory and experiment.

**Bending of beams**- Bending moment - uniform and non- uniform bending; theory and experiment- I-shaped girders and its applications.

**Determination of rigidity modulus – Torsion pendulum- Determination of Young's modulus by non-uniform bending method- Determination of Young's modulus by uniform bending method.**

| UNIT – II | PHOTONICS AND FIBER OPTICS | 12 |
|---|---|---|

**Lasers**; properties of laser-spontaneous and stimulated emission-amplification of light by population inversion- Einstein's A and B coefficients - derivation – Types of laser; Nd.-YAG Laser, Semiconductor lasers; homojunction and heterojunction, Industrial and Medical Applications.

**Fiber Optics**; Principle, Numerical Aperture and Acceptance Angle - Types of optical fibres–-Fiber optic communication System-Block diagram–Medical Applications-Endoscopy.

**Determination of wavelength of the Laser using grating- Determination of particle size using**

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| | | |
|---|---|---|
| **Laser- Determination of Numerical aperture and acceptance angle of an optical fiber.** | | |
| **UNIT – III** | **ELECTRICAL AND MAGNETIC PROPERTIES OF MATERIALS** | **12** |
| **Classical free electron theory** – Relaxation time and collision time - Expression for electrical conductivity – Thermal conductivity – Wiedemann-Franz law –Lorentz number-Drawbacks of classical theory-Quantum theory- Fermi-Dirac statistics – variation of Fermi level with temperature.<br>**Introduction to magnetic materials** –Comparision of Dia, Para and Ferro magnetic materials – Domain theory of ferromagnetism- Hysteresis -Soft and Hard magnetic materials **-**Ferrites and its applications.<br>**Determination of specific resistance of the wire using Carey Foster's Bridge.** | | |
| **UNIT – IV** | **QUANTUM PHYSICS** | **12** |
| **Black body radiation**; Planck's theory (derivation) - wave particle duality- debroglie's wavelength - concept of wave function and its physical significance.<br>**Wave equation**; Schroedinger's time independent and time dependent equations, particle in a one-dimensional rigid box. **Applications;** Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM).<br>**Determination of thickness of a thin wire by using travelling microscope.** | | |
| | | |
| **UNIT – V** | **CRYSTAL PHYSICS** | **10** |
| **Crystal Structures;** Single crystalline, polycrystalline and amorphous materials - unit cell- space lattice-crystal systems- Bravais lattices- Miller indices- inter-planar distances – coordination number and packing factor for SC, BCC, FCC and HCP structures.<br>**Crystal imperfections**; Point and Line defects-Burger vector. | | |
| | **Total Theory Instructional hours : 60** | |

**Approved by BoS Chairman**

| Course Outcomes : Students will be able to | |
|---|---|
| **CO1** | Categorize the basics of properties of matter and its applications, classify the elastic properties of materials by using uniform, non-uniform bending method and torsional pendulum apparatus. |
| **CO2** | Explain the basics of Laser, Fiber Optics and their applications, determination of Particle size, Wavelength of laser and acceptance angle, numerical aperture of optical fiber. |
| **CO3** | Justify the concepts of electrical, magnetic properties of materials, determination of Specific resistance of the material. |
| **CO4** | Interpret the basic knowledge of quantum theory that could be helpful in understanding the wave functions of the particle and determination of thickness of thin sheet by using travelling microscope. |
| **CO5** | Classify and compare the different types of Crystals, their structures and its defects. |

| Text Books | |
|---|---|
| 1. | Bhattacharya, D.K. & Poonam, T, “Engineering Physics”, Oxford University Press,2015. |
| 2. | Gaur, R.K. & Gupta, S.L. “Engineering Physics”, Dhanpat Rai Publishers, 2012. |
| 3. | Pandey, B.K. & Chaturvedi, S. “Engineering Physics”, Cengage Learning India, 2012. |
| 4. | Rajendran V, “Engineering Physics”, Tata McGraw Hill, Publishing Company, NewDelhi, 2011. |
| 5. | Wahab, M.A. —Solid State Physics: Structure and Properties of Materials, Narosa Publishing House, 2009. |

| Reference Books | |
|---|---|
| 1. | Halliday, D., Resnick, R. & Walker, J. “Principles of Physics"", Wiley, 2015. |
| 2. | Serway, R.A. & Jewett, J.W. “Physics for Scientists and Engineers”, CengageLearning, 2010. |
| 3. | Tipler, P.A. &Mosca, G. “Physics for Scientists and Engineers with Modern Physics”, W.H.Freeman, 2007. |
| 4. | Avadhanulu M.N**, “**Engineering Physics - Volume 1”, S.Chand & Company Ltd.,NewDelhi, 2010. |
| 5. | Garcia, N. & Damask, A. —Physics for Computer Science Students. Springer-Verlag, 2012. |
| 6. | Senthil Kumar, G. Physics Laboratory I & II, VRB publishers Pvt. Ltd., Chennai (2016). |

**Equipment Needed for 30 Students**

1. Diode Laser (2 mS power) , He –Ne Laser source(2mW), Optical Fibre Kit - 06
2. Travelling Microscope ,Knife edge, Slotted weights - 19
3. Carey Foster Bridge - 06
4. Air Wedge Apparatus with Travelling Microscope - 06
5. Torsional Pendulum - 06

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| B.E | B23CSI101- C PROGRAMMING (Common to CSE, AI&DS,(CSE)AI&ML, BME, ECE and EEE) | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

**Course Objectives:**

1. To know the basics of problem-solving techniques.
2. To provide exposure to problem-solving through programming.
3. To develop C programming language with conditional statements and loops.
4. To develop modular applications in C using functions pointers and structures.
5. To do input/output and file handling in C.

**UNIT – I INTRODUCTION TO PROBLEM SOLVING & COMPUTER 8**

Problem Solving: Problem Solving Techniques - Logical Thinking – Step for Solving the Problems – Compare Problem Solving and Logical Thinking – Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion).

**UNIT – II BASICS OF C PROGRAMMING 10**

Introduction to programming paradigms - Structure of C program - Phases of developing a running computer program in C – Applications of C Language - C programming: Data Types – Storage Class - Constants – Enumeration Constants - Keywords – Operators: Operators – Types of Operators - Expressions - Precedence and Associativity - Input/Output statements – Decision making statements - Looping statements with example of Pattern – Preprocessor directives.

**UNIT – III ARRAYS AND POINTERS 9**

Introduction to Arrays: Declaration, Initialization – One dimensional array – Two dimensional arrays with example of Matrices Operations – Pointers: Pointer Declaration – Initialization - Pointer operators – Pointer Arithmetic – Dynamic Memory Allocation – Selection sort, Insertion sort, Bubble sort - Searching.

**UNIT – IV FUNCTION AND STRINGS 9**

Function: definition of function, Declaration of function – Function Call - Prototype Declaration - Pass by value, Pass by reference – Recursion - Linear recursion, Binary Search using recursive functions - C standard functions and libraries - String operations: length, compare, concatenate, copy - String Arrays.

**UNIT – V STRUCTURES AND FILE HANDLING 9**

Approved by BoS Chairman

Introduction: need for structure data type, structure definition, Structure declaration, Structure within a structure – Array Structure - Union – File Handling: File Operations – File Types: Sequential and Random access – Case Study: AI Processing System using C.

**List of Experiments:**

| Expt. No. | Description of the Experiments |
|---|---|
| 1. | Experiment with I/O statements, operators, expressions. |
| 2. | Develop a C programs for Decision Making Construct.<br>a) if-else<br>b) switch-case<br>c) goto, break-continue |
| 3. | Develop a C programs for Loop Control statements.<br>a) for<br>b) Nested for<br>c) while and do-while |
| 4. | Develop a C programs for Array<br>a) One Dimensional – Sorting and Searching<br>b) Two Dimensional – Matrix Operations<br>c) Traversal |
| 5. | Develop a C program to perform the pointers.<br>a) Linear Search<br>b) Binary Search<br>c) Pointer Operation |
| 6. | Build a C programs for the recursive function |
| 7. | Implement a C programs for string operations<br>a) String operations using build in methods |
| 8. | Develop a C program to experiment with Pass by value and Pass by reference. |
| 9. | Develop a c program for structure and union<br>a) Payroll using structure and union.<br>b) Student records using structure and union. |
| 10. | Develop a C program to perform file operations. |

**Total Instructional hours: (45+30) = 60**

**Course Outcomes:**

Students will be able to

**CO1:** Demonstrate knowledge on C programming constructs.

**CO2:** Construct C programs using decision making and control statements.

**CO3:** Experiment with programs in C using an array.

**CO4:** Build programs in C using strings, pointers, functions.

**CO5:** Model the applications in C using Structures, Union and File Operations.

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**CO Mapping with PO & PSO**

| CO/PO & PSO | | PO1 (K3) | PO2 (K4) | PO3 (K5) | PO4 (K5) | PO5 (K6) | PO6 (K3) (A3) | PO7 (K2) (A3) | PO8 (K3) (A3) | PO9 (A3) | PO10 (A3) | PO11 (K3) (A3) | PO12 (A3) | PSO1 (K4) (A3) | PSO2 (K3) (A3) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | K2 | 3 | 2 | 1 | - | 1 | - | - | 1 | 1 | - | - | 1 | 2 | 1 |
| CO2 | K3 | 3 | 2 | 1 | - | 1 | - | - | 1 | 2 | - | - | 2 | 2 | 1 |
| CO3 | K3 | 3 | 2 | 1 | - | 1 | - | - | 1 | 2 | - | - | 2 | 2 | 1 |
| CO4 | K3 | 3 | 2 | 1 | - | 1 | - | - | 1 | 2 | - | - | 2 | 2 | 1 |
| CO5 | K3 | 3 | 2 | 1 | - | 1 | - | - | 1 | 2 | - | - | 2 | 2 | 1 |
| Weighted Average | | 3 | 2 | 1 | - | 1 | - | - | 1 | 2 | - | - | 2 | 2 | 1 |

**3 – Strong** **2- Moderate** **1- Weak**

**List of Equipment Required:**

**Requirements for a Batch of 30 Students**

| Sl. No. | Description of the Equipment | Quantity required (Nos.) |
|---|---|---|
| 1. | HP Make, Core i5, 11th Generation, 16GB RAM PCs, Operating systems: Windows* 10 or later, macOS, and Linux. Turbo C/C++ 4.5 | 30 |

**Text Books:**

1. Yashavant P. Kanetkar. "Let Us C", 19th Edition, BPB Publications, 2022.
2. H. M. Deitel, P. J. Deitel, C: How to program, 9th edition, Pearson Education, 2020.

