

Avinashilingam Institute for Home Science and Higher Education for Women

Coimbatore 641 043, Tamil Nadu, India

I BE All Branches

Scheme of Instruction & Examination

(For students admitted from 2017-2018 and onwards)

Part	Subject Code	Name of paper/component	Instruction Periods/ week		Scheme of Examination				
			Theory	Tutorial/ Practical	Duration of exam	CIA	CE	Total	Credits
First Semester									
I		Humanities and Social Sciences (HS)							
	17BEHS01	Technical English	2	0/2	3	50	50	100	3
II		Basic Sciences (BS)							
	17BESM01	Engineering Mathematics I	3	0/2	3	50	50	100	4
	17BESP01	Engineering Physics	3	-	3	50	50	100	3
	17BESC01	Engineering Chemistry I	3	-	3	50	50	100	3
	17BESP02	Physics and Chemistry Laboratory I	-	0/3	3	100	-	100	1
III		Engineering Sciences (ES)							
	17BEES01	Programming using C (CSE)	2	0/3	3	50	50	100	4
	17BEES02	Basic Electrical and Electronics Engineering (EEE)	4	-	3	50	50	100	3
	17BEES03	Engineering Practices Laboratory (CIVIL/MECH/EEE/PHY/ECE)	-	0/3	3	50	50	100	1
IV	15BXNS01	NSS							
Second Semester									
I		Humanities and Social Sciences (HS)							
	17BEHS02	Business Communication & Presentation Skills	1	0/3	3	50	50	100	2
	17BEHS03	Environmental Science	3	-	3	50	50	100	2
II		Basic Sciences (BS)							
	17BESM02	Engineering Mathematics II	3	0/2	3	50	50	100	4
	17BESP03	Materials Science	3	-	3	50	50	100	3
	17BESC02	Engineering Chemistry II	3	-	3	50	50	100	3
	17BESP04	Physics and Chemistry Laboratory II	-	0/3	3	50	50	100	1
III		Engineering Sciences (ES)							
	17BEES04	Engineering Graphics (Civil)	2	0/3	3	50	50	100	4
	17BEES05	Basic Engineering Mechanics (Civil)	3	1/0	3	50	50	100	3
IV	15BXNS02	NSS							

Technical English

Semester I
17BEHS01

Hours of instruction/week :2T + 2P
No.of.credits : 3

Objective

- To help learners achieve proficiency in the effective use of language in various authentic career-related situations.

Outcome

- The students will be able to identify the characteristics of formal and informal communication.
- The learners will be able to comprehend the etiquette followed in online communication.
- The students will be able to understand and analyse data given in tables, charts and diagrams.
- The learners will be able to communicate effectively.

Unit I Language Through Reading 12

Skimming, scanning, and predicting the content of a given passage, identifying the lexical and contextual meanings, note making (guided & unguided) cloze reading, drawing inferences, separating facts from opinions.

Unit II Focus on Language 12

Word formation with prefixes and suffixes, synonyms and antonyms, Impersonal passive voice, Tenses, use of prepositions, 'if clauses', use of words as nouns and verbs, concord, nominal compounds, Editing, British and American English.

Unit III Language through Practice 12

Resume writing, writing instructions and recommendations, preparing checklists, classifying data, analyzing / interpreting data, Paragraph writing, Formal letters, writing to officials (leave letter, seeking permission for practical training, asking for Certificates, testimonials), unseen comprehension, creative writing, Framing Agenda, Minutes of the meeting.

Unit IV Oral Practice (Lab Sessions) 12

Pronunciation Techniques

Speech sounds, Word and Sentence stress, Primary and Secondary Stress, Neutral Accent, Rising and Falling Tone, Voice Modulation, Commonly Mispronounced Words.

Public Speaking Skills

Compeering, Introducing guest to the audience, Welcome address, Proposing a vote of thanks.

Unit V (Lab Sessions) 12

Justifying and Summarizing Skills

Emphasizing a point, discussing the pros and cons, focusing on reasons, Summarizing briefly and concisely

Designing an Advertisement

Interpreting advertisements, Slogan/caption writing, creating one's own advertisement for a product.

Total Hours: 60

References

1. **Aysha Viswamohan (2008).** *English for Technical Communication.* Tata McGraw-Hill Publishing Co Ltd, New Delhi.
2. **Dr. S. Sumant, English for Engineers(2005).** Tata McGraw Hill Publishing Co Ltd, New Delhi.
3. **M. Ashref Rizvi (2005).** *Effective Technical Communication.* Tata McGraw Hill Publishing Co Ltd, New Delhi.
4. **Raymond V Lesikar & Marie E. Flatley(2005).** *Basic Business Communication.* Tenth Ed. Tata McGraw Hill Publishing Co. Ltd, New Delhi.

Engineering Mathematics-I
(Common to all branches)

Semester I
17BESM01

Hours of Instruction/ week: 3T+2 P
No.ofcredits :4

Objectives

The aim of this course is to

- ❖ Develop skills in processing matrices and solve problems in multiple integrals.
- ❖ Enrich knowledge in functions of several variables and in solving ordinary differential equations.
- ❖ Gain practice in implementing algorithms and to use software tools in working with arrays, ordinary differential equations and multiple integrals.

