

Text and Reference Books

1. Bansal, R.K. & Harrison J.B., (1972) *Spoken English*, Orient Longman, India.
2. Chauhan, Narendra Kr. & Singh, Sudhir N., (2013) *Formal Letters*, Pankaj Publication International, New Delhi.
3. Chhabra T.N., (2019) *Business Communication*, Sun India Publication, New Delhi.
4. Dixon Robert J., (1986) *Complete Course in English*, Prentice Hall of India, New Delhi.
5. Jones, Daniel., (2012) *Cambridge English Pronouncing Dictionary*, 18th Edition, Paperback, CUP, India.
6. Lewis, Norman, (2015) *Word Power Made Easy*, Penguin India.

BSM-201/ BSM-153 Complex Analysis and Numerical Methods

- Course category** : Basic Sciences & Maths (BSM)
- Pre-requisite** : NIL
- Subject**
- Contact hours/week** : Lecture: 3, Tutorial: 1, Practical: 0
- Number of Credits** : 4
- Course Assessment methods** : Continuous assessment through tutorials, attendance, home assignments, quizzes, and two minor tests and One Major Theory Examination.
- Course Objectives** : The course is aimed to develop the basic mathematical skills of engineering students that are imperative for effective understanding of engineering subjects.
- Course Outcomes** : The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course
1. Prove basic results in complex analysis.
 2. Establish the capacity for mathematical reasoning through analysing, proving, and explaining concepts from complex analysis.
 3. Solve the problems using complex analysis techniques applied to different situations in engineering contexts.
 4. Demonstrate understanding of common numerical methods and how they are used to obtain approximate solutions.
 5. To study numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
 6. Demonstrate the concepts of numerical methods used for different applications.

Topics Covered

UNIT-I

9

Functions of Complex Variable I: Complex differentiability, Cauchy-Riemann equations, Analytic functions, Harmonic functions, Harmonic conjugates, Cauchy-Integral Theorem, Cauchy-Integral formula, Cauchy's integral formula for higher derivatives.

UNIT-II

9

Functions of Complex Variable II: Taylor's Series and Laurent Series, Zero's and Singularities of functions, Removable singularity, Poles and essential singularities, Residues,

Cauchy's residue theorem., Residue theorem, Evaluation of the real integrals of the type $\int_0^{2\pi} f(\cos \theta, \sin \theta) d\theta$ and $\int_{-\infty}^{+\infty} f(x) dx$.

9

UNIT-III

Numerical Methods I: Solution of algebraic and transcendental equations by Bisection, Regula-Falsi, secant Method and Newton-Raphson methods. Newton's Gregory forward and backward interpolation, Lagrange's and Newton's divided difference method.

9

UNIT-IV

Numerical Methods II: Solution of system of linear equations by Jacobi, Guass-Siedel method and Crout's method. Trapezoidal Rule, Simpson's one-third and three-eighth rules. Solution of differential equations by Taylor, Picard, Euler, Modified Euler's Method, Runge-Kutta Fourth Order Methods, Milne's and Adam's predictor and corrector methods.

Books & References

1. B.S. Grewal: Higher Engineering Mathematics; Khanna Publishers.
2. Jain, Iyenger and Jain: Advanced Engineering Mathematics, Tata McGraw Hill Education Pvt. Ltd., New Delhi
3. James W. Brown & R. V. Churchill: Complex variables and applications, Mcgraw-Hill Asia
4. R. K. Jain and Iyenger: Numerical Methods, Narosa Publications.
5. A. Greenbaum & T. P. Chartier, Numerical methods, Princeton University Press, 2012.

BEC-206

Digital Electronics & Circuits

Course category	: Engineering Fundamental (EF)
Pre-requisite Subject	: NA
Contact hours/week	: Lecture: 3, Tutorial: 0, Practical: 2
Number of Credits	: 4
Course Assessment methods	: Continuous assessment through tutorials, attendance, assignments, quizzes, practical work, record, viva voce, two minors, major theory & practical Examination
Course Outcomes	: The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course. 1. Acquired knowledge about basics of digital electronics and solving problems related to number systems and Boolean algebra. 2. Ability to identify, analyze and design combinational circuits. 3. Ability to identify, analyze and design sequential circuits. 4. To design, implement and evaluate various synchronous and asynchronous sequential circuits and applications. 5. Acquired knowledge about internal circuitry and logic behind digital systems. 6. Able to understand State machine design procedure with sequential PLDs.