**Reference Books:**

1. Reema Thareja, "Programming in C", Oxford University Press, Second Edition, 2016.
2. Kernighan, B.W and Ritchie, D.M, "The C Programming language", Second Edition, Pearson Education, 2015.
3. Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", 1st Edition, Pearson Education, 2013.
4. Pradip Dey, Manas Ghosh, "Computer Fundamentals and Programming in C", Second Edition, Oxford University Press, 2013.

Approved by BoS Chairman

| B.E / B.Tech | B23CEP201 – SOFT SKILLS<br>(Common to all Branches) | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | NC |

| Course Objectives | |
|---|---|
| 1. | To identify personality using evaluation method. |
| 2. | To encourage creative thinking by practice. |
| 3. | To enrich interpersonal skills through integrated activities. |
| 4. | To develop social and professional etiquette. |
| 5. | To identify and apply employability skills for professional success. |

| UNIT – I | SELF EVALUATION | 6 |
|---|---|---|
| Introduction to soft skills, Familiarize oneself, Self-understanding, SWOT analysis, Goal Setting. | | |

| UNIT – II | INNOVATIVE THINKING | 6 |
|---|---|---|
| Divergent thinking, Encourage curiosity, Writing a story, Poster making. | | |

| UNIT – III | INTERPERSONAL SKILLS | 6 |
|---|---|---|
| Interpersonal skills - Need & Components – Understanding Intercultural Competence - Team Work- Problem Solving Skills - Conflict Management & Resolutions in Workplace, Leadership skills, Managerial skills. | | |

| UNIT – IV | BUSINESS ETIQUETTE | 6 |
|---|---|---|
| Define Etiquette -Types and Importance of Workplace Etiquette - Basic Corporate Etiquette - Telephone Etiquette - Meeting & E- mail Etiquette - Customer Service Etiquette. | | |

| UNIT – V | CORPORATE SKILLS | 6 |
|---|---|---|
| Work Ethics- Adaptability-Analytical Reasoning- Lateral Thinking-Stress & Time Management. | | |
| | | **Total Instructional hours : 30** |

**Approved by BoS Chairman**

| Course Outcomes : Students will be able to | |
|---|---|
| **CO1** | Identify different personalities. |
| **CO2** | Show creative skill in different aspects. |
| **CO3** | Utilize leadership skills with ability to work in a team. |
| **CO4** | Analyze work place etiquette. |
| **CO5** | Develop adequate soft skills required for the workplace. |

| Reference Books | |
|---|---|
| 1. | Butterfield, Jeff “Soft Skills for Everyone” Cengage Learning, New Delhi, 2015. |
| 2. | S.Hariharanetal ”Soft Skills” MJP Publishers: Chennai, 2010. |
| 3. | Peter, Francis “Soft Skills and Professional Communication” New Delhi: Tata McGraw Hill. 2012. Print. |
| 4. | Meenakshi Raman, Shalini Upadhyay, ’Soft Skills’, Cengage Learning India Pvt. Ltd, Delhi, 2018. |
| 5. | M.S.Rao, ‘Soft Skills Enhancing Employability’, I. K. International Publishing House Pvt. Ltd, New Delhi, 2010 |
| 6 | Sabina Pillai, Agna Fernandez, ‘Soft Skills and Employability Skills’, Cambridge University Press, 2018. |
| 7 | John Peter.A, ‘Self – Development and Professional Excellence’, Cengage Learning India Pvt. Ltd, Delhi, 2019. |

**Approved by BoS Chairman**

| B.E | B23EEP201-ELECTRIC CIRCUITS AND SIMULATION LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

| Course Objectives | |
|---|---|
| 1. | To impart hands on experience in verification of Electric Circuit laws and Theorems. |
| 2. | To verify Electric Circuit laws and theorems using simulation software. |
| 3. | To implement power measurement methods for three phase circuits. |

| Expt. No. | Description of the Experiments |
|---|---|
| 1 | Verification of Kirchhoff's Voltage and Current Laws using simulation software. |
| 2 | Verification of Kirchhoff's Voltage and Current Laws. |
| 3 | To obtain Thevenin's and Norton's equivalent circuits using simulation software. |
| 4 | Verification of Thevinin's and Norton's Theorem. |
| 5 | To verify Maximum power Transfer theorem and Superposition theorem using a simulation software. |
| 6 | Verification of Superposition and Maximum Power Transfer Theorem. |
| 7 | Study of the effect of Q on frequency response of series and parallel resonant circuits. |
| 8 | Measurement of active power, reactive power, power factor and impedance of RL, RC and RLC circuits using 3 voltmeters and 3 ammeters. |
| 9 | Simulation of three phase power measurement by two wattmeter method using simulation software. |
| 10 | Power measurement in a three phase circuit using two wattmeter method. |
| | **Total Instructional hours : 45** |

| Course Outcomes :Students will be able to | |
|---|---|
| **CO1** | Analyze basic laboratory experiments involving electrical circuits using laboratory test equipments such as power supplies, signal generators, oscilloscopes and multimeters. |
| **CO2** | Examine and verify network theorems. |
| **CO3** | Examine the three phase power measurement method using two wattmeter method. |
| **CO4** | Relate physical observations and measurements involving electrical circuits to theoretical principles. |
| **CO5** | Experiment with various electric circuits for the performance evaluation using simulation software. |

| LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS | | |
|---|---|---|
| **Sl. No.** | **Description of Equipment** | **Quantity required** |
| 1 | Regulated Power Supply (0-30V ) | 15 Nos |
| 2 | Function Generator (MHz Range) | 10 Nos |
| 3 | Oscilloscope (20 MHz) | 10 Nos |
| 4 | Digital Storage Oscilloscope (20 MHz) | 2 Nos |
| 5 | AC/DC – Voltmeters of required rating | 10 Nos |
| 6 | AC/DC -Ammeters of required rating | 10 Nos |
| 7 | Multimeters | 10 Nos |
| 8 | Decade Resistance Box | 6 Nos |
| 9 | Decade Inductance Box | 6 Nos |
| 10 | Decade Capacitance Box | 6 Nos |
| 11 | Single Phase Wattmeter of suitable rating | 5 Nos |
| 12 | Circuit Connection Boards | 20 Nos |
| 13 | Three phase star& delta connected load / Single phase load bank of suitable rating | 3 Nos |
| 14 | Resistors, Inductors, Capacitors of various capacities (Quarter Watt to 10 Watt) | 50 Nos |
| 15 | 10 Nos of PC loaded with Pspice/ Matlab/e-Sim / Scilab/ Equivalent Software Package | Minimum 10 Users |
| 16 | Printer | 1 No |

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# Semester-III

| B.E / B.TECH | B23MAT301 – TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS<br>(Common to AERO, AGRI, ECE, EEE & MECH) | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

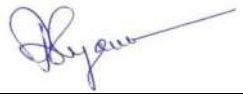
| Course Objectives | |
|---|---|
| 1. | To introduce the basic concepts of PDE for solving standard partial differential equations |
| 2. | To understand Fourier series analysis in representation of Periodic signals. |
| 3. | To develop Fourier series techniques in solving wave and heat flow problems. |
| 4. | To acquaint the student with Fourier transform techniques used in wide variety of situations. |
| 5. | To develop the concept of Z transforms techniques for discrete time systems. |

| UNIT – I | PARTIAL DIFFERENTIAL EQUATIONS | 12 |
|---|---|---|
| Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Solution of first order partial differential equations of the forms $f(p,q) = 0$, $z = px + qy + f(p,q)$ - Lagrange's linear equation - Linear homogeneous partial differential equations of second and higher order with constant coefficients. | | |

| UNIT – II | FOURIER SERIES | 12 |
|---|---|---|
| Dirichlet's conditions - General Fourier series - Odd and even functions - Half range sine series - Half range cosine series - Parseval's identity – Harmonic analysis. | | |

| UNIT – III | BOUNDARY VALUE PROBLEM | 12 |
|---|---|---|
| Classification of second order linear PDE - Solutions of one dimensional wave equation - One dimensional equation of heat conduction - Steady state solution of two dimensional equation of heat conduction in Cartesian coordinates. | | |

| UNIT – IV | FOURIER TRANSFORMS | 12 |
|---|---|---|
| Fourier transform pair - Fourier sine and cosine transforms - Properties (without proof) - Transforms of simple functions - Convolution theorem (without proof) - Parseval's identity. | | |



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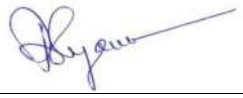
| UNIT – V | Z-TRANSFORMS AND DIFFERENCE EQUATIONS | 12 |
|---|---|---|
| Z-transforms - Elementary properties - Inverse Z-transform (using partial fraction and residues) - Initial and final value theorems - Convolution theorem (without proof) - Formation of difference equations - Solution of difference equations using Z - transforms. | | |
| | | **Total Instructional hours : 60** |

| **Course Outcomes : Students will be able to** | |
|---|---|
| **CO1** | Apply the techniques to find solutions of standard Partial Differential Equations . |
| **CO2** | Solve differential equations using Fourier series analysis. |
| **CO3** | Apply Fourier series to solve boundary value problems. |
| **CO4** | Develop Fourier transforms techniques in engineering problems. |
| **CO5** | Make use of Z - transforms to solve difference equations. |

| **Text Books** | |
|---|---|
| 1. | Grewal B.S., "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, New Delhi, 2020. |
| 2. | Kandasamy P., Thilagavathy K., and Gunavathy K., "Engineering Mathematics" Volume III, S. Chand & Company Ltd., 2016 |

| **Reference Books** | |
|---|---|
| 1. | Ramana B.V., "Higher Engineering Mathematics", McGraw Hill Education Pvt. Ltd, New Delhi, 2016. |
| 2. | Erwin Kreyszig., "Advanced Engineering Mathematics", John Wiley & Sons, 10th Edition, New Delhi, 2018. |
| 3. | Wylie C. Ray and Barrett Louis C.,"Advanced Engineering Mathematics "Tata McGraw Hill Education Pvt. Ltd, 6th Edition, New Delhi, 2012. |
| 4. | Peter V.O Neil., "Advanced Engineering Mathematics", Cengage, New Delhi, 2016. |
| 5. | Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics",Narosa Publications, 5th Edition, New Delhi, 2017. |



