



Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3 of UGC Act 1956)

Re-accredited with 'A' Grade by NAAC. Recognised by UGC Under Section 12 B

Coimbatore - 641 043, Tamil Nadu, India

SCHOOL OF ENGINEERING

I B.E. All Branches

Scheme of Instruction & Examination

(For students admitted from 2018-2019 & onwards)

Part	Course Code	Name of Course/component	Hours of Instruction/week		Scheme of Examination					
			Theory	Tutorial/Practical	Duration of exam	CIA	CE	Total	Credit	
First Semester										
II		Basic Sciences (BS)								
	18BESM01	Algebra and Calculus	3	1/0	3	50	50	100	4	
	18BESP01	Engineering Physics	3	1/0	3	50	50	100	4	
	18BESP02	Physics Practicals	-	0/3	3	50	50	100	1.5	
III		Core Courses Engineering Sciences (ES)								
	18BEES01	Basic Electrical Engineering (ECE)	3	1/0	3	50	50	100	4	
	18BEES02	Engineering Graphics	1	0/4	3	50	50	100	3	
	18BEES03	Basic Electrical Engineering Practicals (ECE)	-	0/2	3	50	50	100	1	
IV		Non-Credit Mandatory Courses (NCMC)								
	18BEMC01	Environmental Science	3	-	2	100	-	100		Remarks
	18BENSS1	NSS-I				100		100		Remarks
Second Semester										
I		Humanities and Social Sciences (HS)								
	18BEHS01	English	2	0/2	3	50	50	100	3	
II		Basic Sciences (BS)								
	18BESM02	Laplace Transforms and Complex Variables	3	1/0	3	50	50	100	4	
	18BESC01	Engineering Chemistry	3	1/0	3	50	50	100	4	
	18BESC02	Chemistry Practicals	-	0/3	3	50	50	100	1.5	
III		Core Courses Engineering Sciences (ES)								
	18BEES04	Programming for Problem Solving (CSE)	3	1/0	3	50	50	100	4	
	18BEES05	Workshop Practicals	1	0/4	3	50	50	100	3	
	18BEES06	Programming for Problem Solving Practicals (CSE)	-	0/2	3	50	50	100	1	
IV		Non-Credit Mandatory Courses (NCMC)								
	18BEMC02	Constitution of India	3	-	2	100	-	100		Remarks
	18BENSS2	NSS-II				100		100		Remarks

Algebra and Calculus
(Common to all branches)

Semester I
18BESM01

Hours of Instruction/ week: 3T+1Tu
No.of credits : 4

Objectives:

The aim of this course is to

- ❖ Enrich knowledge in solving problems in matrices, applications of differential calculus, multiple integrals and ordinary differential equations
- ❖ Gain practice in implementing algorithms and to use software tools in working with arrays, ordinary differential equations and multiple integrals

Unit I Matrices **12**

Characteristic equation of matrix, Eigen values and Eigenvectors of a real matrix, Properties of Eigen values and Eigenvectors, Cayley Hamilton theorem, Reduction of quadratic form to canonical form by orthogonal transformation

Unit II Geometrical Applications of Differential Calculus **12**

Curvature, Cartesian and polar co-ordinates, Centre and radius of curvature, Circle of curvature, Involutives and evolutes, Envelopes of family of curves, Maxima and minima, constrained maxima minima, Jacobians

Unit III Multiple Integrals **12**

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.

Unit IV Ordinary Differential Equations **12**

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 V Mathematical Solutions using Software Tools **12**

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

Total hours - 60

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.