Topics Covered

UNIT-I

Digital system and Binary numbers: Signed binary numbers, Floating point number, 9
Binary Codes, Cyclic codes, Error detecting and correcting codes, Hamming codes.
NAND and NOR implementation, Minimization of circuit using K-map and Tabular method up to five variables, POS and SOP simplification, Logic family- TTL, DTL, ECL, CMOS, HMOS

UNIT-II

Combinational Logic: Analysis and Design procedure for Combinational circuits, Binary 9 adder/subtractor, Binary multiplier, Booth Algorithm, Magnitude comparator, Encoder/Multiplexer, Decoder/Demultiplexer.

UNIT-III

Sequential logic: Sequential circuits, Latches, Flip-flops, Conversion of flip-flops, 9 Analysis of clocked sequential circuits, State reduction and assignments. Registers and counters: Shift registers, Asynchronous counter, Synchronous counter, Sequential circuit analysis and design procedure, Circuit with latches, Hazards.

UNIT-IV

9

Memory and programmable logic: Read only Memory, Read/Write Memory-SRAM and DRAM. Programmable Logic Devices,-PLAs, PALs and their applications; Sequential PLDs and their applications; State machine design with sequential PLDs: Introduction, to field programmable gate arrays (FPGAs).

LIST OF EXPERIMENTS

A. Compulsory Experiments

1. Design and verification of following arithmetic circuits using 74xx family ICs.
 - a. Half adder and Full adder
 - b. Half subtractor and full subtractor
2. To perform the code conversion- binary to gray and gray to binary and its truth table verification.
3. To design a combinational logic circuit using 74xx family ICs and its truth table verification in both SOP and POS forms.
4. Realization of 2:4 decoders and 4:2 encoder circuit and verification of its truth table.
5. To design and verify the truth table of multiplexer and demultiplexer circuits.
6. To design a 1-bit comparator using 74xx family ICs and to study the performance of 4-bit comparator IC7485.
7. Design and verification of basic Flip-Flops using 74xx family ICs and master-slave

JK flip-flop using IC7476.

B. Optional Experiments

8. To realize and verify the truth table of shift register-SIPO/SISO and PISO/PIPO.
9. Design and verification of asynchronous counter design and Mod-n counter.
10. To realize and verify the truth table of synchronous counter design.

Text/Reference Books

1. Hill & Peterson, "Switching Circuit & Logic Design", Wiley
2. Mano, M. Morris. Digital design. Pearson Educación, 2002.
3. Digital principle and applications Malvino and Leach-(TMH)

BHM-201

SCIENTIFIC AND TECHNICAL WRITING

Course category

: HSS

Pre-requisite Subject

: NIL

Contact hours/week

: Lecture: 2, Tutorial: 0, Practical: 0

Number of Credits

: 2

Course Assessment methods

: Continuous assessment through attendance, home assignments, quizzes, two Minor Tests and one Major Theory Examination.

Course Objectives

: To Prepare Professionals with a view to developing the power of know-how of the subject and enhance them face challenges in English language.

Course Outcomes

: The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course.

1. Overcome the problems he/she faces in oral and written communication.
2. Acquire knowledge of and methods for using technical communication, such as, reports, proposals and business letters etc.
3. Use and practice compositions correctly.
4. Enhancing word power by counselling scientific literature.
5. Focusing on effortless speaking and writing.
6. Give Presentations in different sessions and make self-appraisal

Topics Covered

UNIT-I

6

Language Vs communication: Communication as coding and decoding – signs, symbols & pictograph – verbal and non –verbal symbols – Language & communication; Types of Communication- functional, situational, verbal, and non-verbal, interpersonal, group, interactive, public, Mass Communication. Thinking and Articulation – cognitive, affect, critical, creative aspects of articulation.

Skills of Language Acquisition: Natural Language Acquisition Skills: Listening, Speaking, Reading & Writing {LSRW}; Language Acquisition Through Training: Listening, Speaking, Reading, Writing, Grammar & Vocabulary {LSRWGV}

Phrase, Clause & Sentence: Professional Drafting-Simplicity, Clarity and Conciseness of a Presentation, Differentiating between Professional & Creative Writing, Blending of Artistic/Professional Writing, Avoiding gender, racial and other forms of bias in Professional Writing. Pre Writing, Drafting and Re-writing.

Processing Professional Data: Data Collection, Literature Review, Data Analysis, Drafting Data & Deriving Inferences.

UNIT-II

6

Technical Paper Writing: Professional Paper Elements-Front Matter of a Paper, Main Text of a Paper, End Matter of a Paper: Organising References and Bibliography, Order of a thesis and Paper Elements, Concluding Remarks. **Methods of Research Paper Writing:** Identification of Author and His Writing-Author's name and Affiliation, Joint Authorship of a Paper, Identification of Writing-Title, Keywords, Synopsis, Preface and abstract. Drafting Research Article & Methodology.