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| B.E | B23EET301 - FIELD THEORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

| Course Objectives | |
|---|---|
| 1. | To introduce the basic mathematical concepts related to electromagnetic vector fields |
| 2. | To provide knowledge on the concepts of electrostatics, electrical potential, energy density and their application. |
| 3. | To impart knowledge on the concepts of magneto statics, magnetic flux density, scalar and vector potential and its applications. |
| 4. | To impart knowledge on the concepts of Faraday's law, induced EMF and Maxwell's equations. |
| 5. | To impart knowledge on the Concepts of electromagnetic waves and Poynting vector. |

| UNIT-I | INTRODUCTION | 12 |
|---|---|---|

Sources and effects of Electromagnetic fields - Vector algebra - Co - ordinate systems - Vector calculus: Dot product of vectors, Cross product of vectors, Transformation of vectors - Gradient, Divergence and Curl operations - Divergence theorem - Stoke's theorem.

| UNIT-II | ELECTROSTATICS | 12 |
|---|---|---|

Coulomb's law – Electric field intensity – Field due to point and continuous charges - Gauss's law and its Applications – Electric potential – Electric field and equipotential plots- Electric dipole - Electric field in free space, conductors, dielectric- Dielectric polarization- Dielectric strength- Boundary conditions, Poisson's and Laplace Equations – Capacitance - Energy density.

| UNIT-III | MAGNETOSTATICS | 12 |
|---|---|---|

Magnetic flux and magnetic flux density - Biot - Savart's Law - Ampere's Circuital Law - Lorentz law of force - Magnetic flux density and magnetic field intensity due to straight conductors, circular coil and Solenoid coil - Magnetization-Magnetic force - Magnetic torque - Scalar and vector magnetic potentials - Inductance due to solenoid and toroid - Magneto static energy and energy density - Boundary conditions.

| UNIT-IV | ELECTRODYNAMIC FIELDS | 12 |
|---|---|---|

Magnetic Circuits - Faraday's laws - Transformer and Motional EMF - Maxwell's equations in differential and integral forms – Maxwell's equations for harmonically varying fields - Relation between field theory and circuit theory.

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| UNIT-V | ELECTROMAGNETIC WAVES | 12 |
|---|---|---|
| Electromagnetic wave Generation and equations - Wave parameters: Velocity, Intrinsic impedance, Propagation constant and skin depth - Electromagnetic waves in free space, good conductors, lossy and lossless dielectrics – Poynting vector and Poynting's theorem – Plane wave reflection and refraction- Standing wave ratio. | | |
| | | **Total Instructional hours:60** |

| **Course Outcomes: Students will be able to** | |
|---|---|
| **CO1** | Apply Vector Calculus in orthogonal coordinate system to understand the different concepts of electromagnetic theory. |
| **CO2** | Apply fundamental laws governing electromagnetic fields and evaluate the physical quantities such as electric field intensity and electric flux density along with applications. |
| **CO3** | Analyze magneto static fields, magnetic flux density, boundary conditions, vector potential along with their applications. |
| **CO4** | Apply Maxwell's equations to solve the problems in electromagnetic theory. |
| **CO5** | Examine the phenomena of wave propagation in different media and its interfaces. |

| **Text Books** | |
|---|---|
| 1. | Mathew N. O. Sadiku, S.V. Kulkarni 'Principles of Electromagnetics', 6th Edition, Oxford University Press Inc. Asian edition, 2015. |
| 2. | William H. Hayt and John A. Buck, 'Engineering Electromagnetics', McGraw Hill Special Indian edition, 2014. |
| 3. | Kraus and Fleish, 'Electromagnetics with Applications', McGraw Hill International Editions, Fifth Edition, 2010. |

| **Reference Books** | |
|---|---|
| 1. | V.V.Sarwate, 'Electromagnetic fields and waves', Second Edition, Newage Publishers, 2018. |
| 2. | Joseph. A.Edminister, 'Schaum's Outline of Electromagnetics, Fifth Edition (Schaum's Outline Series), McGraw Hill, 2018. |
| 3. | S.P.Ghosh, Lipika Datta, 'Electromagnetic Field Theory', First Edition, McGraw Hill Education(India) Private Limited, 2017. |
| 4. | K A Gangadhar, 'Electromagnetic Field Theory', Khanna Publishers; Sixteenth Edition Eighth Reprint :2015 |

**Approved by BoS Chairman**

| B.E | B23EET302 – ELECTRONIC DEVICES AND CIRCUITS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

| Course Objectives | |
|---|---|
| 1. | To understand the structure, characteristics and applications of PN Junction diode. |
| 2. | To familiarize the structure, operation, characteristics of BJT, FET, MOSFET, UJT, FinFET, GAAFET and CNTFET. |
| 3. | To learn about amplifier gain-frequency response characteristics. |
| 4. | To understand about functioning of differential amplifier and multi-stage amplifier. |
| 5. | To learn about Negative feedback amplifier circuit and Oscillators. |

| UNIT-I | DIODE AND IT'S APPLICATIONS | 9 |
|---|---|---|

PN junction diode –structure, operation and V-I characteristics, diffusion and transition capacitance – Diode applications: Clipping & Clamping circuits - Half Wave and Full Wave Rectifier- Zener diode characteristics- Zener diode as a voltage regulator.

| UNIT-II | TRANSISTORS | 9 |
|---|---|---|

BJT, JFET, MOSFET, FinFET, GAAFET and CNTFET - structure, operation, characteristics and Biasing –UJT- Schmitt trigger.

| UNIT-III | AMPLIFIER | 9 |
|---|---|---|

BJT small signal model – Analysis of CE, CB, CC amplifiers- Gain and frequency response – MOSFET small signal model– Analysis of CS and Source follower – Gain and frequency response- Differential Amplifier using BJT.

| UNIT-IV | MULTISTAGE AMPLIFIERS AND DIFFERENTIAL AMPLIFIER | 9 |
|---|---|---|

BIMOS cascade amplifier, Differential amplifier using FET – Common mode and Difference mode analysis – FET input stages – Single tuned amplifiers – Gain and frequency response – Neutralization methods, power amplifiers –Types (Qualitative analysis).

| UNIT-V | FEEDBACK AMPLIFIERS AND OSCILLATORS | 9 |
|---|---|---|

Feedback concepts - Ideal feedback topologies-Advantages and Disadvantages of Negative Feedback–Topologies of Voltage and Current: Series and Shunt Feedback amplifier circiuits – Positive feedback -Oscillators: Barkhausen Criterion – Operation of RC phase shift, Wien Bridge, Colpitt's and Crystal Oscillators.

**Total Instructional hours:45**

| Course Outcomes: Students will be able to | |
|---|---|
| CO1 | Demonstrate the characteristics and applications of various semiconductor devices. |
| CO2 | Demonstrate the structure, working and biasing of BJT, UJT, JFET, MOSFET, FinFET, GAAFET and CNTFET. |
| CO3 | Identify the frequency responses of BJT and FET amplifiers. |
| CO4 | Construct multi-stage amplifier, differential amplifier, tuned amplifier and power amplifiers. |
| CO5 | Construct negative feedback amplifier and oscillator circuits. |

| Text Books | |
|---|---|
| 1. | S.Salivahanan, N.Suresh Kumar, “Electronic Devices and Circuits”, McGraw-Hill Education, 2018. |
| 2. | Thomas L.Floyd, “Electronic Devices (Conventional Current Version)”, 10th Edition, Pearson education, 2017. |
| 3. | Robert L. Boylstead and Louis Nashelsky, "Electronic Devices and Circuit Theory", Prentice - Hall of India, 9th Edition, New Delhi, 2005. |

| Reference Books | |
|---|---|
| 1. | Jacob Millman, Christos C.Halkias, SatyabrataJit, “Electronic Devices and Circuits”, Tata McGraw Hill Publishing Limited, New Delhi, 2015. |
| 2. | David A. Bell, “Electronic Devices and Circuits”, 5thEdition, Oxford University Press, 2008. |
| 3. | Balwinder Raj,Ashish Raman,” Nanoscale Semiconductors Materials,Devices and Circuits”, CRC Press,2023. |
| 4. | Adrian Kitai ,“ Fundamentals of Semiconductor Materials and Devices”,Wiley Publishers, 2023 |
| 5. | Muhammad H. Rashid, Microelectronic Circuits Analysis and Design,Cengage Learning, 2011. |

Approved by BoS Chairman

| B.E. | B23EET303 - DC MACHINES AND TRANSFORMERS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

| Course Objectives | |
|---|---|
| 1. | To know about the principles of electromechanical energy conversion in singly and multiply excited systems. |
| 2. | To identify the appropriate machine for a given application based on its characteristics. |
| 3. | To understand the starting process and speed control methods of DC motors. |
| 4. | Describe the construction, working principle of transformer and its Performance. |
| 5. | To Analyze the testing of DC Machines and Transformer. |

| UNIT-I | MAGNETIC CIRCUITS AND MAGNETIC MATERIALS | 9 |
|---|---|---|

Magnetic circuits –Laws governing magnetic circuits - Flux linkage, Inductance and energy - Statically and Dynamically induced EMF - Torque – Properties of magnetic materials, Hysteresis and Eddy Current losses - AC excitation, introduction to permanent magnets- Transformer as a magnetically coupled circuit.

| UNIT-II | DC GENERATORS | 9 |
|---|---|---|

Construction of DC Machine – Principle of operation - Lap and wave windings-EMF equations–– characteristics of DC generators-armature reaction –methods of excitation- commutation– Parallel operation.

| UNIT-III | DC MOTORS | 9 |
|---|---|---|

Principle and operations - types of DC Motors – Speed Torque Characteristics of DC Motors-starting and speed control of DC motors –Plugging, dynamic and regenerative braking-Permanent magnet DC motors (PMDC) -DC Motor applications.

| UNIT-IV | TRANSFORMERS | 9 |
|---|---|---|

Construction – principle of operation – equivalent circuit parameters – phasor diagrams, losses – efficiency and voltage regulation-all day efficiency-three phase transformers- connections – Phasing of transformer–parallel operation of three phase transformers-auto transformer – tap changing transformers.