Outcome:

Upon completion of course the students will be able to

CO1: improve their skills to solve problems of matrices

CO2: gain knowledge in the applications of differential calculus

CO3: determine area and volume using multiple integrals

CO4: solve higher order linear ordinary differential equations

CO5: able to apply software tools in solving problems in matrices, ordinary differential equations and multiple integrals

CO/PO Matrix

POs	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
CO1	H	H	M	-	-	-	-	-	-	-	-	M
CO2	H	H	M	-	-	-	-	-	-	-	-	M
CO3	H	H	M	-	-	-	-	-	-	-	-	M
CO4	H	H	M	-	-	-	-	-	-	-	-	M
CO5	M	L	M	-	M	-	-	-	-	-	-	M

Engineering Physics
(Common to all Branches)

Semester I
18BESP01

Hours of instruction/week: 3T+1Tu
No. of credits: 4

Objective

- To enhance the students with fundamental knowledge in Physics and its applications.
- To apply the concepts of Physics in various streams of Engineering and Technology.

Unit I Ultrasonics & Acoustics

12

Introduction, Magnetostriction effect, Production of ultrasonic waves: Magnetostriction generator, Inverse piezoelectric effect, Piezoelectric generator, Detection of ultrasonic waves, Properties, Cavitation soldering and cleaning, Ultrasonic Doppler Blood flow meter

Classification of sound, characteristics of musical sound, Weber- Fechner law, Absorption coefficient and its determination, Factors affecting acoustics of building and their remedies.

Unit II Lasers & Fiber optics

12

Principle of spontaneous and stimulated emission, Einstein theory of stimulated emission, Population inversion, Pumping mechanism, Types of Lasers, CO₂, Nd-YAG and Semiconductor laser, Applications: welding, heat treatment, cutting and holography.

Principle of fiber optics, Preparation, Crucible-crucible technique, Classification based on materials, refractive index profile, Applications: Fiber optic communication, Temperature sensor and Endoscope.

Unit III Crystal physics

12

Single crystalline, polycrystalline and amorphous materials – single crystals, unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – inter-planar distance - coordination number and packing factor for SC, BCC, FCC and HCP structures- crystal imperfections: point defects, line defect ,growth of single crystals: Czochralski growth technique.

Unit IV Quantum physics

12

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).

Unit V Vacuum & Nano science

12

Importance of vacuum in industries, Pumping speed and throughput, Types of pumps, Working principle and construction of Rotary pump, Diffusion pump, Measurement of vacuum using Pirani and Penning Gauges.

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 method, Applications, CNT field effect transistor, Fuel cells, Organic light emitting diode (OLED).

References

1. *G. Senthil Kumar(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. *Jaya Kumar (2009). Materials Science. R.K. Publishers*
5. *S.O. Pillai (2011).Solid State Physics New Age International (P) Limited, Publishers*

Outcomes

At the end of the course, the students will

CO1: gain knowledge on the concepts and applications of Ultrasonics and Acoustics.

CO2: acquire knowledge on the concepts and applications of Lasers and Fiber optics.

CO 3: understand the basics of crystals, their structures and crystal growth technique.

CO4: gain knowledge on the concepts of quantum theory and its applications.

CO5: understand the basics of vacuum, nano science and its devices.

CO/PO Matrix

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	-	-	-	M	L	-	-	-	-	L
CO2	H	M	-	-	-	M	-	-	-	-	-	L
CO3	H	M	M	-	-	M	-	-	-	-	-	L
CO4	H	M	M	-	-	M	-	-	-	-	-	L
CO5	H	M	-	-	-	M	-	-	-	-	-	L

Physics Practicals
(Common to all Branches)

Semester I
18BESP02

Hours of Instruction/week:3P
No. of credits: 1.5

Objective

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

List of Experiments (Any 10)

- LASER- Wavelength & Particle size determination
- Ultrasonic interferometer-Determination of compressibility of a liquid
- Melde’s apparatus- Frequency of the vibrator
- Spectrometer- wavelength determination –Grating (Simulation Experiment).
- Torsional Pendulum-Rigidity modulus of wire and moment of inertia of disc.
- Non Uniform bending – Determination of Young’s Modulus .
- LCR Bridge –Dielectric constant of solids
- Four Probe Apparatus-Bandgap of a semiconductor
- Hysteresis curve tracer - Coercivity and Retentivity
- Solar cell-V-I characteristics
- Spectrometer- Determination of dispersive power of the prism.
- Fiber optics – Numerical aperture

Outcomes

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

CO1:gain technical skills in handling instruments and the calculation methods.