Outcome

At the end of the course the students are able to

- ❖ Improve their skills to solve problems of matrices.
- ❖ Gain knowledge of framing and processing the differential equations
- ❖ Understand the ideas of functions of several variables.
- ❖ Transform physical quantities into mathematical quantities and solve problems in multiple integrals.
- ❖ Able to apply software tools in solving problems in matrices, ordinary differential equations and multiple integrals.

Unit I Matrices **15**

Characteristic equation of matrix, Eigen values and Eigen vectors of a real matrix, Properties of Eigen values and Eigen vectors, Reduction of quadratic form to canonical form by orthogonal transformation.

Unit II Ordinary Differential Equations **15**

Linear equations of second order with constant coefficients, Homogeneous equations of Euler type, Method of variation of parameters, Simultaneous first order linear equations with constant coefficients.

Unit III Functions of Several Variables **15**

Functions of two variables, Partial derivatives, Total differential, Maxima & minima, Constrained maxima and minima, Jacobians.

Unit IV Multiple Integrals **15**

Double integration, Cartesian and polar coordinates, Change of order of integration, Area as a double integral, Triple integration in Cartesian coordinates, Volume as a triple integral.

UnitV Mathematical Solutions using Software Tools **15**

Arithmetic Operations Commands, Elementary Math Built-in functions, Arrays, Ordinary differential equations, Multiple Integrals (Unit V – Practicals is only for gaining knowledge in software applications and not included in theory exams)

Total hours - 75

References

1. *T.Veerarajan (2016), Engineering Mathematics (for semester I and II)*, updated second Edition, Tata McGraw Hill Publishing Co.Ltd, New Delhi.
2. *E.Kreyszig (2014), Advanced Engineering Mathematics*, Eighth Edition, John Wiley and Sons (Asia) Ltd, Singapore.
3. *B.S.Grewal (2014), Higher Engineering Mathematics*, Thirty Sixth Edition, Khanna Publishers, Delhi.
4. *P.Kandaswamy, K.Thilagavathy and K.Gunavathy (2014), Engineering Mathematics, Volume I*, Tenth Revised Edition, S. Chand & Co, New Delhi.
5. Open Source Software tools.

Engineering Physics
(Common to all branches)

Semester I
17BESP01

Hours of instruction/week :3
No. of credits: 3

Objective

- To impart fundamental knowledge in various topics of Physics and Engineering applications.

Outcomes

- The students will gain knowledge on Engineering Physics Principles with its applications.
- The students will acquire knowledge on theoretical ideas and modern technological aspects
- The students will gain knowledge on Technical and medical applications of Ultrasonics.

Unit I Ultrasonics

Introduction, Magnetostriction effect, Production of ultrasonic waves: Magnetostriction generator, Inverse piezoelectric effect, Piezoelectric generator, Detection of ultrasonic waves, Properties, Cavitations, soldering and cleaning, Non Destructive Testing, Pulse echo system, Through transmission and resonance system, Medical application: Ultrasonic Doppler Blood flow meter.

9

Unit II Laser technology

Principle of spontaneous and stimulated emission, Einstein's theory of stimulated emission, Population inversion, Pumping mechanism, Types of lasers, CO₂, Nd-YAG and Semiconductor laser, Applications: welding, heat treatment, cutting, holography, Medical applications (for eye and cancer treatment) .

9

Unit III Fiber optics

Principle, Preparation, Crucible-crucible technique, Classification based on materials, refractive index profile, Modes of propagation Light sources for fiber optics, Detectors, Applications: Fiber optical communication link, Temperature and displacement sensors, Endoscope.

9

Unit IV Quantum physics

Introduction to Quantum theory, Dual nature of matter and radiation, de Broglie wave length, Uncertainty principle, Schrödinger's equation, Particle in one dimensional box, Electron microscope, Scanning electron microscope (SEM), Scanning Transmission Electron Microscope (STEM).

9

Unit V Vacuum science

Importance of vacuum in industries, Schematic diagram of a vacuum system, Pumping speed and throughput, Types of pumps, Working principle and construction of Rotary pump, Diffusion pump, Measurement of vacuum using pirani and penning Gauges.

9

Total Hours: 45

References:

1. *G.SenthilKumar(2011). Engineering Physics*. Chennai Revised Edition. VRP Publisher.
2. *M.Arumugam(2007). Engineering Physics*. Anuradha Agencies, Kumbakonam.
3. *S.Jaya Kumar(2007). Engineering Physics*. R.K.Publishers, Coimbatore.
4. *P.K.Palanisamy(2006). Engineering Physics*. Scitech Publications, Chennai.
5. *Rajendran-Tata McGraw Hill-publications*

Engineering Chemistry I
(Common to all Branches)

Semester I
17BESC01

Hours of Instruction/week:3
No.of credits:3

Objective

- To provide students with a background in important concepts and principles of Chemistry.
- To use the knowledge of Chemistry in describing and solving real technological problems.