| UNIT-V | TESTING OF DC MACHINES AND TRANSFORMERS | 9 |
|---|---|---|

**DC MACHINES** - Brake test, Retardation test, Swinburne's test and Hopkinson's test-Separation of no load losses.

**TRANSFORMERS-** Open circuit test, Short circuit test, Load test, Sumpner's test and Polarity test.

**Total Instructional hours:45**

| Course Outcomes: Students will be able to | |
|---|---|
| **CO1** | Illustrate the laws governing the electromechanical energy conversion for singly and multiple excited systems. |
| **CO2** | Develop the EMF equation and Characteristics of various types of DC Generator. |
| **CO3** | Identify the Speed-Torque characteristics and braking methods of DC Motor. |
| **CO4** | Analyze the performance and equivalent circuit parameters of the transformer. |
| **CO5** | Examine the losses and performance of various electrical machines by conducting different testing methods. |

| Text Books | |
|---|---|
| 1. | Stephen J. Chapman, 'Electric Machinery Fundamentals'4th edition, McGraw HillEducation Pvt. Ltd, 2010. |
| 2. | P.C. Sen'Principles of Electric Machines and Power Electronics' John Wiley & Sons;3rd Edition 2013. |
| 3. | Nagrath, I.J. and Kothari.D.P., Electric Machines', McGraw-Hill Education, 2004. |

| Reference Books | |
|---|---|
| 1. | B.R. Gupta ,'Fundamental of Electric Machines' New age International publishers,3rd Edition, Reprint 2015. |
| 2. | S.K. Bhattacharya, 'Electrical Machines' McGraw - Hill Education, New Delhi,3rd Edition, 2009. |
| 3. | Vincent Del Toro, 'Basic Electric Machines' Pearson India Education, 2016. |
| 4. | Bimbhra P S , "Electrical Machinery", Khanna Publishers, New Delhi, 2011. |

**Approved by BoS Chairman**

| B.E | B23EET304 – MEASUREMENTS AND INSTRUMENTATION | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

| Course Objectives | |
|---|---|
| 1. | To impart knowledge on various instrument systems and their errors. |
| 2. | To gain the knowledge on the functional aspects of measuring instruments |
| 3. | To infer the importance of various bridge circuits used with measuring instruments. |
| 4. | To introduce students a knowledge on various storage and display devices. |
| 5. | To understand the concepts of transducers data acquisition systems and sensors |

| UNIT-I | INTRODUCTION | 9 |
|---|---|---|

Roles and needs of instrumentation – Classification of Instrument – Functional elements of an instrument – Static and Dynamic characteristics – Errors in measurement – Statistical evaluation of measurement data – Standards and Calibration.

| UNIT-II | ANALOG AND DIGITAL INSTRUMENTS | 9 |
|---|---|---|

**ANALOG INSTRUMENTS:** Permanent magnet moving coil and moving iron meters – dynamometer and induction instruments-measurement of power and energy- Calibration of meters- Instrument Transformer

**DIGITAL INSTRUMENTS:** Electronic voltmeter-Digital voltmeter of ramp and dual slop integrating types-Digital multimeter- -Digital energy meter - Maximum Demand Indicator- Digital frequency meter– Power factor meter - smart energy meter and net metering.

| UNIT-III | MEASUREMENT OF R-L-C | 9 |
|---|---|---|

Resistance measurement – Kelvin double bridge, Wheatstone bridge, substitution method, Loss of charge method, Guard Wire method. Measurement of inductance and capacitance – Maxwell, Anderson, Wein and Schering bridge. Measurement of Earth resistance - megger.

| UNIT-IV | STORAGE AND DISPLAY DEVICES | 9 |
|---|---|---|

Digital Magnetic tape - Recorders, digital plotters and printers – Spectrum Analyzer- Harmonic Distortion Analyzer- CRT display – Digital CRO- Function generator, LED, LCD and dot matrix display–Data Loggers.

| UNIT-V | TRANSDUCERS, DATA ACQUISITION SYSTEMS AND SENSORS | 9 |
|---|---|---|

Electrical transducers, resistive transducers, strain gauge, thermistor, RTD, inductive transducers, LVDT, capacitive transducer, piezo electric, photo voltaic cell, photo diode, photo transistors. –Elements of data acquisition system –A/D, D/A converters- Smart sensors.

**Total Instructional hours: 45**

| Course Outcomes: Students will be able to | |
|---|---|
| CO1 | Outline the operating characteristics and standards of measurement systems. |
| CO2 | Identify the various analog and digital instruments and comprehend their use in modern electronic systems. |
| CO3 | Choose suitable AC and DC bridge for measuring R, L,C and frequency for the required specifications |
| CO4 | Infer the concept of various storage and display devices and their applications. |
| CO5 | Identify the transducers for physical variables and to describe operating principle and understand the data acquisition systems. |

| Text Books | |
|---|---|
| 1. | A.K. Sawhney, Puneet Sawhney 'A Course in Electrical & Electronic Measurements & Instrumentation', Dhanpat Rai and Co, New Delhi, Edition 2011. |
| 2. | J.B.Gupta, "A Course in Electronic and Electrical Measurements", S.K.Kataria & Sons, Delhi, 2013. |
| 3. | Doebelin E.O. and Dhanesh N Manik , "Measurement Systems" , McGraw Hill, New Delhi 2012. |

| Reference Books | |
|---|---|
| 1. | H.S.Kalsi, " Electronic Instrumentation ", McGraw Hill, III Edition 2010. |
| 2. | D.V.S Murthy, " Transducers and Instrumentation" , Prentice Hall of India Pvt. Ltd., 2015. |
| 3. | R.B. Northrop, 'Introduction to Instrumentation and Measurements', Taylor & Francis, New Delhi,3rd Edition 2014. |
| 4. | E. O. Doebelin and D. N. Manik, "Measurement Systems – Application and Design", Tata McGraw-Hill, New Delhi, 6th Edition 2017. |
| 5. | R. K. Rajput, "Electrical and Electronics Measurements and Instrumentation", Chand Pub, 2016 |
| 6. | David A.Bell, " Electronic Instrumentation and Measurements" , Oxford University Press, New Delhi, 2012. |

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| B. E. | B23CSI303-FUNDAMENTALS OF DATA STRUCTURES USING C | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

| Course Objectives | |
|---|---|
| 1. | To acquire the concepts of data structures. |
| 2. | To understand the usage linked lists. |
| 3. | To understand the concepts of stacks and queues. |
| 4. | To know the concepts of trees and graphs . |
| 5. | To familiarize the concepts of sorting, searching and hashing techniques. |

| UNIT - I | INTRODUCTION | 9 |
|---|---|---|
| Abstract Data Types (ADTs), List ADT, array-based implementation – linked list implementation — singly linked lists- circularly linked lists - doubly-linked lists – applications of lists –Polynomial Manipulation – All operations (Insertion, Deletion, Merge, Traversal). | | |

| UNIT - II | LINEAR DATA STRUCTURES- STACK | 9 |
|---|---|---|
| Stack ADT- definition, operations, array and linked implementations in C, applications-infix to postfix conversion, Postfix expression evaluation, recursion implementation. | | |

| UNIT - III | LINEAR DATA STRUCTURES-QUEUE | 9 |
|---|---|---|
| Queue ADT - Types of Queue: Simple Queue, Circular Queue, Priority Queue, deQueue - Operations on each types of Queues (Insertion, Deletion, and Traversal) – applications of queues. | | |

| UNIT - IV | NON-LINEAR DATA STRUCTURES- TREES & GRAPHS | 9 |
|---|---|---|
| Tree ADT - Tree traversals - Binary Tree ADT - expression trees - Applications of Trees - Binary Search Tree – Balanced Binary Tree- B -Trees – Heaps - Graph – Graph traversal Algorithms – Shortest Path Algorithms – Minimum Spanning Tree Algorithms | | |

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| UNIT - V | SEARCHING, SORTING & HASHING | 9 |
|---|---|---|
| Searching- Linear Search - Binary Search. Sorting - Quick sort - Bubble sort - Merge sort - Selection sort - Hashing- Hash Function – Types of Hash Functions – Collision – Collision Resolution Technique – Perfect Hashing. | | |

| Expt. No. | Description of the Experiments |
|---|---|
| 1. | Implementation of Singly, Doubly and Circular Linked list using C |
| 2. | Array implementation of Stack and Queue ADTs. |
| 3. | Linked list implementation of Stack and Queue ADTs. |
| 4. | Implementation of Tree traversal algorithms. |
| 5. | Implementation of Binary Search Trees. |
| 6 | Implementation of AVL Trees. |
| 7 | Implementation of Shortest path and MST algorithms |
| 8 | Implementation of searching algorithms. |
| 9 | Implementation of sorting algorithms. |
| 10 | Hashing – collision resolution techniques. |
| | **Total Instructional hours : (45+15) = 60** |

| **Course Outcomes : Students will be able to** | |
|---|---|
| **CO1** | Identify suitable data structures for simple problems |
| **CO2** | Apply the linear data structures such as stacks and queues to solve problems. |
| **CO3** | Make use of tree data structures to provide solutions. |
| **CO4** | Apply the concept of graphs in real world scenarios. |
| **CO5** | Analyse various searching ,sorting and hashing techniques. |