Thesis/Dissertation Writing: Thesis Elements-Front Matter of a Thesis, Main Text of a Thesis, End Matter of a Thesis, Specimen—Thesis and Research Paper, Chapters and Sections-Introductory Chapters and Sections, Statement of the Problems, Plan and Scope, Core Chapters and Sections-Theoretical Analysis and Synthesis, Basic Assumption and Hypothesis.

Professional Presentation & Seminar Delivery Tools: Designing the Presentation; Establishing the Objectives. Making Professional Power Point Presentations, Signalling Structure of Presentation through Sentences and Crisp Phrases, Preparing Notes for Professional/Technical Presentation, Text Animation, White Board, Flip Charts, Diagrams, Preparing Cards. Seminar Presentations: Purpose modes and methods. Nascent Emerging Platforms for On-line Presentations viz. Zoom, Webex, Team & Meet etc.

UNIT-III

6

Introduction to Generation-Z, Cyber Identity & Professional Netiquettes for Netizens: Drafting E-mails, Blogs on social media, Videoconferencing. Managing Profiles on social media. What to Write and Share on social media.

Professional Drafting: Letters Vs E-mails, Formal and Informal mails, Parts of e-mails, Types of e-mails, Managing tone of E-mails & Business Letters, Examples of Letters & E-mail, Professional Correspondence through E-mail, Job Applications & Covering Letters. Introduction to DOs (Demi-Official Letters)

Conducting Professional Meeting: Pre-meeting Preparation, During Meeting: Action Taken Report (ATR) & New Agenda Points, Post Meeting Follow ups. Notice, Circular, Agenda & Minutes.

Career & Correspondence: Developing a Professional C.V, Bio Data & Resume Building. Report Writing, Kinds of Reports, Length of Report, Parts of a Report, Terms of Reference, Collection of Facts, Outlines of Report, Examples of Report, Technical Proposal, Elements of Proposal, Examples of Proposal, drafting of proposal.

Professional Interviews- Interview skills-body language, gesture, posture, tips, and tactics of interview. Professional interview of an expert. Questioning & Answering Skills.

Case study- objectives, methods, examples of various case-study.

Audience Analysis in Technical Writing: Industrial vs. non-industrial users; Exploring primary, secondary, tertiary users in contexts of production and use; Creating personas; Multicultural issues; Analysing real-world examples. Estimating, tracking, and managing tech writing projects. Determine the project scope, Estimates and schedules, Assemble the team, provide resources and leadership, Evaluate the project, Appendixes and Annexure, References, Peripherals—Official Formalities, Rights and Permission, Certificate and Copyright, Dedication, Acknowledgement, Correspondences. Managing Tone in Writing.

Project Writing: Elements of a Professional Project Making: Making a final Project on topics, given by the instructor, Result & Discussion.

Text and Reference Books

1. Acharya Anita. (2012) *Interview Skills- Tips & Techniques*. Yking Books, Jaipur.
2. Basu, B. N., (2008) *Technical Writing*. PHI Learning Pvt. Ltd., New Delhi.
3. Chauhan, N. K & Singh, S. N. (2013) *Formal Letters*, Pankaj Publication International, New Delhi.
4. Chhabra T.N. (2018) *Business Communication*. Sun India Publication New Delhi.
5. Dubey Arjun et.al. (2016) *Communication for Professionals*. Alfa Publications, Delhi.

BEE-201 ELECTRICAL MACHINES-I

Course category	: Program Core (PC)
Contact hours/week	: Lecture: 3, Tutorial: 1,Practical: 2
Number of Credits	: 5
Course Assessment Methods	: Continuous assessment through tutorials, attendance, home assignments, quizzes, practical work, record, viva voce and two minor tests and One Major Theory & Practical Examination.
Course Outcome	: The student are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course
1.	Acquire knowledge about the fundamental principles and classification of electromagnetic machines.
2.	Ability to understand electro-mechanical energy conversion process of rotating electrical machines in singly exited & doubly excited magnetic system.
3.	Ability to learn basic concept of design, working & performances of DC Machines as Generator.
4.	Ability to solve theoretical & numerical problems related with DC Machines as Generator.
5.	Ability to learn basic concept of design, working & performances of DC Machines as Motors and solve theoretical & numerical problems.
6.	Ability to know constructional details, working principle & Performances of single Phase & three phase transformer.