Outcome:

Outcomes:

- Will be familiar with the techniques used for water treatment.
- Will gain knowledge about the properties of polymers and the techniques of polymerization.
- Will have an understanding about the thermodynamic concepts and prediction of feasibility of chemical reactions.
- Will be able to apply the concept of adsorption for industrial applications.
- Will acquire a basic understanding about some spectroscopic techniques used for the analysis of materials.

Unit I Water Technology

9

Characteristics: Alkalinity, types of alkalinity and determination. Hardness: Types and estimation by EDTA method (problems). Boiler feed water, requirements, and disadvantages of using hard water in boilers. Internal conditioning: Phosphate, calgon and carbonate conditioning. External conditioning: Demineralization process. Domestic water treatment: Disinfection methods (Chlorination, ozonation, UV treatment). Desalination: Reverse osmosis.

Unit II Polymer Chemistry

9

Introduction: Functionality-degree of polymerization. Classification of polymers- Natural and synthetic, thermoplastic and thermosetting. Types and mechanism of polymerization: addition (free radical, cationic, anionic), condensation and copolymerization. Properties of polymers: T_g, tacticity, molecular weight-weight average, number average and polydispersity index. Techniques of polymerization: Bulk, emulsion, solution and suspension.

Unit III Chemical Thermodynamics

9

First Law of thermodynamics, Second law: Entropy-entropy change for an ideal gas, reversible and irreversible processes, entropy of phase transitions. Free energy and work function: Helmholtz and Gibbs free energy functions; Criteria of spontaneity; Gibbs-Helmholtz equation; Maxwell relations - Van't Hoff isotherm and isochore.

Unit IV Surface Chemistry and Catalysis

9

Adsorption: Types, adsorption of gases on solids. Adsorption isotherm: Freundlich, Langmuir isotherm. Adsorption of solutes from solutions. Applications: Role of adsorption in catalytic reactions, ion exchange adsorption, basic principles in adsorption chromatography. Catalysis: Classification, characteristics of catalysts, acid – base catalysis, auto catalysis, enzyme catalysis, Michaelis - Menten equation.

Unit V Photochemistry And Spectroscopy

9

Photochemistry: Laws of photochemistry-Grotthuss-Draper law, Stark-Einstein law and Lambert-Beer Law. Photo processes - fluorescence, phosphorescence, chemiluminescence and photo-sensitization. Spectroscopy: Electromagnetic spectrum-absorption of radiation-electronic, vibrational and rotational transitions. Width and intensities of spectral lines. Estimation of concentration of a coloured solution by colorimetry, UV-Visible and IR spectroscopy- principles, instrumentation (Block diagram only) and applications.

Total Hours : 45

REFERENCES:

1. **Jain P. C. & Monika Jain,** “*Engineering Chemistry*”, DhanpatRai Publishing Company (P) Ltd, New Delhi, 2015.
2. **Vairam S., Suba Ramesh,** “*Engineering Chemistry*”, Wiley India Pvt Ltd., New Delhi., 2013.
3. **Kuriakose J.C. and Rajaram.J.”***Chemistry in Engineering and Technology*”, Vol.1 &2, Tata McGraw Hill Publishing Company (P) Ltd., 2010.
4. **Dara S.S.,Umare S.S.,** ‘*Engineering Chemistry*’ S.Chand&CompanyPvt.Ltd,New Delhi.,2010
5. **Sivasankar B.,** “*Engineering Chemistry*”, Tata McGraw-Hill Publishing Company Ltd, New Delhi, 2008.
6. **Kannan P., Ravikrishnan A.,** “*Engineering Chemistry*”, Sri Krishna Hitech Publishing Company Pvt. Ltd. Chennai, 2014

Physics and Chemistry Laboratory I

(Common to all Branches)

Semester I
17BESP02

Hours of Instruction/week:3

No.of credits:1

Objective

- To impart experimental skills on potentially important experiments needed for Engineering.
- To impart hands on experience in the use of analytical equipments

Outcome

- To inculcate technical skill in handling of instruments and the calculation methods.

Part A -Physics

List of Experiments

1. LASER- Particle size determination-Grating
2. Ultrasonic interferometer-Determination of compressibility of a liquid
3. Fiber optics – Numerical aperture (It should be moved to I semester from II semester)
4. Melde's apparatus- Frequency of the vibrator
5. Spectrometer- wavelength determination –Grating (Simulation Experiment).
6. Torsional Pendulum-Rigidity modulus of wire and moment of inertia of disc.
7. Non Uniform bending – Determination of Young Modulus .

Part B –Chemistry

Outcomes

- Will acquire skills in measuring, recording and analysing the results.
- Will be able to assess the quality of water.

List of Experiments

1. Determination of total hardness of water by EDTA method.
2. Determination of DO content by Winkler's method.
3. Determination of alkalinity in a water sample.
4. Determination of chloride content of water sample by argentometric method.
5. Estimation of concentration of a coloured solution using colorimeter
6. Estimation of sodium and potassium present in water using flame photometer.

A minimum of FIVE experiments each in Physics and Chemistry shall be offered. Laboratory classes on alternate weeks for Physics and Chemistry.

