Millia Institute of Technology
Rambagh, Purnea

Affiliated to Bihar Engineering University, Patna

NAAC Accredited & ISO 9001:2015

SYLLABUS

Department of
Electronics & Communication Engineering

2nd SEMESTER

B.Tech in Electronics & Communication Engineering

SEMESTER –II

Sl. No.	Course Code	Course Title	Hours Per Week			Total Credits
			Lecture	Tutorial	Practical	
41.	100215	Engineering Chemistry	3	0	0	3
42.	100202	Engineering Mathematics-II	3	1	0	4
43.	100216	Communicative English	3	0	0	3
44.	100220P	Sports/YogaNCC/NSS	0	0	2	1
45.	100209	Basic Electronics	3	0	0	3
46.	100217	Engineering Graphics & Design	1	0	0	1
47.	100215P	Engineering Chemistry Lab	0	0	2	1
48.	100216P	Communicative English Lab	0	0	2	1
49.	100209P	Basic Electronics Lab	0	0	2	1
50.	100217P	Engineering Graphics & Design Lab	0	0	4	2
TOTAL						20

Course Code-100215 Engineering Chemistry 3 0 0 3

UNIT 1.0- Atomic and Molecular Structure 8 hrs

Electromagnetic radiations, Dual nature of electron and Heisenberg uncertainty Principle. Photoelectric effect, Planck's theory. Principles for the combination of atomic orbitals to form a molecular diagram of molecular orbitals. Bent's rule, VSEPR theory (typical example) co-ordination numbers and geometries. Isomerism in transition metal compounds. Metal Carbonyls; Synthesis and Structure.

UNIT 2.0- Spectroscopy 6 hrs

Principle of rotational and vibrational spectroscopy, selection rule for application in diatomic molecules, elementary idea of electronic spectroscopy, UV-VIS spectroscopy with related to rules and its applications. Basic Principle of nuclear Magnetic resonance spectroscopy with applications.

UNIT 3.0 -Electrochemistry and Fuels 6 hrs

Nernst equation, EMF and electrochemical cell, the introduction of corrosion, corrosion mechanism, types of corrosion, water line corrosion, stress corrosion, pitting corrosion, Lead acid storage cell, leclanche cell. Calorific value of fuels, proximate and ultimate analysis of coals, fuel cells, Bio fuels.

UNIT 4.0- Water Chemistry 8 hrs

Hardness of water, estimation of water hardness by EDTA and Alkalinity method. Removal of the hardness of water- soda lime process, zeolite process, Ion exchange process, Boiler problem, sludge, and scale formation, priming and foaming, Boiler corrosion, and Caustic embrittlement.

UNIT 5.0 - Polymer and Plastics 8 hrs

Polymerization techniques (free radical, ionic, and co-ordination mechanism)Preparation properties, and technical application of phenol-formaldehyde resins, elastomers, synthetic rubbers (Buna-S, Buna-N, neoprene). Inorganic polymers, Silicones, adhesives, epoxy resins. the structural difference between thermoplastic and thermosetting Plastics, the Importance of commercially important thermoplastics and thermosets; Poly ethylene, Polyvinyl chloride, Polystyrene.

UNIT 6.0- Organic Reactions and Synthesis of A Drug Molecul 6 hrs

Introduction to intermediate and reaction involving Substitution, addition, elimination, oxidation-reduction. Diels Elder cyclization and epoxide ring opening reactions, synthesis of commonly used drug molecules like aspirin.

Test/ Reference:-

1. University Chemistry, B.H. Mahan,Pearson
2. Chemistry, principles and application, M.J. Sienko and R.A. Plane, McGraw Hill International
3. Fundamentals of molecular Spectroscopy, C.N. Banwell , McGraw Hill International
4. Engineering Chemistry (NPTEL Web- Book), B.L. Tembe, Kamaluddin and M.S. Krishnan, NPTEL
5. Physical Chemistry, P.W. Atkins, Oxford University Press
6. A text book of engineering chemistry, S. Chawala, Dhanpat Rai Publication
7. General Chemistry Part 1, R. Sarkar, New Central Book agency