CO2:apply the principle of elasticity and optics for various streams of Engineering.

CO3:gain practical knowledge on Semiconductor, Dielectric and Magnetic properties of materials

CO/PO Matrix

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	-	M	L	M	-	-	-	-	-	L
CO2	H	H	-	M	-	M	-	-	-	-	-	L
CO3	H	H	-	M	L	M	-	-	-	-	-	L

Basic Electrical Engineering

Semester I
18BEES01

Hours of Instruction /week: 3L+1Tu
No. of credits: 4

Objective:

- To gain knowledge on network theorems, transients, AC and DC machines

Unit I: Basics of Circuit Analysis **12**

Ohm's Law- Kirchoff's Laws-series and parallel DC circuits-AC Circuits- Mesh and Nodal analysis using Matrix method

Unit II: Network Theorems and Resonance **12**

Thevenin's and Norton's theorems-Superposition theorem- Reciprocity theorem-Maximum power transfer theorem- series and parallel resonance Quality factor and Bandwidth

Unit III: Transient Analysis and Three phase circuits **12**

Three phase balanced /unbalanced loads – current and voltage relationship in star/delta connection – phase diagrams of voltage and currents – power and power factor measurements in three phase circuits - Transient response of RL, RC and RLC circuits to DC excitation - Three phase power- measurement by two wattmeter method.

Unit IV: DC Machines and Transformers **12**

Essential features of construction-EMF and torque equation- Characteristics of different types of DC generators and motors- Starting-Speed control characteristics of DC motors, Applications-Construction and operating principle of transformer- applications.

Unit V: AC Machines **12**

Construction and operation of alternators - single phase induction motor - types- methods of starting- applications

Total Hours: 60

Course Outcomes:

At the end of the course, the student will be able to:

- CO1: Understand the basic concepts of AC and DC circuits, analyze circuits using Kirchoff's voltage & current laws.
- CO2: Verify network theorem and resonance.
- CO3: Understand the basics of RLC circuit elements and voltage and current sources.
- CO4: Analyze the behavior of magnetic circuits and demonstrate the working of basic electrical machines including DC and AC machines.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	-		L	-	-	-	-	-	-	-
CO2	H	M	-	-	L	-	-	-	-	-	-	-
CO3	H	M	-	-	L	-	-	-	-	-	-	-
CO4	H	M	-	-	-	-	-	-	-	-	-	-

Reference Books:

1. **Sudhakar, A., Shyam Mohan S. Palli, "Circuits and Networks"**, Tata Mc Graw Hill Publishing Company Limited, Second Edition, ISBN 0-07-048295-0, 2006.
2. **Arumugam, M., Premkumaran, N., "Electric circuit theory"**, Khanna Publisher, fourth Edition, 2006.
3. **Theraja, B.L. "Electrical Technology"**, Nirja Construction & Development Company Pvt. LTD, New Delhi, Vol. II, 22nd Edition, 2005.
4. **Soni gupta, "A Course in Electrical Circuit Analysis"**, Dhanpat Rai & sons, Fourth Edition.
5. **Joseph Edminister, Mahmood Nahvi, "Electric circuits"**, Schaums outlines, Tata Mc Graw Hill Publishing Company Limited, Third Edition, ISBN 0-07-463591-3. Year 2003.
6. **Nagrath, I.J., "Electric Machines"**, Tata McGraw hill Edition, 2002.

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.
8. Dhananjay A.Jolhe (2008). Engineering Drawing with an introduction to AutoCAD. Tata McGraw Hill Publishing Company Limited.

Course Outcomes:

CO1: To draw orthographic projection of one dimensional, two dimensional and 3 dimensional objects.

CO2: To prepare isometric and perspective sections of simple solids

CO3: To demonstrate basic skills in computer aided drafting.