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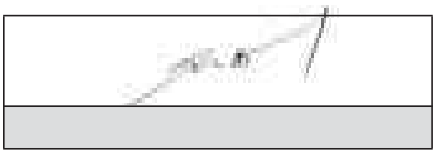
| Text Books | |
|---|---|
| 1. | "C Programming Absolute Beginner's Guide" by Greg Perry and Dean Miller is the third edition, June 23, 2013 |
| 2 | Pradip Dey and Manas Ghosh, ―Programming in C, Second Edition, Oxford University Press, 2011. |
| 3. | Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, ―Fundamentals of Data Structures in C, Second Edition, University Press, 2008 |

| Reference Books | |
|---|---|
| 1. | Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, Introduction to Algorithms", Fourth Edition, Mcgraw Hill/ MIT Press, 2022. |
| 2. | "Data Structures Using C" by Aaron M. Tenenbaum, Yedidyah Langsam, and Moshe J. Augenstein ,2022 |
| 3. | "Data Structures and Algorithm Analysis in C" by Mark Allen Weiss,2022 |
| 4. | Mark Allen Weiss, Data Structures and Algorithm Analysis in C, 2nd Edition, Pearson Education, 2016. |
| 5. | Langsam, Augenstein and Tanenbaum, Data Structures Using C and C++, 2nd Edition, Pearson Education, 2015. |



| B.E | B23EEP301 - DC MACHINES AND TRANSFORMERS LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

| Course Objectives | |
|---|---|
| 1. | To evaluate the performance of DC motor by conducting direct load test. |
| 2. | To evaluate the performance of DC generator by conducting direct load test. |
| 3. | To understand the working and testing methods of transformers. |
| 4 | To conduct different tests on DC machines to analyze their performance. |
| 5 | To make use of simulation software to analyze the performance of DC machines. |

| Expt.No. | Description of the Experiments |
|---|---|
| 1 | Open circuit and load characteristics of DC Shunt Generator. |
| 2 | Load test on DC Shunt motor. |
| 3 | Load test on DC Series motor. |
| 4 | Load test on DC Compound motor. |
| 5 | Speed control of DC Shunt motor. |
| 6 | Swinburne's test. |
| 7 | Load test on single phase transformer. |
| 8 | Parallel operation of transformer. |
| 9 | Open circuit and short circuit tests on single phase transformer. |
| 10 | Sumpner's test on single phase transformers. |
| 11 | Hopkinson Test on DC machines |
| 12 | Separation of no load losses in single phase transformer. |
| 13 | Performance Analysis of DC Machines using Simulation software. |
| | **Total Instructional hours: 60** |

| Course Outcomes: Students will be able to | |
|---|---|
| **CO1** | Analyze the performance of DC generators / motors by conducting direct load test experimentally. |
| **CO2** | Compare the performance characteristics obtained experimentally and Simulation on various DC machines |
| **CO3** | Estimate the performance of DC machines by conducting Swinburne's and Hopkinson Test. |
| **CO4** | Analyze the performance of transformer by conducting various test. |
| **CO5** | Develop the equivalent circuit parameters of transformers by conducting various tests. |

| LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS | | |
|---|---|---|
| **Sl.No.** | **Description of Equipment** | **Quantity required** |
| 1 | DC Shunt Motor With Loading Arrangement | 2 |
| 2 | DC Series Motor With Loading Arrangement | 1 |
| 3 | DC Compound Motor With Loading Arrangement | 1 |
| 4 | DC Shunt Motor Coupled With DC Shunt Generator | 2 |
| 5 | Single Phase Transformer | 3 |
| 6 | Three Phase Transformer | 2 |
| 7 | Single Phase Auto Transformer | 2 |
| 8 | Three Phase Auto Transformer | 2 |
| 9 | Single Phase Resistive Loading Bank | 2 |
| 10 | Three Phase Resistive Loading Bank | 2 |
| 11 | Tachometer -Digital/Analog | 8 |
| 12 | Frequency Meter | 1 |
| 13 | SPST Switch | 2 |
| 14 | DPST Switch | 2 |
| 15 | Personal Computers | 30 |
| 16 | Simulation software | 30 Users |

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| B.E | B23EEP302- ELECTRONICS AND INSTRUMENTATION LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

| Course Objectives | |
|---|---|
| 1. | To know the characteristics of various semiconductor devices. |
| 2. | To construct Half-Wave and Full-Wave Rectifier with and without Filter. |
| 3. | To learn the operation of AC and DC bridges. |
| 4 | To impart knowledge about sensors, transducers and measuring instruments. |
| 5 | To gain hands on experience in different measuring devices. |

| Expt.No. | Description of the Experiments |
|---|---|
| 1 | V-I Characteristics of PN Junction Diode and Zener Diode |
| 2 | Half-Wave Rectifier with and without Filter and Full-Wave Rectifier with and without Filter |
| 3 | Drain and Transfer Characteristics of JFET |
| 4 | Characteristics of UJT and generation of saw tooth waveforms. |
| 5 | Characteristics of CC,CE and CB Transistor Configuration. |
| 6 | Differential Amplifier-Transfer Characteristics- CMRR Measurement. |
| 7 | Measurement of Resistance using Wheatstone Bridge. |
| 8 | Measurement of Capacitance using Schering Bridge. |
| 9 | Measurement of Inductance using Maxwell's Bridge. |
| 10 | Characteristics of Displacement and Pressure Transducers. |
| 11 | Characteristics of RTD and Thermistor. |
| 12 | Characteristics of Strain Gauge, Optical Sensor and Flow Sensor. |
| | **Total Instructional hours: 45** |

| Course Outcomes: Students will be able to | |
|---|---|
| **CO1** | Build the VI characteristics of PN Junction Diode ,Zener Diode, JFET , UJT and CC,CE,CB Transistor. |
| **CO2** | Construct Half-Wave and Full-Wave Rectifier with and without Filter. |
| **CO3** | Make use of Various bridges to measure the unknown values of R,L,C. |
| **CO4** | Analyze the characteristics of Displacement and Pressure Transducer & Sensors/ Transducers for physical variables. |
| **CO5** | Examine the characteristics of Differential Amplifier. |

| LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS | | |
|---|---|---|
| **Sl.No.** | **Description of Equipment** | **Quantity required** |
| 1 | Semiconductor devices like Diode, Zener Diode, NPN Transistors, JFET, UJT. | Each 5 |
| 2 | Resistors, Capacitors and inductors -various ranges | Each 5 |
| 3 | Voltmeter (0-2V),(0-1V), (0-10V),(0-30V) | Each 5 |
| 4 | Ammeter (0-100μA),(0-100mA),(0-500μA), (0-30mA), | Each 5 |
| 5 | Function Generators | 10 |
| 6 | Bread boards | 20 |
| 7 | Regulated Power Supply (0-30V ) | 30 |
| 8 | Digital Multimeter | 8 |
| 9 | Analog Oscilloscope | 5 |
| 10 | LVDT kit | 1 |
| 11 | Maxwell's Inductance Capacitance Bridge kit | 1 |
| 12 | Schering bridge kit | 1 |
| 13 | Wheatstone bridge kit | 1 |
| 14 | Decade Resistance Box | 6 |
| 15 | Decade Inductance Box | 6 |
| 16 | Decade Capacitance Box | 6 |
| 17 | Bourdon pressure trainer kit | 1 |
| 18 | Portable DC voltmeter(0-30) V | 4 |
| 19 | Transducer trainer: Thermistor and RTD | 1 |
| 20 | Transducer trainer: Optical sensor | 1 |
| 21 | Transducer trainer: Strain gauge | 1 |
| 22 | Transducer trainer: flow sensor | 1 |

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| B.E | B23EEP303 – DESIGN THINKING AND PROTOTYPING | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 2 | 1 |

| Course Objectives | |
|---|---|
| 1. | To understand the needs of the user. |
| 2. | To Develop the students as a good designer by imparting creativity and problem-solving ability. |
| 3. | To Generate multiple concepts using various creativity tools and thinking styles. |
| 4 | To design and demonstrate innovative ideas using prototypes. |
| 5 | To learn the Iterative process of ideation, prototyping and testing. |

| MODULE-I | INTRODUCTION AND IDENTIFYING THE NEED |
|---|---|
| Understanding the unique needs of the user - empathize - define - ideate - prototype - test. Case Studies - Develop appreciation for the design process and its application in specific settings (Guest lectures, design-based Videos, Field visits). | |

| MODULE -II | PROBLEM FORMULATION |
|---|---|
| Framing a problem statement neutrally using adequate checks. Case studies. | |

| MODULE- III | CONCEPT GENERATION |
|---|---|
| Generate multiple concepts using various creativity tools and thinking styles. | |

| MODULE -IV | PROTOTYPING |
|---|---|
| Select from ideas and make quick prototypes (mock-ups) using available material. | |

| MODULE-V | EVALUATION |
|---|---|
| Iterative process of ideation, prototyping and testing-Take the mock-ups to users for feedback and iterate process till users feel delighted. | |
| | **Total Instructional hours:30** |

| Course Outcomes: Students will be able to | |
|---|---|
| **CO1** | Identify the user needs. |
| **CO2** | Develop a suitable problem statement. |
| **CO3** | Apply multiple concepts using various creativity tools and thinking styles. |
| **CO4** | Design and demonstrate innovative ideas using prototypes. |
| **CO5** | Evaluate and create users feel delighted product. |

**Activities:**
Some of the activities which are undertaken as a part of this course include:

- Field Visits
- Case Studies on innovation, failures etc.
- Guest lecture
- Group Discussions
- Presentation by student
- Experiential learning workshops.

| Learning Resources | |
|---|---|
| 1. | Design Thinking: A guide to creative problem solving for everyone, Andrew Pressman, Routledge Taylor and Francis group, 2019, 1st edition. |
| 2. | Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Tim Brown, Harper Business, 2019. |
| 3. | Engineering Design, George E. Dieter, Linda C. Schmidt, McGraw-Hill Education, 2019, 5th edition. |
| 4. | Product design and development, Ulrich, K., Eppinger, S. and Yang, M., 2020, 7th edition. |
| 5. | **Online Resources:**<br>https://www.arvindguptatoys.com/<br>https://honeybee.org/<br>https://dschool.stanford.edu/resources/getting-started-with-design-thinking<br>https://designthinking.ideo.com/ |

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# Semester-IV

| B.E | B23MAT403 – NUMERICAL METHODS (Common to AERO, EEE & MECH) | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 1 | 0 | 4 |

| Course Objectives | |
|---|---|
| 1. | To provide the basic concepts of solving algebraic and transcendental equations. |
| 2. | To introduce the numerical techniques of interpolation in real life situations. |
| 3. | To acquaint the student with understanding of numerical techniques of differentiation and integration and apply in engineering and technology disciplines. |
| 4. | To enrich the knowledge in solving ordinary differential equations. |
| 5. | To gain practice in solving various types of partial differential equations. |

| UNIT – I | ALGEBRAIC EQUATIONS AND EIGEN VALUE PROBLEMS | 12 |
|---|---|---|

Solution of algebraic and transcendental equations - Fixed point iteration method - Newton Raphson method - Solution of linear system of equations - Gauss elimination method - Pivoting -Gauss Jordan method - Iterative methods of Gauss Jacobi and Gauss Seidel - Eigenvalues of a matrix by Power method for symmetric matrices.

| UNIT – II | INTERPOLATION AND APPROXIMATION | 12 |
|---|---|---|

Interpolation with unequal intervals - Lagrange's interpolation - Newton's divided difference interpolation - Difference operators and relations - Interpolation with equal intervals - Newton's forward and backward difference formulae.

| UNIT – III | NUMERICAL DIFFERENTIATION AND INTEGRATION | 12 |
|---|---|---|

Approximation of derivatives using interpolation polynomials - Numerical integration using Trapezoidal, Simpson's 1/3 rule - Cubic Spline - Romberg's Method - Evaluation of double integrals by Trapezoidal and Simpson's 1/3 rules.