Topic Covered

UNIT -I 9**Principles of Electro-mechanical Energy Conversion –**

Introduction, Flow of Energy in Electromechanical Devices, Energy in magnetic systems, singly Excited Systems; Doubly excited Systems; derivation of mechanical force, mechanical energy and torque in magnetic field system, generated EMF in electrical machines

UNIT II 9**D.C. Machines-I**

Construction of DC Machines, parts of dc machine, armature winding, types of dc generators, Emf and torque equation, Armature Reaction, Commutation process, inter pole and Compensating Windings, Performance Characteristics of D.C. generators under no load and loaded conditions.

UNIT III 9**D.C. Machine-II**

DC motors, operating characteristics of D.C. motors, back EMF and torque equation, necessity of starters, types of starters, Speed control of D.C. motors, Field Control, armature control and voltage control, losses, Efficiency, and various Testing on D.C. motors.

UNIT IV 9**Transformer:**

Construction& working of single-phase transformer, types of transformers, equivalent circuit models, efficiency, voltage regulation, various testing methods, Single phase auto transformers, efficiency, merits & demerits, and applications of auto transformer. Construction & various connection diagrams of three phase transformers, phasor groups, parallel operation of three phase transformers, three winding transformers.

Textbooks:

1. I. J. Nagrath & D. P. Kothari," Electrical Machines", Tata McGraw Hill
2. Ashfaq Husain," Electrical Machines", Dhanpat Rai & Sons
3. U.A Bakshi and M.V Bakshi, "Electromechanical Energy Conversion-I", Technical Publication Pune,
4. B.R. Gupta & Vandana Singhal, "Fundamentals of Electrical Machines, New International.
5. Fitzgerald, A.E., Kingsley and S. D. Umans "Electric Machinery", MC Graw Hill.

Reference Books:

1. Irving L. Kosow, "Electric Machine and Tranformers", Prentice Hall of India.
2. M.G. Say, "The Performance and Design of AC machines", Pit man & Sons.
3. P. S. Bimbhra, "Electrical Machinery", Khanna Publisher

BEE-202 BASIC SYSTEM ANALYSIS

Course category	: Program Core (PC)
Contact hours/week	: Lecture: 3, Tutorial: 1,Practical :0
Number of Credits	: 4
Course Assessment	: Continuous assessment through tutorials, attendance, home assignments, quizzes, and two minor tests and One Major Theory Examination.
Methods	

Course Outcome : The student are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course

1. Analyze as well as synthesize Continuous and discrete signals, classification & identification of different signals/ models.
2. Acquire the knowledge of analogous electrical systems of different non- electrical systems.
3. Application of Fourier-series and Fourier Transform for the analysis of periodic & aperiodic signals.
4. Application of Laplace Transform for the analysis of continuous-time systems.
5. Modelling and system analysis through State variable.
6. Application of Z-Transform for the analysis of discrete-time systems.

Topic Covered

UNIT I

9

Introduction to continuous time signals and systems:

Basic continuous time signals, unit step, unit ramp, unit impulse and periodic signals with their mathematical representation and characteristics. Introduction to various types of systems.

Analogous System:

Linear mechanical elements, force-voltage and force-current analogy, modelling of mechanical and electro-mechanical systems: Analysis of first and second order linear systems by classical method.

UNIT II

9

Fourier Transform Analysis:

Exponential form and Trigonometric form of Fourier series, Fourier symmetry, Fourier Integral and Fourier Transform. Transform of common functions and periodic wave forms: Applications of Fourier Transform to network analysis.

Laplace Transform Analysis:

Review of Laplace Transform, Laplace Transform of periodic functions, Initial and Final Value Theorems, Inverse Laplace Transform, Convolution Theorem, Superposition Integral, Application of Laplace Transform to analysis of networks, waveform synthesis and Laplace Transform of complex waveforms

UNIT III

9

State Variable Analysis:

Introduction, State Space representation of linear systems, Transfer Function and state Variables, State Transition Matrix, Solution of state equations for homogeneous and non-homogeneous systems, Applications of State-Variable technique to the analysis of linear systems.