Course Code-100215P Engineering Chemistry Lab 0 0 2 1

Perform any 10 Experiments

1. To estimate hardness of water by alkalinity method
2. To estimate hardness of water by EDTA method
3. To remove hardness of water by ion exchange method
4. Determination of pH of a given acid solution using a standard sodium hydroxide solution
5. Determination of surface tension and viscosity
6. Chemical analysis of salt (Acid radical and basic radical)
7. Adsorption of acetic acid by charcoal
8. Test of adulteration of fat butter, sugar, turmeric powder, chilli powder and pepper
9. Saponification/ acid value of an oil
10. Identification of organic substances and their functional groups
11. Potentiometric determination of redox potentials and emf
12. Synthesis of drug/ polymer like ASPRIN/ Urea- formaldehyde resin
13. Thin layer chromatography
14. Analysis of flue gas by orsatapparatus

Course Code-100216 Communicative English 3 0 0 3

Unit-1.0: Vocabulary Building **7 hrs**

Nature of Word Formation; Root Word and Morpheme; Prefix and Suffix; Foreign Expressions in English; Synonym and Antonym; Homophone and Homograph; Abbreviation and Acronym.

Unit-2.0: Basic Writing Skills **7 hrs**

Parts of Speech: Types of Words; Structures of Sentence; Kind of Sentence; Phrase and Clause; Punctuation Marks; Capitalization; Tenses: Present, Past and Future; Voices: Active and Passive; Formation of Questions using Primary Auxiliaries, Modals and Wh-Words.

Unit-3.0: Common Errors in English **7 hrs**

Articles; Prepositions; Modifiers; Subject-Verb Agreement; Noun-Pronoun agreement; Redundancies; Cliches; Spelling Error.

Unit-4.0: Principles of Appropriate Writi **7 hrs**

Defining: Describing, Classifying and Exemplifying; Introduction, Body, and Conclusion; References, Quotations and Illustrations; Organizing the Paragraphs in a Document; 7Cs of the Professional Writing: Clear, Concise, Concrete, Correct, Coherent, Complete and Courteous.

Unit-5.0: Practices of Formal Writing **7 hrs**

Formal Letter: Cover-Letter and Application; Resume Writing; Report Writing; Minutes of Meeting; Memorandum; Notice; Essay Writing: Personal and Impersonal; Email Writing Etiquettes; Article Writing; Writing for Current Social Media.

Unit-6.0: Comprehension of Written English **7 hrs**

Of Studies (Essay) by Sir Francis Bacon; *The Sun Rising* (Poem) by John Donne; *The Last Leaf* (Story) by O Henry; Unseen/Untaught Passage.

Test/ Reference:-

1. English language and communication skills for engineers, Sanjay Kumar,Pushp lata, Oxford university Press
2. Communicative English for Technical student, Dr. Bijay Bhadur Singh and Dr. Kalpana Sinha, Foundation publishing House (FPM)
3. Communication Skill (As per VRV syllabus 2018),Sanjay Kumar and Pushp lata, Oxford University Press
4. A course in Listening & Speaking, V. Sasi Kumar ,P. Kiranmai Dutt and Geetha Rajeevan, Foundation Books

Course Code-100216P Communicative English Lab 0 0 2 1

Perform any 10 Experiments

Language Lab of English includes Listening Comprehension, Reading Comprehension, Speaking Skills: Phonetics, International Phonetic Alphabet Symbols (IPAS), Sounds: Vowels and Consonants, Pronunciation, Intonation, Stress and Rhythm, Just A Minute Technique (JAM), Communication: Verbal and Non-Verbal; Ethical Usage of Artificial Intelligence, Self-Introduction: Social, Academic and Professional; Interview: Online and Offline; Oral Presentation, Debate, Group Discussion, Group-Activities, and Brainstorming Vocabulary Activities.

1. Listening Comprehension and Speed (Software)
2. Reading Comprehension and Speed (Software)
3. Pronunciation: Learning and Test (Software)
4. Self-Introduction: Social, Academic and Professional
5. English Typing: Microsoft Word Document (MS Word), and Microsoft Power Point Presentation (PPT)
6. Oral Presentation
7. Interview: Online and Offline
8. Just A Minute Technique (JAM) and Extempore
9. Debate
10. Group Discussion
11. Activities: Role Play, Peer Activities, and Group Activities
12. Anchoring and Addressing: an Assembly, a Meeting, a Seminar, a Party

Course Code-100220P Sports/Yoga/NCC/NSS 0 0 2 1

Course Objectives:

(a) Encouraging creativity and innovation: The course could aim to foster a culture of creativity and innovation among engineering students. It could provide opportunities for students to generate and develop new ideas, think critically, and come up with innovative solutions to real-worldproblems. This objective could be achieved through brainstorming sessions, design thinking exercises, and hands-on projects.