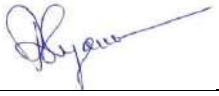
| UNIT – IV | INITIAL VALUE PROBLEMS (ODE) | 12 |
|---|---|---|

Single step methods - Taylor's series method - Euler's method - Modified Euler's method - Fourth order Runge - Kutta method for solving first order equations - Multi step methods - Milne's and Adams - Bash forth predictor corrector methods for solving first order equations.

| UNIT – V BOUNDARY VALUE PROBLEMS | 12 |
|---|---|
| Finite difference methods for solving second order two - point linear boundary value problems - Finite difference techniques for the solution of one dimensional wave equation - One dimensional heat equation by explicit and implicit (Crank Nicholson) methods - Solution of Laplace's and Poisson's equations (Cartesian co-ordinates only). | |
| | **Total Instructional hours : 60** |

| **Course Outcomes : Students will be able to** | |
|---|---|
| CO1 | Interpret the basic concepts and techniques of solving algebraic andtranscendental equations. |
| CO2 | Apply the numerical techniques of interpolation and error approximations in various intervals. |
| CO3 | Make use of various numerical techniques of differentiation and integration for engineering problems. |
| CO4 | Relate the knowledge of various techniques and methods for solving first and second order ordinary differential equations. |
| CO5 | Solve the partial and ordinary differential equations with boundary conditions related to engineering problems. |
| **Text Books** | |
| 1. | Burden R.L and Faires J.D, "Numerical Analysis", 9th Edition, Cengage Learning, 2016. |
| 2. | Grewal B.S., and Grewal J.S., "Numerical Methods in Engineering and Science", Khanna Publishers, 10th edition, New Delhi, 2015. |

| **Reference Books** | |
|---|---|
| 1. | Sankara Rao K., "Numerical methods for Scientists and Engineers", Prentice Hall of IndiaPrivate, 3rd Edition, New Delhi, 2017. |
| 2. | Kandasamy P., Thilagavathy K., and Gunavathi K., "Numerical Methods", 2nd Edition, S.Chand and Co, Reprint 2012. |
| 3. | Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 44th Edition, 2017. |
| 4. | Kreyszig, E, "Advanced Engineering Mathematics", John Willey and Sons, 10th Edition, 2018. |



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| B.E | B23EET402 – INDUCTION AND SYNCHRONOUS MACHINES | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

| Course Objectives | |
|---|---|
| 1. | To impart knowledge on Construction, principle of operation and performance of induction machines |
| 2. | To impart knowledge on Starting and speed control of three-phase induction motors. |
| 3. | To understand operation, construction and types of single phase motors and their applications in house hold appliances. |
| 4. | To introduce the concept of parallel operation of synchronous generators, regulation and its calculations. |
| 5. | To impart knowledge on Principle of operation and performance of synchronous motor. |

| UNIT-I | THREE PHASE INDUCTION MOTOR | 9 |
|---|---|---|

Constructional features – Operation - Torque equation - Phasor diagram - Equivalent circuit - Performance analysis - Torque - slip characteristics - No load and blocked rotor tests - Load test - Equivalent circuit - Circle diagram – Cogging and Crawling - Separation of losses – Double cage induction motors.

| UNIT-II | STARTING AND SPEED CONTROL OF THREE PHASE INDUCTION MOTOR | 9 |
|---|---|---|

Need for starting – Types of starters – DOL, Rotor resistance, Autotransformer and Star delta starters – Speed control – Voltage control, Frequency control, V/f control and pole changing – Cascaded Connection - Slip power recovery Scheme-Braking of three phase induction motor: Plugging, dynamic braking and regenerative braking.

| UNIT-III | SINGLE PHASE INDUCTION MOTOR AND SPECIAL MACHINES | 9 |
|---|---|---|

Construction - Principle of operation of single phase induction motor - Double revolving field theory - Equivalent circuit - Determination of equivalent circuit parameters and Performance characteristics - Methods of starting – Split Phase, Capacitor start, Capacitor start and run, Shaded pole – Linear induction motor – Brushless DC motor – Stepper Motor.

| UNIT-IV | SYNCHRONOUS GENERATOR | 9 |
|---|---|---|

Construction - types –Operation - Winding Factors - EMF Equation – Synchronous reactance - Armature Reaction - Voltage Regulation; EMF, MMF, and ZPF Methods - Parallel Operation - Synchronization - Synchronizing power - Two reaction theory - Slip test.

| UNIT-V | SYNCHRONOUS MOTOR | 9 |
|---|---|---|
| Construction - Principle of Operation – Methods of Starting - Torque equation - Operation on infinite bus bars - Phasor Diagrams - Power Flow Equations - Effect of Varying load angle and excitation - V and Inverted V Curves - Synchronous Condenser - Hunting and Suppression Techniques. | | |
| | | **Total Instructional hours:45** |

| **Course Outcomes: Students will be able to** | |
|---|---|
| **CO1** | Analyze the performance of three phase Induction motors along with its construction and operation. |
| **CO2** | Classify the different types of Starters and explain the different techniques for the Speed control and braking of an Induction Motor. |
| **CO3** | Examine the performance of Single-Phase Induction Motors along with construction, operation, starting methods and working of special machines. |
| **CO4** | Inspect different methods to find the regulation of alternators along with its construction, operation and parallel operation of Alternators. |
| **CO5** | Examine the performance of Synchronous motors along with its principle of operation, and its starting methods. |

| **Text Books** | |
|---|---|
| 1. | D.P. Kothari and I.J. Nagrath, 'Electric Machines', McGraw Hill Publishing Company Ltd, 5th Edition 2017 |
| 2. | P.S. Bhimbhra, 'Electrical Machinery', Khanna Publishers, edition 2, 2021. |
| 3. | K Murugesh Kumar, "Electrical Machines - II", Vikas Publishing House, New Delhi, 2010. |

| **Reference Books** | |
|---|---|
| 1. | A.E. Fitzgerald, Charles Kingsley, Stephen. D. Umans, 'Electric Machinery', Mc Graw Hill publishing Company Ltd, 6th Education 2017. |
| 2. | B.R.Gupta, 'Fundamental of Electric Machines' New age International Publishers,3rd Edition, Reprint 2015. |
| 3. | Bhattacharya S K, "Electrical Machines", Tata McGraw-Hill, New Delhi, 2011. |
| 4. | Ashfaq Husain, "Electric Machines", Dhanpat Rai & Co., New Delhi, 2011. |

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| B.E | B23EET403- GENERATION TRANSMISSION AND DISTRIBUTION | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

| Course Objectives | |
|---|---|
| 1. | To familiarize with the structure of power system network. |
| 2. | To obtain the equivalent circuits for the transmission lines based on distance and to determine voltage regulation and efficiency. |
| 3. | To understand the mechanical design of transmission lines. |
| 4. | To analyze the voltage distribution in insulator strings to improve the efficiency. |
| 5. | To study about distribution systems, types of substations and methods of grounding, |

| UNIT-I | INTRODUCTION FOR GENERATION | 9 |
|---|---|---|

Introduction-Structure of Electric Power System-Conventional source of electrical energy-basic layout of thermal power generation, hydroelectric power generation and nuclear power plant-Basic layout of sustainable energy resources (solar and wind) - Different operating voltages of generation, transmission and distribution – advantage of higher operating voltage for AC transmission-Indian energy scenario.

| UNIT-II | TRANSMISSION LINE PARAMETERS | 9 |
|---|---|---|

Transmission line parameters of single and three phase transmission lines with single and double circuits: resistance, inductance and capacitance of solid, stranded and bundled conductors, Symmetrical and unsymmetrical spacing and transposition – application of self and mutual GMD; skin and proximity effects -Typical configurations, conductor types and electrical parameters of EHV lines.

| UNIT-III | MODELLING AND PERFORMANCE OF TRANSMISSION LINES | 9 |
|---|---|---|

Performance of short, medium and long transmission line- equivalent circuits and mathematical models - Ferranti effect - surge impedance, attenuation constant, phase constant and surge impedance loading- voltage regulation and transmission efficiency, real and reactive power flow in lines – Formation of corona-Effect on the performance.

| UNIT-IV | INSULATORS, CABLES AND MECHANICAL DESIGN OF LINES | 9 |
|---|---|---|

Classification of insulators for transmission and distribution purpose – voltage distribution in insulator string and grading- improvement of string efficiency- Underground cables – constructional features of LT and HT cables- capacitance-dielectric stress and grading. Mechanical design of OH lines – Line Supports –Types of towers- Sag and tension calculations – effect of wind and ice.

| UNIT-V | SUBSTATION, DISTRIBUTION SYSTEM AND GROUNDING SYSTEM | 9 |
|---|---|---|
| Types of substations - bus-bar arrangements - substation bus schemes: single bus scheme, double bus with double breaker, double bus with single breaker, main and transfer bus, ring bus, double bus-bar with bypass isolators - radial and ring-main distributors - Importance of earthing in a substation - Methods of Grounding- Trends in Transmission and Distribution: Smart substations, Substation Automation. | | |
| | | **Total Instructional hours:45** |

| **Course Outcomes: Students will be able to** | |
|---|---|
| **CO1** | Demonstrate the structure and operations of generation, transmission, distribution Systems. |
| **CO2** | Evaluate the transmission line parameters for different configurations. |
| **CO3** | Construct the transmission lines to determine the line performance |
| **CO4** | Design of transmission lines using cables and insulators. |
| **CO5** | Summarize the distribution, Substation schemes, grounding systems and modern trends in distribution system. |

| **Text Books** | |
|---|---|
| 1. | S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011. |
| 2. | Leonard L. Grigsby, 'Electric Power Generation, Transmission, and Distribution, Third Edition CRC Press, 2012 |
| 3. | Rai G.D., "Non-conventional energy resources", Khanna publishers, 2014. |

| **Reference Books** | |
|---|---|
| 1. | Arun Ingole, "power transmission and distribution" Pearson Education, 2017 |
| 2. | B.R.Gupta, 'Power System Analysis and Design' S. Chand, New Delhi, Fifth Edition, 2008. |
| 3. | G.Ramamurthy, "Handbook of Electrical power Distribution," Universities Press, 2013. |
| 4. | C.L.Wadhwa, 'Electrical Power Systems', New Academic Science Ltd, 2009. |