Total Hours: 30

Programming using C

Semester I

Instruction hours/week: (2T+3P)

17BEES01

No. of credits: 4

Objectives

- To understand about structured programming.
- To learn the various features of C.
- To help students to understand the implementation of C language.

Unit I Introduction 15

Computer Software - Application and System Software - Need for logical thinking – Problem formulation and development of simple programs - Problem solving methods-Pseudo code - Flow Chart and Algorithms -Procedural Programming (modular and structural)- Program compilation-execution- debugging- testing.

Unit II C Programming Basics 15

Introduction to C programming – Fundamentals – Structure of a C program – Character set- Keywords- Data types and sizes - Constants- Variables – Expressions - Operators –Control statements - if - else statement- nested if statement- switch case – Looping Statements - while- do-while- for - nested control structures - break- continue-goto statement – Implementation of simple C programs on Control Structures.

Unit III Arrays and Strings 15

Arrays: Introduction - Initialization – Declaration – One Dimensional and Two Dimensional Arrays. Strings: String Operations – String Arrays - variable length arrays- Implementation of Concepts on Arrays and String handling.

Unit IV Functions and Pointers 15

Functions: Prototypes and Functions–Declaring- defining and accessing functions–Parameter passing methods –Recursion–Storage classes–auto- extern- static and register–Library functions. Pointers: Pointer concept–Declaration–Accessing variable through pointer–Initializing pointer variable– Pointers and Functions–Pointers and Arrays - Implementation of Concepts on Functions and Pointers.

Unit V Structures and Files 15

Structures: Structures – User defined data types – Nested structure - Passing structures to a function - Self-referential structures – Union. Files: Introduction to Files-File access-File operations - Implementation of Concepts on Structures and File Handling.

Outcomes

- Solve the given problem using the syntactical structures of C language.
- Develop- execute and provide solution for various problems using the features of C language.
- Develop programs using the concepts of C language.
- Understand input and output routines

Total hours: 75

References:

1. **PradipDey-ManasGhosh (2013). *Computer Fundamentals and Programming in C*.**Second Edition. Oxford University Press.
2. **Byron S Gottfried and Jitendar Kumar Chhabra (2011). *Programming with C*.** Third Edition. Tata McGraw Hill Publishing Company. New Delhi.
3. **Deitel and Deitel (2011). *C How to Program*.** Sixth Edition. Pearson Education. New Delhi.
4. **Yashavant P. Kanetkar (2011).*Let Us C*.** BPB Publications.
5. **E.Balagurusamy(2017). *Programming in ANSI C*.** McGraw Hill Education.
6. **www.spokentutorial.org**

Basic Electrical and Electronics Engineering

Semester I
17BEES02

Instruction hours/ week :4
No. of credits: 3

Objective:

- To understand the basics of electric circuits and network theorems.
- To understand the concepts of DC circuits, AC circuits and three phase circuits.
- To understand the basic working of various DC machines, transformers and induction motors.
- To introduce the basic functional elements of instrumentation.
- Be exposed to the operation and applications of electronic devices.

Outcome:

- CO1: To impart knowledge on electrical DC and AC concepts to DC analyze circuits.
CO2: To impart knowledge on working of various Measuring instruments.
CO3: To impart knowledge on Constructional details, principle of operation of Machines and Transformers
CO4: Ability to develop or solve engineering Electric circuits and problems
CO5: Design applications using the basic electronic devices

Unit I ELECTRICAL CIRCUITS 12

Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Analysis of DC circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits.

Unit II MEASUREMENTS 12

Principles, Construction and application of Moving Coil and Moving Iron Instruments (Ammeter and Voltmeter) – Dynamometer type Watt meter and Induction type Energy meter.

Unit III ELECTRICAL MACHINES 12

Construction, Principle of Operation– Basic Equations and Applications of DC Generators– DC Motors– Single Phase Transformer– Single phase induction Motor– Torque-speed characteristics– Industrial applications.

Unit IV DIODES 12

Characteristics of PN Junction Diode – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Design of Voltage Regulation using Zener diode.

Unit V TRANSISTORS 12

Bipolar Junction Transistor – Characteristics- CB, CE, CC Configurations– Transistor as an Amplifier.

Total Hours : 60

References:

1. Mittle N., "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 1990.
2. Sedha R.S., "Applied Electronics", S. Chand & Co., 2006.
3. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition, (2006).
4. Mehta V K, "Principles of Electronics", S.Chand& Company Ltd, (1994).
5. MahmoodNahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, (2002).
6. Premkumar N, "Basic Electrical Engineering", Anuradha Publishers, (2003).

Engineering Practices Laboratory

Semester I
17BEES03

Instruction hours/week: 3
No. of credits: 1

Course Objectives

- To cater to the needs of the practical application and to help in learning Engineering skills in Civil, Mechanical, Electrical and Electronics
- To provide adequate knowledge in the Plumbing & Pipe fitting, Wiring, Joints type, Simple turning & Drilling and soldering simple electronics components.