(b) Enhancing problem-solving skills: The course could focus on enhancing the problem-solving skills of engineering students. It could provide training on various problem-solving techniques, such as root cause analysis, critical thinking, and decision-making. Students may learn how to identify and analyse complex problems, develop feasible solutions, and implement them effectively.

(c) Developing project management skills: The course could aim to develop project management skills among engineering students. It could cover topics such as project planning, scheduling, budgeting, and risk management. Students may learn how to manage resources, communicate effectively, and work collaboratively in a project-based environment.

(d) Promoting interdisciplinary collaboration: The course could encourage interdisciplinary collaboration among engineering students. It could provide opportunities for students from different engineering disciplines to work together on innovative projects. This could foster cross-disciplinary learning, encourage diverse perspectives, and promote teamwork and collaboration skills.

(e) Facilitating practical application of engineering concepts: The course could focus on the practical application of engineering concepts and principles. It could provide students with opportunities to apply their theoretical knowledge to real-world projects, prototypes, or simulations. Students may learn how to translate engineering theories into practical solutions and develop hands-on experience in implementing innovative projects.

Pre-requisite: Nil

Course Outcome:

1. Developed innovative projects: Students may have successfully developed innovative projects that demonstrate their creativity, problem-solving skills, and technical competence. These projects could be prototypes, models, simulations, or practical solutions to real-world problems, showcasing their ability to apply engineering concepts in a creative and innovative manner.

2. Improved critical thinking and problem-solving skills: Students may have honed their critical thinking and problem-solving skills through various course activities, such as brainstorming, design thinking, and project development. They may have learned to analyse complex problems, identify viable solutions, and make informed decisions based on technical, economic, and social considerations.

3. Enhanced project management and teamwork skills: Students may have gained practical experience in managing projects, including planning, scheduling, budgeting, and risk management. They may have learned how to work effectively in a team, collaborate with diverse team members, and communicate project progress and results professionally.

4. Increased interdisciplinary knowledge and collaboration: Students may have gained exposure to interdisciplinary concepts and collaborated with peers from different engineering disciplines. They may have learned to appreciate diverse perspectives, leverage interdisciplinary knowledge, and work collaboratively to develop innovative solutions that integrate multiple domains of engineering.

5. Cultivated a mindset of innovation and entrepreneurship: Students may have developed a mindset of innovation and entrepreneurship, recognizing the importance of creativity,

Course Code-100217 Engineering Graphics and Design 1 0 0 1

Unit- 1.0: Introduction to Engineering Drawing **7hrs**

Principles of Engineering Graphics and Their Significance, Usage of Drawing Instruments, Lettering, Conic Sections including the Rectangular Hyperbola (General Method Only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales Plain, Diagonal and Vernier Scales

Unit- 2.0 Orthographic Projections **7hrs**

Principles of Orthographic Projections - Conventions -Projections of Points and Lines Inclined to Both Planes; Projections of Planes Inclined Planes Auxiliary Planes.

Unit- 3.0 Projections of Regular Solids **7hrs**

Types of Solids, Projects of Solids (Prism, pyramids, cone, and cylinder): Inclined to Both the Planes- Auxiliary Views; Draw Simple Annotation, Dimensioning and Scale.

Unit- 4.0 Sections and Sectional Views of Right Angular Solids **7hrs**

Section of Solids (Prism, Cylinder, Pyramid, Cone), Auxiliary Views; Development of Surfaces Of Right Regular Solids- Prism, Pyramid, Cylinder And Cone; Draw The Sectional Orthographic Views of Geometrical Solids, Objects From Industry And Dwellings (Foundation To Slab Only).

Unit- 5.0 Isometric Projections **7hrs**

Isometric Views, Compound Solids; Principles of Isometric Projection Isometric Scale, Conventions; Isometric Views of Lines, Planes, Simple and Conversion of Isometric Views toOrthographic Views And Vice-Versa, Conventions.