CO PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	H								L	H			M	
CO2	H								M	H				
CO3	H				H					H			L	

Basic Electrical Engineering Practicals

Semester I
18BEES03

Hours of Instruction /week: 2P
No. of credits: 1

Objective:

- To understand the basic principles of circuits, network theorems and DC and AC machines

List of Experiments:

1. Verification of ohm's law and Kirchoff's laws
2. Verification of Mesh and Nodal Analysis.
3. Verification of Thevenin's theorem
4. Verification of Reciprocity Theorem
5. Load test on DC shunt motor
6. Swinburne's test
7. Load test on single phase induction motor
8. OC and SC test on single phase transformer
9. Speed control of DC shunt motor
10. Load test on DC shunt generator
11. Open circuit characteristics on DC shunt generator
12. Study of starters

Total Hours:30

Course Outcomes:

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

- CO1 : Analyze AC and DC circuits and verify networks theorem
CO2 : Understand the working principle of AC and DC machines.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	M	-	-	L	-	-	-	-	-	-	-
CO2	H	M	-	-	L	-	-	-	-	-	-	-

Environmental Science
(Common to all branches)

Semester I
18BEMC01

Hours of Instruction /week: 3T

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.

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 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 III 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– solid 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.

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 protection 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 HOURS: 45**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.

Outcomes:

Upon completion of the course, the students

- CO1: Will be familiar with various ecosystems and biodiversity and their importance in maintaining ecological balance.
- CO2: Will be able to understand the relevance and importance of natural resources in the sustenance of life on earth.
- CO3: Will be able to list different types of pollutions and their impacts on air, water and soil quality and suggest suitable measures to mitigate these impacts.
- CO4: Will gain knowledge on the various environmental problems related to social issues and possible solutions to such problems.
- CO5: Will be able to correlate human population growth to environmental degradation.

Semester II

English (Common for all branches)

Semester II
18BEHS01

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

Course Objective

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

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, content and structure words, 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 Public Speaking Skills (Lab Sessions) **12**

Interview Skills

Introducing oneself, listing one's aspirations and goals, systematically expressing one's achievements (academic as well as professional), strengths and weaknesses, Introspection.

Presentation Skills

Business and technical presentation, technical articles (for journals and conferences), business etiquette, Impromptu, Memorised speech, Manuscript Speech and Extempore. 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 objectively

Designing an Advertisement

Interpreting posters, 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, (2005).** *English for Engineers* 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.

Course Outcome

The students will be able to

CO 1: identify the techniques of reading and infer meanings

CO 2: comprehend the grammatical aspects of language usage

CO 3: understand and analyse data given in tables, charts and diagrams

CO 4: learn the basic techniques of presentation and public speaking skills

CO5: design and create posters, banners, advertisements

Program Outcome												
Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									M	H	M	
CO2	M									M	L	
CO3		M					M	H		L		
CO4										H	H	
CO5									M			

Laplace Transforms and Complex variables
(Common to all branches)

Semester II
18BESM02

Hours of Instruction/ week: 3T+ 1Tu
No. of credits: 4

Objectives:

- ❖ To enhance knowledge in Laplace transforms, Analytic Functions, complex integration and Vector calculus
- ❖ To gain knowledge in creating and working with arrays and to explore the built –in functions for Vector, Matrix operations and Integration.

Unit I Laplace Transform **12**

Laplace Transform, Definition and Sufficient conditions, Transforms of functions, properties of Laplace Transforms, 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 II Analytic Functions **12**

Function of a complex variable, Analytic function, Necessary conditions, Cauchy – Riemann equations in Cartesian coordinates, Sufficient conditions (Proof not included), Properties of analytic function, Determination of harmonic conjugate by Milne – Thomson method, Conformal mapping, $w = z + a$, az , $\frac{1}{z}$

Unit III Complex Integration **12**

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

Unit IV Vector Calculus **12**

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 V Mathematical Solutions using Software Tools **12**

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

Total hours –60

References:

- 1.*T.Veerarajan, (2016), Engineering Mathematics (for semesters I &II),*Third Edition, TataMcGraw–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.

Outcome:

Upon completion of course the students will be able to

CO1: apply Laplace transform techniques to solve ordinary differential equations.