Part A

1. Study of Carpentry tools
2. Study of pipeline joints
3. Preparation of Half Lap joint
4. Preparation of T-Lap Joint
5. Household wiring – series and parallel connections with single switch.
6. Household wiring – series and parallel connections with two switches.
7. Stair case light wiring.
8. Safety Measures in the use of electricity.

Part B

1. Simple turning and facing operations
2. Preparation of Sand Mould
3. Preparation of square butt joint in Arc welding
4. Study of centrifugal pump
5. Soldering simple electronic circuits
6. Assembling electronic components on a small PCB and testing
7. V-I Characteristics of PN Junction Diode
8. V-I Characteristics of Zener Diode
9. Study of telephone, FM radio, Low, voltage power supplies

Total Hours: 45

Course outcome

- On completion of the course the student will be able to fabricate carpentry components and pipe connections including plumbing works.
- Do residential house wiring and Measure energy and resistance to earth of an electrical equipment

Examination Pattern

The Examination is to be conducted for both parts A & B, allotting 1 ½ for each part.

Business Communication & Presentation Skills

Semester II
17BEHS02

Hours of instruction/week: 1T + 3 P
No. of credits: 2

Objective

- To give students hands on training in the usage of English language to prepare them for corporate environment.

Outcome

- Students will be able to participate actively in individual and group exercises.
- Students will be able to analyse critically the mistakes they make while participating in activities.
- Learners will be able to make technical presentations collaboratively.
- Learners will be able to develop professional work habits with effective collaboration and cooperation with peer group.

Exercises

I	Group Discussion	8
	GD strategies, initiating a discussion, persuasion skills, body language, ways of interrupting (non-offending), summarizing and concluding.	
II	Interview Skills	8
	Introducing oneself, listing one's aspirations and goals, systematically expressing one's achievements (academic as well as professional), strengths and weaknesses, Introspection.	
III	Presentation Skills	10
	Business and technical presentation, technical articles (for journals and conferences), business etiquette, Impromptu, Memorised speech, Manuscript Speech and Extempore.	
IV	Active Listening Practices	8
	Speech decoding, comprehending, types of conversation, formal and informal, listening to academic, business and technical speeches.	
V	Online Grammar Exercises	8
	Editing the passage, cloze exercises, jumbled sentences, tag questions, usage of tenses, phrasal verbs, sentence patterns.	
VI	Vocabulary Enrichment	8
	Word formation, technical jargon, words often confused and misused, Collocation.	
VII	Book Review	10
	Reading inspiring articles, inferring meanings, reading between the lines and beyond the lines, understanding implicit and explicit ideas.	

Total Hours.:60

References

- Aysha Viswamohan (2008). English for Technical Communication.* Tata McGraw Hill Publishing Co. Ltd, New Delhi.
- M. Ashref Rizvi (2005). Effective Technical Communication.* Tata McGraw Hill Publishing Co. Ltd, New Delhi.
- Dr. K. Devadoss and P. Malathi (2008). Customize Yourself to Corporate Life.* Inder Publications, Coimbatore.

Environmental Science
(Common to all branches)

Semester II
17BEHS03

Hours of Instruction/week:3
No.of credits:2

Objective

- To study the interrelationship between living organism and environment and to help students understand the various environment problems that we face and evaluate possible solutions to them.

Outcomes:

- Will be familiar with the complex relationship between natural environment and human activities.
- Will gain knowledge on the impacts of human activities on environment.
- Will make a difference in how we treat the earth, which supports our lives and economics.

Unit I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

11

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.

Field study of common plants, insects, birds.

Field study of simple ecosystems – pond, river, hill slopes, etc.

Unit II ENVIRONMENTAL POLLUTION

9

Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – soil waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

Unit III NATURAL RESOURCES

10

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

Unit IV SOCIAL ISSUES AND THE ENVIRONMENT

9

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act– Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

Unit V HUMAN POPULATION AND THE ENVIRONMENT

6

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

TOTAL: 45 PERIODS

REFERENCES:

- 1. Raman Sivakumar, "Introduction to Environmental science and Engineering", McGraw Hill Education, 2009.**
- 2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education 2004.**
- 3. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi 2006.**
- 4. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.**
- 5. Dharmendra S. Sengar, 'Environmental law', Prentice Hall of India Pvt. Ltd., New Delhi, 2007.**
- 6. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press 2005.**

Engineering Mathematics II
(Common to all branches)

Semester II
17BESM02

Hours of Instruction/ week: 3T + 2P
No. of credits: 4

Objectives:

- To enhance knowledge in Laplace transform, Vector calculus and its applications.
- To understand the concepts of complex integration and contour integration.
- To gain knowledge in creating and working with arrays and to explore the built –in functions for Vector, Matrix operations and Integration.

Outcome:

At the end of the course, the students are able to

- Process Laplace Transform problems
- Solve differential equations applications using Laplace transform
- Evaluate real and complex integrals using the Cauchy integral formula and the residue theorem.
- Apply softwares with math tool box to solve problems involving vectors, matrices and complex integration problems.