Unit- 6.0 Overview of Computer Graphics **7hrs**

Listing the Computer Technologies that Impact on Graphical Communication, Demonstrating Knowledge of the Theory of CAD Software [Such As: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify And Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog Boxes And Windows, Shortcut Menus (Button Bars), The Command Line (Where Applicable), The Status Bar, Different Methods of Zoom as Used in CAD, Select and Erase Objects.; Isometric Views of Lines, Planes, Simple And Compound Solids.

Test/ Reference:-

1. Engineering Drawing, N.D. Bhatt, Charotar Publishing House, 53rd Edition, ISBN: 978-9380358277
2. A Textbook of Engineering Drawing, R.K. Dhawan, S. Chand Publishing, Revised Edition, ISBN: 978-8121929571
3. Engineering Drawing and Graphics, K. Venugopal, V. Prabhu Raja, New Age International Publishers, 3rd Edition, ISBN: 978-8122430120
4. Engineering Graphics with AutoCAD, D.M. Kulkarni, A.P. Rastogi, A.K. Sarkar, PHI Learning Pvt. Ltd., 1st Edition, ISBN: 978-8120337834

Course Code-100217P Engineering Graphics and Design Lab 0 0 4 2

Perform any 10 Experiments

1. (Which includes dimensioning methods, different types of line, construction of different polygon, divide the line and angle in parts, use of stencil)
2. Construction of Plane, Diagonal & Vernier Scales.
3. Construction of Ellipses, Parabolas, and Hyperbolas using the general method.
4. Construction of cycloid, epicycloid, hypocycloid, and involute of a circle.
5. Projection of Points and Lines inclined to both planes.
6. Projections of Planes (e.g., rectangular, triangular) in inclined positions.
7. Projection of Solids (prisms,pyramids, cones, and cylinders)
8. Drawing of Sections of Prisms, Cylinders, Pyramids, and Cones.
9. Development of Surfaces for prisms, pyramids, cylinders, and cones.
10. Construction of Isometric views of lines, planes, and simple solids.
11. Introduction to CAD Software.
12. Use of CAD software to draw basic geometric shapes, apply dimensions, and modify objects.

Course Code-100202 Engineering Mathematics– II 3 1 0 4

Unit- 1.0 Complex Analysis – I **6 hrs**

Functions of complex variable, limit, Continuity, Differentiability, Analytic function, Cauchy-Riemann Equations in Cartesian and polar form, harmonic function and harmonic conjugate.

Unit- 2.0 Complex Analysis – II **8 hrs**

Line Integral, contour integrals, Cauchy theorem, Cauchy's Integral formula(without proof), Taylors series, zero of analytic functions, singularities, Laurent's series, residue, Cauchy residue theorem(without Proof) and its applications.

Unit- 3.0 Ordinary Differential Equations **8 hrs**

Linear differential equations of nth Order with constant coefficients, solution of Homogeneous and Non-Homogeneous Equations, Equations with variable coefficients, Cauchy- Euler Equations, Method of Variation of Parameters.

Unit- 4.0 Sequence and Series **6 hrs**

Introduction of Sequence and Series, Nature of series Tests of convergence of Series: Comparison test, D'Alembert ratio test, Cauchy's Root test, Raabe's test, Logarithmic test, Cauchy's condensation test.

Unit- 5.0 Laplace Transform **8 hrs**

Laplace Transform, Existence theorem, properties of Laplace Transform, Laplace Transform of Periodic functions, Inverse Laplace Transform, convolution theorem. Application of Laplace Transform to solve Ordinary differential equations.

Unit- 6.0 Fourier Series **6 hrs**

Fourier Series, Fourier Series for odd and even functions, Half range sine and cosine series, Parseval's theorem.

Test/ Reference:-

1. Advanced Engineering Mathematics, Kreyszig Erwin, John Wiley and Sons,10th Edition,2020 ISBN:978-0470-45836-5
2. Advanced Engineering Mathematics, Dass H.K., S Chand and Company pvt.Ltd.,22nd Edition,2018 ISBN:978-93-5283-718-2
3. Higher Engineering Mathematics, Grewal B.S., Khanna Publishers,44th Edition,2023 ISBN:9788174091154
4. Complex Variables (Theory and Applications), Kasana H.S., PHI,2nd Edition.2015 ISBN:978-81-203-2641-5
5. A Text Book of Engineering Mathematics, Bali N.P., Goyal Manish Laxmi Publications,9th Edition,2014
6. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill New Delhi, 11th Reprint, 2010, ISBN-10 007063419X ISBN-13978- 0070634190
7. Differential Equations, Ross S.L.,Wiley Publications,3rd edition,2016 ISBN:978-81-265—1537-0
8. Advanced Differential Equations, Raisinghania M.D., S.Chand and Company PVT.LTD.,18th Edition,2015 ISBN:978-81-219-0893-1
9. Schaum's Outlines Complex Variables, Spiegel Murray R, Lipschutz Seymour, Schiller J John and Spellman Dennis, MC Graw Hill Education Private Ltd.2nd Edition,2010 ISBN:978-0-07-008538-1