CO2: find the analyticity of function of complex variables and interpret its transformations.

CO3: evaluate real and complex integrals using the Cauchy integral formula and the residue theorem

CO4: find the vector differentials and interpret the relation between line, surface and volume integrals of vector quantities

CO5: apply softwareswith math tool box to solve problems involving vectors, matrices and complex integration problems.

CO/PO Matrix

POs	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
CO1	H	H	M	-	-	-	-	-	-	-	-	M
CO2	H	H	M	-	-	-	-	-	-	-	-	M
CO3	H	H	M	-	-	-	-	-	-	-	-	M
CO4	H	H	M	-	-	-	-	-	-	-	-	M
CO5	M	L	M	-	M	-	-	-	-	-	-	M

Engineering Chemistry
(Common to all Branches)

Semester II
18BESC01

Hours of Instruction/week:3T+1Tu
No. of credits: 4

Objective

- To provide students with a background in important concepts and principles of Chemistry and use the knowledge gained to describe and solve real technological problems.

Unit I Water Technology

12

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 Electrochemistry and corrosion

12

Electrochemical cells: Electrode potential, Nernst equation (problems). Reference electrodes: Calomel electrode, glass electrode and measurement of pH, EMF, electrochemical series and its significance. Chemical and electrochemical corrosion: principle, mechanism, galvanic corrosion, differential aeration corrosion. Factors influencing corrosion. Corrosion control: Selection of materials and proper designing, sacrificial anode and impressed current cathodic protection methods, corrosion inhibitors.

Unit III Chemical Thermodynamics

12

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 Polymer Chemistry

12

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 V Photochemistry and Spectroscopy

12

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: 60

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&Company Pvt.Ltd,New Delhi.,2010
5. O G Palanna, "Engineering Chemistry", McGraw-Hill Education (India) Pvt. Ltd., Chennai 2017
6. Kannan P., Ravikrishnan A., "Engineering Chemistry", Sri Krishna Hitech Publishing Company Pvt. Ltd. Chennai, 2014

Outcomes:

Upon completion of the course, the students

CO1: Will be familiar with the techniques used for water treatment.

CO2: Will be able to apply electrochemical concepts to solve corrosion problems.

CO3: Will have an understanding about the thermodynamic concepts and prediction of feasibility of chemical reactions.

CO4: Will be familiar with the properties of polymers and the techniques of polymerization.

CO5: Will acquire a basic understanding about spectroscopic techniques used for the analysis of compounds.

CO/PO Matrix

POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	M	L	-	L	L	-	-	-	-	L
CO2	H	H	M	M	-	L	L	-	-	-	-	L
CO3	H	M	-	L	-	-	-	-	-	-	-	-
CO4	H	L	L	L	-	L	L	-	-	-	-	L
CO5	H	M	-	L	-	-	-	-	-	-	-	-

Chemistry Practicals
(Common to all Branches)

Semester II
18BESC02

Hours of Instruction/week:3P
No. of credits: 1.5

Objective

- To impart experimental skills and hands on experience in the use of analytical equipment needed for engineering applications.

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. **pHmetry**
To find out the strength of given hydrochloric acid by sodium hydroxide.
7. **Conductometry**
 - a. Estimation of strength of acids in a mixture of acids.
 - b. Estimation of Barium Chloride using Sodium Sulphate.
8. **Potentiometry**
Estimation of ferrous ion in the given solution.
9. **Viscometry**
Determination of molecular weight of a polymer
10. **Corrosion Experiment**
Weight Loss method.
11. **Spectrophotometry**
Estimation of iron content of water sample

(Any ten experiments)

Outcomes:

Upon completion of the course, the students

CO1 :Will acquire skills in measuring, recording and analysing the results.

CO2 :Will be able to assess the quality of water.