UNIT IV

9

Z-Transform Analysis:

Concept of Z-Transform, Z-Transform of common functions, Inverse Z-Transform, Initial and Final Value theorems, Applications to solution of difference equations, Pulse Transfer Function

Textbooks:

1. David K. Cheng; "Analysis of Linear System", Narosa Publishing Co.

2. ME Van-Valkenberg; "Network Analysis", Prentice Hall of India
3. C. L. Wadhwa, "Network Analysis and Synthesis", New Age International Publishers, 2007.
4. Samarajit Ghosh, "Network Theory: Analysis and Synthesis" Prentice Hall of India, 2008

Reference Books:

1. Choudhary D. Roy, "Network & Systems", Wiley Eastern Ltd.
2. Donald E. Scott, "Introduction to circuit Analysis" Mc. Graw Hill
3. B.P. Lathi, "Linear Systems & Signals" Oxford University Press, 2008.
4. I.J. Nagrath, S.N. Saran, R. Ranjan and S. Kumar, "Signals and Systems", "Tata Mc. Graw Hill, 2001.
5. Taan S. Elali & Mohd. A. Karim, "Continuous Signals and Systems with MATLAB" 2nd Edition, CRC Press.

BSM-241

Course category

Pre-requisite Subject

Contact hours/week

Number of Credits

Course Assessment methods

ENVIRONMENTAL CHEMISTRY

Program link basic science and engineering courses (PLBSE)

NIL

Lecture: 2, Tutorial: 0, Practical: 0

2

Continuous assessment through attendance, home assignments, quizzes, Two Minor Test and One Major Theory Examination.

The students are expected to be able to demonstrate the following knowledge, skills and attitudes after completing this course.

Course Outcomes

1. Students will acquire basic knowledge about Environment, which allows students to gain qualitative and quantitative skills.
2. Students will be aware of environmental pollution and control methods along with quality standards of air, water etc along with waste management.
3. Students will be able to give systematic account of natural resources their use and environmental problems due to overexploitation.
4. Students will acquire basic knowledge about the chemical reactions taking place in the environment.
5. To acquire awareness for ethical principle of environment.
6. To gain knowledge as a leader in multidisciplinary areas.

Topics Covered

UNIT-I

6

Basic concept of Environmental chemistry, Introduction to atmospheric chemistry, Layers of the atmosphere and their chemical composition, chemistry of gaseous and particulate pollutants, Ozone and its control, Green House Effect.

UNIT-II

6

The Chemistry of Natural Waters, Oxidation-Reduction Chemistry in Natural Waters, Ion Concentrations in Natural and potable Water, Water Pollution and Purification of Water, Water

Disinfection, Ground water: Its Supply, Chemical Contamination, and Remediation the Chemical Contamination and Treatment of Wastewater and Sewage.

UNIT-III 6

Toxic Heavy Metals, Mercury, Lead, Arsenic, and cadmium. Soil pollution, Domestic and Commercial Garbage: solid waste management. The Recycling of Household and Commercial Waste, Hazardous Wastes, and methods of disposal

UNIT-IV 6

Toxic Organic Compounds, Pesticides, Insecticides, Herbicides, Dioxins, Furans, and PCBs, Polynuclear Aromatic Hydrocarbons Chemistry of food additives, dyes, detergents, and bleaching agents

Books & References

1. Environmental Chemistry - Colin Baird and Michael Cann, W. H. Freeman
2. Environmental Chemistry - Stanley E. Manahan, CRC Press; 9th edition.
3. Sonja Krause, Herbert M. Clark, James P. Ferris, Robert L. Strong Chemistry of the Environment, Elsevier Science & Technology Books.
4. Eugene R. Weiner Applications of Environmental Chemistry, CRC Press, LLC.
5. By Clair N. Sawyer, Perry L. McCarty, Gene F. Parkin Chemistry for environmental engineering and science (5th edition), McGraw-Hill Professional.

BSM-251 **INTEGRAL TRANSFORMS AND STATISTICAL METHODS**

Course category	: Basic Sciences & Maths (BSM)
Pre-requisite Subject	: NIL
Contact hours/week	: Lecture: 3, Tutorial: 1, Practical: 0
Number of Credits	: 4
Course Assessment methods	: Continuous assessment through tutorials, attendance, home assignments, quizzes and Two Minor tests and One Major Theory Examination
Course Objectives	: The course is aimed to understand and implement various concepts of numerical analysis and statistics to solve real life problems.
Course Outcomes	: The students are expected to be able to demonstrate the following knowledge, skills, and attitudes after completing this course

1. Use of Laplace Transform to solve the differential equation.
2. Use of Fourier transforms, and Z transforms to solve the differential equation.
3. Provide knowledge of various significant and fundamental concepts of Statistical Methods.
4. Demonstrate understanding of the probability and statistical foundations of data analysis.
5. Demonstrate understanding of the importance of assumption checking for valid statistical analysis and be able to perform assumption checking.
6. To inculcate the habit of mathematical thinking and lifelong learning.

Topics Covered