Course Code-100209 Basic Electronics 3 0 0 3

Unit- 1.0

Semiconductor diode **9 hrs**

Intrinsic and extrinsic types, energy band in intrinsic and extrinsic Semiconductor, equilibrium carrier concentration Direct and indirect band-gap semiconductor. Ideal diode Construction, p-n junction under open circuit, drift, and diffusion current, built in potential, forward bias, and reverse bias condition. Effect of temperature, static and dynamic resistance, breakdown mechanism in diode, Junction capacitance. Zener diode Working, VI characteristics Light emitting Diode, Photodiode, Solar cell.

Unit- 2.0

Diode Applications **7 hrs**

Half wave rectifiers, Full wave rectifiers & Rectifier with filters, Zener diode application as voltage regulator, Clipping and Clamping circuits, Voltage doubler (includes numerical on rectifier, filter, and Zener regulator)

Unit- 3.0

Bipolar Junction Transistor **8 hrs**

BJT introduction: Construction, Symbol, and types (PNP and NPN), working of BJT, BJT configuration and characteristics, Load line analysis, Operating point, Need for Biasing, different Biasing circuits, Bias stability. BJT as a switch &Amplifier, low frequency small signal model of BJT, CE amplifier with and without feedback

Unit- 4.0

Field Effect Transistor **6hrs**

General characteristics of FET; Comparison between FET & BJT; JFET: Construction, Principle of Operation, Shockley equation. Outputand transfer characteristics; Depletion & Enhancement Type MOSFET: Construction, Principle of operation. Output and transfer characteristics;

Unit- 5.0

Operational Amplifier **6 hrs**

Block diagram of an Operational amplifier, schematic symbol, characteristics of an ideal and practical operational amplifier, concept of virtual ground, Inverting and non-inverting amplifier, voltage follower, adder, subtractor, integrator and differentiator.

Unit- 6.0

Fundamental of Digital Electronics **6 hrs**

Introduction to number system: octal, Hexadecimal, Binary numbers, Binary addition using 1's and 2's complement method. logic gates, Universal gates, Boolean Algebra, De Morgan's theorems, Simplification, and realization of Boolean expression using basic gates and NAND gates.

Test/ Reference:-

1. Electronic Device & Circuit theory Boylestad and Nashelsky Pearson
2. Electronic Principles Albert Malvino & Davis J. Bates TMH
3. Digital logic and computer design M. Morris Mano PHI
4. Electronic Devices and Circuit David A Bell Oxford
5. Microelectronic Circuit: Theory and Application Sedra and Smith Oxford

Course Code-100209P Basic Electronics Lab 0 0 2 1

Perform any 10 Experiments

1. Study of Cathode Ray Oscilloscope (CRO) (a) Measurement of amplitude, time period and frequency of unknown continuous signals.
2. Identification of active and passive component.
3. Study the characteristics of P-N junction diode under (a) Forward bias, and (b) Reverse bias.
4. Study of clipping circuits and clamping circuits.
5. To recognize a half -wave rectifier and full-wave rectifier using sinusoidal voltage.
6. Study of Full wave rectifier using Capacitor filter.
7. To recognize voltage regulator using Zener diode.
8. Study of the input and output characterization of common base (CB) bipolar junction transistor.
9. Study the input and output characterization of common emitter (CE) bipolar junction transistor.
10. Study the output and transfer characteristics of JFET (Junction field effect transistor)
11. Study of operational amplifier as (i) Inverting (ii) Non-inverting amplifier.
12. Study of operational amplifier as (i) Integrator (ii) Differentiator.
13. Construction and verification of all other gate (AND, OR, NOT, XOR) using only a) NOR gate b) only NAND gate.