CO3 :Will develop skills in handling analytical instruments

CO4 :Will acquire practical knowledge in concepts of corrosion

CO/PO Matrix

Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	H	H	-	H		L	-	L	-	-	-	-
CO2	H	H	-	H		H	M	-	-	-	-	L
CO3	H	H	-	H		M	-	-	-	-	-	-
CO4	H	H	-	H		M	-	-	-	-	-	L

Programming for Problem Solving

(Applicable for B.E students admitted from 2018-19 & onwards)

Semester II
18BEES04

Hours of instruction/week : 3T+1Tu
No. of Credits: 4

Objective:

To understand the basic concepts and develop knowledge in programming concepts and problem solving using C Language.

Unit I Introduction

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. **12**

Unit II C Programming Basics

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. **12**

Unit III Arrays and Strings

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. **12**

UNIT IV Functions and Pointers

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. **12**

Unit V Structures and Files

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. **12**

Total hours: 60

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.* Tata McGraw Hill Education.

Course Outcomes:

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

- CO1:** Gain Knowledge on Problem Formulation and development of simple programs.
- CO2:** Understand the fundamentals of C programming and decision making statements to solve the problem.
- CO3:** Implement different Operations on arrays and strings handling.
- CO4:** Apply functions and Pointers to solve the given problem.
- CO5:** To have a comprehensive knowledge of Structures and File Handling

Program Outcome												
Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2		M										
CO3	M											
CO4			L									
CO5	M											

Workshop Practicals

Semester II

Hours of Instruction/week: 1T+4P

18BEES05

No. of credits: 3

Course Objective:

The course caters the needs of the practical application and to help in learning skills in Civil Engineering, Mechanical Engineering and Electrical Engineering.

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 drilling 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

Examination Pattern

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

Course Outcomes:

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

CO1: Understand carpentry components in various joints and pipe connections including plumbing works

CO2: Understand residential house wiring, arc welding, centrifugal pumps, Characteristics of PN Junction Diode, Zener Diode

CO – PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	H											L		
CO 2	H											L		

Programming for Problem Solving Practicals

Semester II
18BEES06

Hours of Instruction/ week :2P
No. of Credits: 1

Objective:

To develop programming skills using the fundamentals and basics of C language

List of Experiments

C Programs:

1. Programs using conditional operator and if statement
2. Programs using SwitchCase Statements
3. Programs using for, while and do while loops
4. Programs using Arrays
5. Programs using Functions and Recursive Functions
6. Programs using Structures
7. Programs using Pointers
8. Programs using File Operations

Total Hours: 30

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.

Course Outcomes:

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

CO1: Implement and develop a program with operations on arrays and Strings.

CO2: Apply functions and Pointers to solve the given problem.

CO3: Apply structures and union to implement file Operations in C programming for a given application.

Program Outcome												
Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M											
CO2		M										
CO3				M								

Constitution of India
(Common to all branches)

Hours of Instruction/week: 3T

Semester II

18BEMC02

OBJECTIVE

To know about making of Indian constitution, Rights&Duties,Organs of Governance, Local Administration, and Election Commission

Unit I: History of Making of the Indian Constitution

9

History, Drafting Committee, (Composition & Working), Philosophy of the Indian constitution-Preamble Salient Features

Unit II Contours of Constitutional Rights & Duties

9

Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

Unit III Organs of Governance

9

Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions

Unit IV Local Administration

9

District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation, Panchayat raj: Introduction, PRI: ZilaPachayat.Elected officials and their roles, CEO ZilaPanchayat: Position and role Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Unit V Election Commission

9

Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

Total Hours: 45

References:

1. *The Constitution of India, 1950 (Bare Act)*, Government Publication.
2. *Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution*, 1st Edition, 2015.
3. *M. P. Jain, Indian Constitution Law*, 7th Edn., Lexis Nexis, 2014.
4. *D.D. Basu, Introduction to the Constitution of India*, Lexis Nexis, 2015.

Outcomes

Students will be able to:

1. CO1:Understand the history of Indian Constitution
2. CO2: Discussthe basicConstitutional rights and duties
3. CO3: Define the Organs of Governance
4. CO4: Explain the role and responsibilities of Local Administration
5. CO5: Describe the Role and Functioning of Election Commission