Unit I Laplace Transform I **15**

Laplace Transform, Definition and Sufficient conditions, Transforms of functions, properties of Laplace Transforms

Unit II Laplace Transform II **15**

Inverse transforms, Derivatives and integrals of transforms, Transforms of derivatives and integrals, Convolution theorem, Transform of periodic functions, Application to solution of linear ordinary differential equations up to second order with constant coefficients.

Unit III Vector Calculus **15**

Gradient, divergence and curl, Green's, Gauss divergence and Stoke's theorems (without proof) , Verification of the above theorems and evaluation of integrals using them.

Unit IV Complex Integration **15**

Statement and application of Cauchy's theorem and Cauchy's integral formula, Laurent expansion, Singularities, Classification, Residues, Cauchy's residue theorem, Contour integration, Unit circle and semi-circular contours (excluding poles on real axis).

Unit V Mathematical Solutions using Software Tools **15**

Scripts and Functions, Software tools applied to operation with Vectors, Arrays and Complex Integrations. (Unit V – Practicals is only for gaining knowledge in software applications and not included in theory exams)

Total hours –75

References:

1. *T.Veerarajan, (2016), Engineering Mathematics (for semesters I &II),* Third Edition, Tata McGraw–Hill Pub. Co. Ltd, New Delhi.
2. *B.S.Grewal (2014), Higher Engineering Mathematics,* Thirty Sixth Edition, Khanna Publishers, Delhi.
3. *P.Kandaswamy, K.Thilagavathy&K.Gunavathy (2014), Engineering Mathematics,* Tenth Edition ,S.Chand& Company Ltd, New Delhi.
4. Open source software tools.

Materials Science
(Common to all branches)

Semester II
17BESP03

Hours of Instruction/week:3
No. of credits: 3

Objective

- To understand the properties and applications of different engineering materials.

Outcomes

- Students will be able to understand the concepts and applications of different engineering materials.
- Students will have the knowledge of various characterization techniques.
- Students will be familiar with Nano electronic devices.

Unit I Semiconducting Materials

9

Direct and indirect band gap semiconductors, Intrinsic semiconductors, properties, Materials preparation: Zone refining technique, carrier concentration in intrinsic and extrinsic semiconductors, Hall effect-theory and experiment, Applications of Hall effect, Semiconductor Devices: Solar cells and LED.

Unit II Magnetic Materials

9

Classification and properties : Domain Theory, Hysteresis , Hard and soft magnetic materials Magnetic principle in computer data storage, Magnetic recording materials, Magnetic bubble memory, Magneto optical recording, Magnetic hard disc (GMR sensor).

Unit III Dielectric and superconducting materials

9

Study of various polarization, Effect of temperature and frequency on dielectric constant, Breakdown mechanisms, Applications, Ferroelectric energy converter, Types of superconductors, Properties, BCS theory (qualitative), Application of superconductors, SQUID, Cryotron, Magnetic levitation.

Unit IV Nano Materials

9

Dimensionality and size dependence, Fabrication methods: Top down process (Lithographic process) and Bottom up process (Physical vapour deposition) Carbon nanotubes (CNT), Types and Properties, Fabrication of CNT (Laser ablation, Electric arc discharge), Applications, CNT field effect transistor, Fuel cells, Basic Principles of Quantum dot Laser, Organic light emitting diode (OLED).

Unit V Smart Materials and Characterisation techniques

9

Shape Memory alloys (SMA), Characteristics, Properties of NiTi alloys, X-ray diffraction (XRD), Energy-dispersive X-ray spectroscopy (EDX), X-ray photoelectron spectroscopy (XPS), Photoluminescence (PL), Fourier transform Infrared spectroscopy (FTIR), Ultraviolet and visible spectroscopy (UV-Vis), Atomic Force Microscope (AFM), Scanning Electron Microscope (SEM).

Total Hours: 45

References:

1. *Jaya Kumar – Materials Science-* R.K. Publishers (2009).
2. *Balasubramaniam R. —Callister's Materials Science and Engineering*||, Wiley-India 2014.
3. *Garcia N. and Damask A.,—Physics for Computer Science Students*||, Springer-Verlag, 2012.
4. *Hanson G.W., —Fundamentals of Nanoelectronics*||, Pearson Education 2009.
5. *Charles Kittel, —Introduction to Solid State Physics*||, Wiley Publications 2012.
6. *Wilson J. and Hawkes, J.F.B., —Optoelectronics: An introduction*||, Prentice Hall 1989.
7. *Donald Askeland, —Materials Science and Engineering*||, Cengage Learning India Pvt Ltd., 2010.
8. *Kasap S.O., —Principles of Electronic Materials and Devices*||, Tata McGraw-Hill 2007.
9. *Pierret R.F., —Semiconductor Device Fundamentals*||, Pearson 2006.

Engineering Chemistry II (Common to all Branches)

Semester II
17BESC02

Hours of Instruction/week:3
No. of credits: 3

Objective

- To develop a sound knowledge about the fundamental concepts of chemistry.
- To apply the knowledge gained in solving related engineering problems.