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| B.E | B23EET404 – ANALOG AND DIGITAL INTEGRATED CIRCUITS | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 0 | 3 |

| Course Objectives | |
|---|---|
| 1. | To understand about IC fabrication procedure and basics of Op-Amp. |
| 2. | To study about the signal conversion circuits and special ICs. |
| 3. | To simplify Boolean expressions and design combinational circuits. |
| 4. | To design Sequential circuits. |
| 5. | To learn about semiconductor memories and PLDs. |

| UNIT-I | IC FABRICATION AND OPERATIONAL AMPLIFIER | 9 |
|---|---|---|

Fundamental of monolithic IC fabrication technology- realization of monolithic ICs - Op-Amp-characteristics Basic operations of Op-Amp -Inverting, Non-inverting, Differentiator, Integrator - Differential Amplifier using Op-Amp - Op-Amp Based Instrumentation Amplifier, Comparator, Multivibrators, Schmitt trigger.

| UNIT-II | SIGNAL CONVERSION CIRCUITS AND SPECIAL ICs | 9 |
|---|---|---|

First and second order active filters- V/I and I/V conversion S/H Circuit- D/A converter (R-2R ladder and weighted resistor types), A/D converters using opamps, IC 555 Timer circuit: Functional block, characteristics & applications, IC566 voltage controlled oscillator, IC565 phase locked loop circuit, IC voltage regulators - LM78XX, LM79XX, LM317, IC723.

| UNIT-III | COMBINATIONAL CIRCUITS | 9 |
|---|---|---|

Boolean Algebra and laws Simplification of Boolean expressions- Introduction to sum of products (SOP) & product of sums (POS)- Logic Minimization using K-map and their realisation using logic gates. Simplification and implementation of combinational logic multiplexers and de multiplexers - Adders, BCD adder, CLA, Subtractors, Encoders, Decoders, Code converters and Comparators.

| UNIT-IV | SEQUENTIAL CIRCUITS | 9 |
|---|---|---|

Latches and Flip-Flops (SR, JK, T, D), Master/Slave FF, Sequential Circuit Design, Moore and Mealy Machines, state diagram; state reduction; state assignment, Shift Registers, Synchronous counters (up, down, up-down, mod-N, Ring). Asynchronous Sequential Logic circuits - characteristics- Cycles- Races, Asynchronous Counters (up, down), hazards - Design of Hazard free circuits.

| UNIT-V | SEMICONDUCTOR MEMORIES AND PROGRAMMABLE LOGIC DEVICES | 9 |
|---|---|---|
| Memory organization and operation, expanding memory size, classification and characteristics of memories, RAM (static and dynamic), ROM (EEPROM, FLASH), CAM, CCD. Programmable Logic Devices: PROM – PLA - PAL, Introduction to CPLDs - Study of the architecture of CPLD and Study of the Architecture of FPGA. | | |
| | | **Total Instructional hours:45** |

| **Course Outcomes: Students will be able to** | |
|---|---|
| **CO1** | Demonstrate the IC fabrication procedure and basic operations of Op-amp . |
| **CO2** | Illustrate the function of Signal Conversion Circuits and Special ICs using Op-amp. |
| **CO3** | Develop the combinational circuits. |
| **CO4** | Construct the Sequential circuits. |
| **CO5** | Develop simple Programmable Logic Devices and semiconductor memories. |

| **Text Books** | |
|---|---|
| 1. | D. Roy Choudhary, Sheil B. Jani, " Linear Integrated Circuits", 4th Edition, New Age International, New Delhi, 2010. |
| 2. | David A. Bell, ˆOperational amplifiers & Linear ICs, Oxford University Press, 2010. |
| 3. | M. M. Mano, 'Digital logic and computer design', Pearson Education, 2016. |
| 4. | S. Salivahanan, 'Digital Circuits and Design', Oxford University Press, 2018. |

| **Reference Books** | |
|---|---|
| 1. | Ramakant A. Gayakward, "Op-amps and Linear Integrated Circuits", 4th Edition, Pearson Education, New Delhi, 2009. |
| 2. | Floyd ,Buchla,"Fundamentals of Analog Circuits, Pearson, 2013 |
| 3. | Mandal, "Digital Electronics Principles & Application, McGraw Hill Edu, 2013. |
| 4. | D.P.Kothari, J.S. Dhillon, 'Digital circuits and Design', Pearson Education, 2016. |

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| B.E | B23EEI401 - CONTROL ENGINEERING | L | T | P | C |
|---|---|---|---|---|---|
| | | 3 | 0 | 2 | 4 |

| Course Objectives | |
|---|---|
| 1. | To understand the use of transfer function models for analysis physical systems and introduce the control system components |
| 2. | To provide adequate knowledge in the time response of systems and steady state error analysis. |
| 3. | To accord basic knowledge in obtaining the open loop and closed–loop frequency responses of systems. |
| 4. | To study the stability analysis and design of compensators. |
| 5. | To study the state variable representation of physical systems. |

| UNIT-I | SYSTEMS AND REPRESENTATION | 9 |
|---|---|---|
| Open loop and closed loop systems – Transfer function of physical systems: Mechanical systems – Translational, Rotational systems and Electrical network - Analogous systems, AC servomotor and DC servomotor, Block diagram reduction techniques – Signal flow graphs-– Mason's gain formula. | | |

| UNIT-II | TIME RESPONSE ANALYSIS | 9 |
|---|---|---|
| Standard test signals - Time response of first order and second order feedback control systems - Time domain specifications - Steady state error - Static error constants - Dynamic error coefficients- Controllers: P, PI and PID controller and its Effects. | | |

| UNIT-III | FREQUENCY RESPONSE ANALYSIS | 9 |
|---|---|---|
| Frequency domain specifications - Correlation between time and frequency responses for second order systems - Bode plot - Gain Margin and Phase Margin - Polar plot. | | |

| UNIT-IV | STABILITY AND COMPENSATOR DESIGN | 9 |
|---|---|---|
| Concept of Stability - Necessary conditions for stability - Absolute stability and Relative stability - Routh Hurwitz criterion - Root locus: concepts of root locus - Construction of root locus – Nyquist stability criterion - Effect of Lag, lead and lag-lead compensation on frequency response - Design of Lag, lead and lag-lead compensator using bode plots(Qualitative). | | |

| UNIT-V | STATE VARIABLE ANALYSIS | 9 |
|---|---|---|
| Concepts of state variable and state model – State space representation using physical variable, State Model using Canonical variables-Transfer function from state space representation– Eigen values – Eigen vectors - Concepts of controllability and observability. | | |
| | | **Total Lecture hours:45** |

**LABORATORY CONTENT**

| Expt. No. | Description of the Experiments |
|---|---|
| 1. | Determination of Transfer Function of DC Machines. |
| 2. | Mathematical modeling and simulation of physical systems in Mechanical &Electrical process. |
| 3. | Simulation of Type – 0 and Type – 1 Systems. |
| 4. | Process simulation: first order and second order system. |
| 5. | Study of P, PI, PD and PID Controllers using MATLAB software. |
| 6. | Stability Analysis of Linear Systems<br>Bode Plot<br>Polar Plot. |
| 7. | Stability Analysis using simulation platform.<br>Routh Hurwitz Criterion<br>Root Locus<br>Nyquist Plot. |
| 8. | Design of Lag, lead compensators. |
| 9. | Test of controllability and observability in continuous and discrete domain in simulation plat form. |
| | **Total Practical hours:30** |

**Total Instructional hours: 45+30 =75**

| **Course Outcomes: Students will be able to** | |
|---|---|
| **CO1** | Identify the basic components of a control system and determine the transfer function of the physical systems using appropriate techniques. |
| **CO2** | Analyze the system performance using time domain technique and effects of P, PI and PID controller. |
| **CO3** | Analyze simple systems in frequency domain. |
| **CO4** | Determine the stability of closed-loop control system and explain the procedure to design compensators for the given system. |
| **CO5** | Develop the state space model for a given system and find the controllability. |

| **Text Books** | |
|---|---|
| 1. | Nagrath I.J and Gopal M "Control Systems Engineering", New Age International Publishers, 6th Edition, New Delhi, 2011. |
| 2. | S.K.Bhattacharya, “Control System Engineering”, 3rd Edition, Pearson, 2013. |
| 3. | Norman S. Nise, "Control Systems Engineering", John Wiley and Sons Ltd, 7th Edition, Singapore, 2014. |
| 4 | Benjamin C. Kuo, “Automatic Control Systems”, 7th edition PHI Learning Private Ltd, 2010. |

| Reference Books | |
|---|---|
| 1. | Katsuhiko Ogata, "Modern Control Engineering", Prentice Hall of India Private Ltd., 5th Edition, New Delhi, 2009. |
| 2. | M. Gopal, 'Control Systems, Principles and Design', 4th Edition, Tata McGraw Hill, New Delhi, 2012. |
| 3. | Richard C. Dorf and Robert H. Bishop, "Modern Control Systems", Pearson Prentice Hall, 17th Edition, NJ, 2014. |
| 4 | NPTEL Video Lecture Notes on "Control Engineering" by Prof.S.D.Agashe, IIT Bombay. |



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| B.E / B.Tech | B23CSI102 – PROBLEM SOLVING AND PYTHON PROGRAMMING<br>(Common to AERO, AGRI, BT, and MECH) | L | T | P | C |
|---|---|---|---|---|---|
| | | 2 | 0 | 4 | 4 |

| Course Objectives | |
|---|---|
| 1. | To develop python programs with conditional statements and loops |
| 2. | To learn how to use strings, functions and pass arguments in Python |
| 3. | To use python data structures such as lists, tuples, and dictionaries |
| 4. | To use file concepts and to build a package using Python modules for reusability |
| 5. | To learn the fundamentals of data manipulations with Python |

| UNIT - I | INTRODUCTION TO PYTHON PROGRAMMING | 9 |
|---|---|---|

Introduction: Python basics and its scripting modes – Variables, Operators - Control Structures: if, if-else, nested if, if – elif ladder statements - Iterative statements : while, for, Nested loops, else in loops, break, continue and pass statements.