Outcome

- Will have a basic understanding about the electrochemical principles and their applications.
- Will be able to summarise the various types of corrosion and their preventive measures.
- Will gain knowledge about lubricants and adhesives.
- Will have a basic knowledge on conducting polymers and their applications.
- Will have basic knowledge about nanomaterials.

Unit I Electrochemistry

9

Electrochemical cells: Electrode potential, Nernst equation (problems). Reference electrodes: Standard Hydrogen electrode, Calomel electrode, Ion selective electrode, glass electrode and measurement of pH. EMF, measurement of emf, reversible and irreversible cells, electrochemical series and its significance. Potentiometric titrations (redox, Fe^{2+} vs dichromate and precipitation, Ag^+ vs Cl^-). Conductometric titration (acid- base, HCl vs NaOH).

Unit II Corrosion and its control

9

Basic concepts, chemical corrosion, Pilling-Bedworth rule. Electrochemical corrosion: principle, mechanism, different types (galvanic corrosion, differential aeration corrosion, stress corrosion). Factors influencing corrosion. Corrosion control: Selection of materials and proper designing, sacrificial anode and impressed current cathodic protection methods, corrosion inhibitors.

Unit III Lubricants and Adhesives

9

Lubricants and lubrication- functions- classification with examples- properties (viscosity index, flash and fire point, oiliness, carbon residue, aniline point, cloud and pour point), greases (calcium based, sodium based, lithium based only), solid lubricants (graphite and molybdenum sulphide). Adhesives – adhesive action – development of adhesive strength – physical and chemical factors influencing adhesive action – bonding process of adhesives – phenol formaldehyde resins, polyurethane, epoxy resins and urea formaldehyde.

Unit IV Conducting Polymers

9

Conducting polymers, types, mechanism of conduction. Applications: Organic light emitting diodes, sensors, circuit boards, rechargeable batteries, photoconductive polymers, thermo sensitive polymers,

Unit V Nano Materials

9

Size dependence of properties, electrical, optical, magnetic and mechanical properties. Synthesis of nanomaterials: Traditional chemical routes (formation of colloid nanoparticles, self assembly of colloid nanoparticles, electrodeposition), electrostatic self assembly, Langmuir-Blodgett (LB) technique. Properties and uses of nanoparticles, nanoclusters, nanorods, nanotubes and nanowires.

Total Hours: 45

References:

1. ***P.C Jain & Monika Jain, Engineering Chemistry***, DhanpatRai Publishing Co Ltd, New Delhi. 2015.
2. ***Vairam S., Suba Ramesh., "Engineering Chemistry"***, Wiley India Pvt Ltd., New Delhi, 2013.
3. ***Kuriakose J.C. and Rajaram.J."Chemistry in Engineering and Technology"***, Vol.1 &2, Tata McGraw Hill Publishing Company (P) Ltd., 2010.
4. ***Kannan P., Ravikrishnan A., "Engineering Chemistry"***, Sri Krishna Hitech Publishing Company Pvt. Ltd. Chennai, 2014
5. ***Alexei Nabok, "Organic and Inorganic nanostructures"***, Artech House, Inc., 2005.
6. ***S Dara S.S., Umare S.S., 'Engineering Chemistry'*** S.Chand&CompanyPvt.Ltd, New Delhi, 2010

Physics and Chemistry Laboratory II
(Common to all Branches)

Semester II
17BESP04

Hours of Instruction/week:3
No.of credits:1

Objective

- To impart experimental skills on potentially important experiments needed for engineering.

Outcome

- To inculcate technical skill in handling of instruments and the calculation methods.

Part A -Physics

List of Experiments

1. LCR Bridge –Dielectric constant of solids
2. Four Probe Apparatus-Bandgap of a semiconductor
3. Hysteresis loop- Hysteresis curve tracer
4. Solar cell-V-I characteristics
5. Hall effect-carrier concentration
6. LASER- wavelength determination-Grating.
7. Determination of dispersive power of the prism- spectrometer.

Part B-Chemistry

Outcomes

- Will develop skills in handling analytical instruments
- Will acquire practical knowledge in concepts of corrosion

pHmetry

To find out the strength of given hydrochloric acid by sodium hydroxide.

Conductometry

1. Estimation of strength of acids in a mixture of acids.
2. Estimation of Barium Chloride using Sodium Sulphate.

Potentiometry

Estimation of iron content of the given solution.

Viscometry

Determination of molecular weight of a polymer using Oswald viscometer

Corrosion Experiment

Weight Loss method.

Spectrophotometry

Estimation of iron content of water sample

Total Hours: 30

A minimum of FIVE experiments each in Physics and Chemistry shall be offered. Laboratory classes on alternate weeks for Physics and Chemistry.

Engineering Graphics
(Common to all branches)

Semester II
17BEES04

Instruction hours/week: 2T+3P
No. of credits: 4

Course Objectives:

- To develop the students in graphic skill for communication of concepts and ideas
Design of engineering products and expose them to existing national standards related to technical drawings.

Unit I Projection of Points, Lines and Surfaces 15

Introduction to letter practice, the principles, orthographic projection of points, Projection of straight lines located in the first quadrant only, determination of true length and true inclination, Projections of plane surfaces like polygonal lamina and circular lamina, located in first quadrant only.

Unit II Projection of Simple Solids 15

Projection of simple solids like prism, pyramid, and cylinder, Drawing views when the axis of the solid is inclined to one reference plane.

Unit III Sectioning of Solids 15

Sectioning of simple solids like prisms, pyramids, cylinder, cone and sphere. Obtaining sectional views and true shape when the axis of the solid is vertical and cutting plane inclined to one reference plane.

Unit IV Isometric, Perspective Projection and freehand sketching 15

Isometric projections, Isometric scale, Isometric views of simple solids, Free hand sketching techniques, sketching of orthographic views from given pictorial views of objects, including freehand dimensioning. Sketching pictorial views from given orthographic views. Perspective projections of solids.

Unit V Auto CAD 15

Introduction to drafting software, creation of simple geometric bodies using basic primitives (line, arc, circle) and editing the drawings. Practice in drawing orthographic projection

Total Hours:

75Course outcomes:

On completion of the course the student will be able to

- Perform free hand sketching of basic geometrical constructions and multiple views of objects.
- Do orthographic projection of lines and plane surfaces.
- Draw projection of solids.
- Prepare isometric and perspective sections of simple solids.
- Demonstrate basic skills in computer aided drafting.

References:

1. **Venugopal.K (2008). *Engineering Graphics*. New Age International (P) Limited.**
2. **Natarajan K.V (2008).*Engineering drawing and graphics*. 17thEdition.Private Publisher, Chennai.**
3. **Bhatt.N.D(2011)“*Engineering Drawing*” Charotar Publishing House.**
4. **Kumar M.S (2007). *Engineering Graphics*. Ninth edition. D.D. Publications, Chennai.**
5. **Warren J, Luzadder and John.M.Duff (2007). *Fundamentals of Engineering Drawing*. Eleventh edition. PrenticeHall of India Pvt., Ltd.,**
6. **Gopalakrishnan K.R (2007). *Engineering Drawing (Vol.I& II)*.Subhass Publications,**
7. **Bertoline and Wiebe (2007). *Fundamentals of graphics Communication*. Third edition. McGrawhill.**
8. **DhananjayA.Jolhe (2008). *Engineering Drawing with an introduction to AutoCAD*. Tata McGraw Hill Publishing Company Limited.**

Basic Engineering Mechanics

Semester II
17BEES05

Instruction hours/ week: 3T+1Tu
No. of credits: 3

Course Objective

- Ability to identify and formulate elementary level engineering problems related to mechanics
- Will be able to illustrate the laws of motion, kinematics of motion and their interrelationship
- Will be able to analyse the properties of surfaces & solids in relation to moment of inertia
- the ability to understand and effectively communicate the fundamentals of particles mechanics analysis and to articulate the basics

Unit I Basics and Statics of Particles

12

Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces — Vectorial representation of forces – Vector operations of forces - additions, subtraction, dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility .

Unit II Equilibrium of Rigid Bodies

12

Free body diagram – Types of supports –Action and reaction forces –stable equilibrium – Moments and Couples – Moment of force about a point and about an axis – Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem – Single equivalent force -Equilibrium of Rigid bodies in two dimensions – Equilibrium of Rigid bodies in three dimensions

Unit III Properties of Surfaces and Solids

12

Centroids and Centre of mass– Centroids of lines and areas - Rectangular, circular, triangular areas by integration – T section, I section, - Angle section, Area moments of inertia of plane areas – Rectangular, circular, triangular areas by integration – T section, I section, Angle section – Parallel axis theorem and perpendicular axis theorem.

Unit IV Dynamics of Particles

12

Displacements, Velocity and acceleration, their relationship – Relative motion – Curvilinear motion - Newton's laws of motion – Work Energy Equation

Unit V Friction and Elements of Rigid Body Dynamics

12

Friction force – Laws of sliding friction – equilibrium analysis of simple systems with sliding friction –wedge friction-. Rolling resistance -Translation and Rotation of Rigid Bodies – Velocity and acceleration

Total Hours: 60

Course Outcomes:

- Will be able to solve engineering problems dealing with force, displacement, velocity and acceleration
- Will be able to solve rigid body problems regarding dynamic of particles

References:

1. *Beer, F.P and Johnston Jr. E.R., “Vector Mechanics for Engineers (In SI Units): Statics and Dynamics”, 8th Edition, Tata McGraw-Hill Publishing company, New Delhi (2004).*
2. *Vela Murali, “Engineering Mechanics”, Oxford University Press (2010)*
3. *Hibbeler, R.C and Ashok Gupta, “Engineering Mechanics: Statics and Dynamics”, 11th Edition, Pearson Education 2010.*
4. *Irving H. Shames and Krishna Mohana Rao. G., “Engineering Mechanics – Statics and Dynamics”, 4th Edition, Pearson Education 2006.*
5. *Meriam J.L. and Kraige L.G., “Engineering Mechanics- Statics-Volume 1, Dynamics-Volume 2”, Third Edition, John Wiley & Sons,1993.*