| UNIT - II | STRINGS AND FUNCTIONS | 9 |
|---|---|---|

Strings: Formatting, Comparison, Slicing, Splitting, Stripping, Negative indices, String functions. Regular expression: Matching the patterns, Search and replace. Functions: Types, parameters, arguments: positional arguments, keyword arguments, parameters with default values, functions with arbitrary arguments

| UNIT - III | COLLECTIONS | 9 |
|---|---|---|

List: Create, Access, Slicing, Negative Indices, List Methods, and comprehensions, Tuples: Create, Indexing and Slicing, Operations on tuples. Dictionary: Create, add, and replace values, operations on dictionaries

| UNIT - IV | SETS AND FILE HANDLING | 9 |
|---|---|---|

Sets: Create and operations on set, Files: Manipulating files and directories, text files: reading/writing text and numbers from/to a file; creating and reading a formatted file (csv or tab separated)

| UNIT - V | MODULES AND PACKAGES | 9 |
|---|---|---|

Modules: Importing module, standard modules, executing modules. Packages: Importing Packages, simple programs using built-in functions of packages like pandas, jumpy, matplotlib

| Expt. No. | Description of the Experiments |
|---|---|
| 1. | Programs Using Simple Statements<br>a. Exchange the values of two variables,<br>b. Circulate the values of n variables,<br>c. Distance between two points. |

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| | |
|---|---|
| 2. | Programs Using Conditionals and Iterative Statements<br>a. Number Series<br>b. Number Patterns<br>c. Pyramid Pattern |
| 3. | Programs Using built-in and user defined Functions<br>a. Factorial of a Number<br>b. Largest Number in a list<br>c. Area of Shape |
| 4. | Programs using Strings<br>a. Reversing a String<br>b. Checking Palindrome in a String<br>c. Counting Characters in a String<br>d. Replacing Characters in a String |
| 5. | Operations of Lists<br>a. Basic Operations (Insertion, Updating, deletion, accessing, List Comprehensions)<br>b. Implement linear search and binary search using list.<br>c. Matrix operations using Nested List.<br>d. Implement Merge, Bubble and Insertion sort |
| 6. | Create a tuple and perform its operations for the following:<br>a. Basic Operations (Insertion, Updating, deletion, accessing)<br>b. Items present in a library<br>c. Components of a car<br>d. Materials required for construction of a laboratory |
| 7. | Operations of Dictionaries<br>a. Python program to create a dictionary with integer keys, and print the keys, values & key-value pairs<br>b. Python program to randomize (shuffle) values of dictionary |
| 8. | Operations of Sets<br>Basic operations of set (Membership, Operations and Modifications) |
| 9. | Programs using File Handling<br>a. Copy from one file to another.<br>b. Word count<br>c. Longest word |
| 10. | Python programs using Time and Calendar related functions<br>a. Print the current time using time module.<br>b. Display the calendar of given month of the year using calendar module |
| 11. | Implementing programs using written modules and Python Standard Libraries (pandas, numpy. Matplotlib, scipy) |
| | **Total Instructional hours : (45+30) = 75** |

| **Course Outcomes : Students will be able to** | |
|---|---|
| **CO1** | Construct Python programs using iterative and conditional statements |
| **CO2** | Experiment with user-defined functions and Strings. |
| **CO3** | Build python programs with list, tuples, dictionaries and set |
| **CO4** | Develop Python application using file operations and modules. |
| **CO5** | Apply data manipulation concepts using libraries |

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| Requirements for a Batch of 30 Students | | |
|---|---|---|
| **Sl. No.** | **Description of the Equipment** | **Quantity required (Nos.)** |
| 1. | HP Make, Core i5, 11th Generation, 16GB RAM PCs, Operating systems: Windows* 10 or later, macOS, and Linux. Python* version: 3.10.X | 30 |

| Text Books | |
|---|---|
| 1. | Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Updated for Python 3, Shroff/ O 'Reilly Publishers, 2016 |
| 2. | Reema Thereja, "Python Programming using Problem Solving Approach", 4th Impression, Oxford University Press, 2019. |
| 3. | Bernd Klein, Python Course Data Analysis with Python, 2021. |

| Reference Books | |
|---|---|
| 1. | John V Guttag, "Introduction to Computation and Programming Using Python", Revised and expanded Edition, MIT Press, 2013. |
| 2. | Robert Sedgewick, Kevin Wayne, Robert Dondero, "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India Education Services Pvt. Ltd, 2016 |
| 3. | Timothy A. Budd, "Exploring Python", Mc-Graw Hill Education (India) Private Ltd, 2015 |
| 4. | Kenneth A. Lambert, "Fundamentals of Python: First Programs", CENGAGE Learning, 2012 |

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| B.E | B23EEP401- AC MACHINES LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

| Course Objectives | |
|---|---|
| 1. | To determine the losses and efficiency of s three phase induction machines. |
| 2. | To determine the losses and efficiency of single phase induction machines. |
| 3. | To impart knowledge on voltage regulation of alternators using EMF and MMF methods. |
| 4 | To impart knowledge on voltage regulation of alternators using ZPF methods |
| 5 | To expose the students to the operation of Synchronous motors. |

| Expt.No. | Description of the Experiments |
|---|---|
| 1 | Load test on three phase induction motor |
| 2 | No-load test and blocked rotor test on three phase induction motor |
| 3 | Load test on single phase induction motor |
| 4 | No-load test and blocked rotor test on single phase induction motor |
| 5 | Regulation of three phase alternator by EMF method |
| 6 | Regulation of three phase alternator by MMF method |
| 7 | Regulation of three phase alternator by ZPF method |
| 8 | Slip test on synchronous machines |
| 9 | Parallel operation of three phase synchronous machines |
| 10 | V and Inverted V curves of Three Phase Synchronous Motor |
| | **Total Instructional hours: 45** |

| Course Outcomes:Students will be able to | |
|---|---|
| **CO1** | Evaluate the performance of Three phase Induction Machines. |
| **CO2** | Evaluate the performance of Single phase Induction Machines. |
| **CO3** | Analyze the performance of alternator using EMF, MMF and ZPF methods. |
| **CO4** | Evaluate the Parallel operation of three phase synchronous machines. |
| **CO5** | Analyze the Performance characteristics of synchronous machines using V and Inverted V curves. |

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS**

| Sl.No. | Description of Equipment | Quantity required |
|---|---|---|
| 1 | DC Shunt motor Coupled With Three Phase Slip Ring Induction Motor | 1 |
| 2 | Three Phase Induction Motor With Loading Arrangement | 2 |
| 3 | Single Phase Induction Motor With Loading Arrangement | 2 |
| 4 | Tachometer Digital/ Analog | 8 |
| 5 | Single Phase Auto Transformer | 2 |
| 6 | Three Phase Auto Transformer | 2 |
| 7 | Single Phase Resistive Loading Bank | 2 |
| 8 | Capacitor Bank | 1 |
| 9 | DC Shunt Motor Coupled With Three Phase Alternator | 4 |
| 10 | Three Phase Resistive Loading Bank | 2 |
| 11 | Synchronous Motor 3 HP | 1 |



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| B.E | B23EEP402 – ANALOG AND DIGITAL INTEGRATED CIRCUITS LABORATORY | L | T | P | C |
|---|---|---|---|---|---|
| | | 0 | 0 | 4 | 2 |

| Course Objectives | |
|---|---|
| 1. | To learn the applications of an analog IC's. |
| 2. | To learn design, testing and characterizing of circuit behavior with analog IC's. |
| 3. | To learn the Basic Digital IC's. |
| 4 | To learn design, testing and characterizing of circuit behavior with digital IC's. |
| 5 | To learn the digital simulation for development of application oriented digital logic circuits. |

| Expt.No. | Description of the Experiments |
|---|---|
| 1 | Study of Astable and Monostable multivibrators using NE555 Timer. |
| 2 | Application of Op-Amp: Voltage to Current Converter, Current to Voltage Converter and Zero crossing detector. |
| 3 | Variability Voltage Regulator using IC LM 317. |
| 4 | Study of Basic Digital IC's. (Verification of truth table for AND, OR, EXOR, NOT, NOR, NAND,JK FF and D FF). |
| 5 | Implementation of Boolean Functions, Adder and Subtractor circuits. |
| 6 | Design and implementation of Code converters. |
| 7 | Design and implementation of Parity generator and parity checker. |
| 8 | Design and implementation of Encoders and Decoders. |
| 9 | Design and implementation of multiplexer and de-multiplexer |
| 10 | Design and implementation of synchronous counters and Asynchronous Counters |
| 11 | Design and implementation of 4-bit shift registers in SISO, SIPO, PISO, PIPO modes using suitable IC's |
| 12 | Simulation and verification of Combinational and Sequential Circuits using software tool. |
| | **Total Instructional hours: 45** |

| Course Outcomes: Students will be able to | |
|---|---|
| CO1 | Design of various analog circuits using Operational Amplifier IC 741, NE 555 Timer and LM 317 IC's. |
| CO2 | Apply Boolean functions in Digital Logic circuits. |
| CO3 | Design and Implement combinational circuits. |
| CO4 | Design and Implement Sequential circuits. |
| CO5 | Analyze the combinational and sequential logic circuits using software tools. |

| LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS | | |
|---|---|---|
| **Sl.No.** | **Description of Equipment** | **Quantity required** |
| 1 | Dual (0-30V) variable Power Supply | 10 |
| 2 | CRO (30 MHz) | 8 |
| 3 | Digital Multimeter | 10 |
| 4 | Function Generator (1 MHz) | 8 |
| 5 | IC Tester (Digital) | 1 |
| 6 | Bread board | 10 |
| 7 | PC with circuit simulation Software (Lab VIEW / Multisim /HDL) | 2 |
| 8 | IC 741 | 10 |
| 9 | IC NE555 | 10 |
| 10 | IC LM 317 | 10 |
| 11 | Digital IC types(IC 7432, IC 7408, IC 7400, IC 7404, IC 7402, IC 7486, IC 7410, IC 7476, IC 7474) | Each 10 |
| 12 | LED | 10 |
| 13 | Digital IC Trainer Kit | 8 |
| 14 | Resistors 1/4 Watt Assorted | 20 |
| 15 | Capacitor | 10 |
| 16 | Step-down transformer 230V/12-0-12V | 10 |
| 17 | Single Strand Wire | 2 coil |

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