Shaheed Bhagat Singh State Technical Campus, Ferozepur

B. Tech. First Year Scheme (for 2018 batch & onwards)

First Semester **Physics Group** **Contact Hours: 22**

S. No	Category	Course Code	Course Title	Hours per week			Marks Distribution		Total Marks	Credits
				L	T	P	Internal	External		
1	Basic Science Courses	BTPH101B	Physics	3	1	0	40	60	100	4
2	Basic Science Courses	BTPH102B	Physics (Lab)	0	0	3	30	20	50	1.5
3	Basic Science Courses	BTAM1X1B **	Mathematics-I	3	1	0	40	60	100	4
4	Engineering Science Courses	BTEE101B	Basic Electrical Engineering	3	1	0	40	60	100	4
5	Engineering Science Courses	BTEE102B	Basic Electrical Engineering (Lab)	0	0	2	30	20	50	1
6	Engineering Science Courses	BTME101B	Engineering Graphics & Design	1	0	4	40	60	100	3
7	Mentoring & professional development	BMPD101B		0	0	2	Satisfactory/ Not satisfactory			Non-credit
Total				**10**	**03**	**11**	**220**	**280**	**500**	**17.5**

**X: 1 for CSE, 2 for EE, ECE, CE & ME, 3 for CHEM

First Semester **Chemistry Group** **Contact Hours: 27**

S. No	Category	Course Code	Course Title	Hours per week			Marks Distribution		Total Marks	Credits
				L	T	P	Internal	External		
1	Basic Science Courses	BTCH101B	Chemistry - I	3	1	0	40	60	100	4
2	Basic Science Courses	BTCH102B	Chemistry – I (Lab)	0	0	3	30	20	50	1.5
3	Basic Science Courses	BTAM1X1B **	Mathematics - I	3	1	0	40	60	100	4
4	Engineering Science Courses	BTPS101B	Programming for Problem Solving	3	0	0	40	60	100	3
5	Engineering Science Courses	BTPS102B	Programming for Problem Solving (Lab)	0	0	4	30	20	50	2
6	Engineering Science Courses	BTM P101B	Workshop/ Manufacturing Practices	1	0	4	40	60	100	3
7	Humanities & Social Sciences including Management Courses	BTHU101B	English	2	0	0	40	60	100	2
8	Humanities & Social Sciences including Management Courses	BTHU102B	English (Lab)	0	0	2	30	20	50	1
7	Mentoring & professional development	BMPD101B		0	0	2	Satisfactory/ Not satisfactory			Non-credit
Total				**12**	**02**	**15**	**290**	**360**	**650**	**20.5**

**X: 1 for CSE, 2 for EE, ECE, CE & ME, 3 for CHEM

Shaheed Bhagat Singh State Technical Campus, Ferozepur

B. Tech. First Year Scheme (for 2018 batch & onwards)

Second Semester **Physics Group** **Contact Hours: 22**

S. No	Category	Course Code	Course Title	Hours per week			Marks Distribution		Total Marks	Credits
				L	T	P	Internal	External		
1	Basic Science Courses	BTPH101B	Physics	3	1	0	40	60	100	4
2	Basic Science Courses	BTPH102B	Physics (Lab)	0	0	3	30	20	50	1.5
3	Basic Science Courses	BTAM2X1B **	Mathematics-II	3	1	0	40	60	100	4
4	Engineering Science Courses	BTEE101B	Basic Electrical Engineering	3	1	0	40	60	100	4
5	Engineering Science Courses	BTEE102B	Basic Electrical Engineering (Lab)	0	0	2	30	20	50	1
6	Engineering Science Courses	BTME101B	Engineering Graphics & Design	1	0	4	40	60	100	3
7	Mentoring & professional development	BMPD201B		0	0	2	Satisfactory/ Not satisfactory			Non-credit
Total				**10**	**03**	**11**	**220**	**280**	**500**	**17.5**

**X: 1 for CSE, 2 for EE, ECE, CE & ME, 3 for CHEM

Second Semester **Chemistry Group** **Contact Hours: 27**

S. No	Category	Course Code	Course Title	Hours per week			Marks Distribution		Total Marks	Credits
				L	T	P	Internal	External		
1	Basic Science Courses	BTCH101B	Chemistry - I	3	1	0	40	60	100	4
2	Basic Science Courses	BTCH102B	Chemistry – I (Lab)	0	0	3	30	20	50	1.5
3	Basic Science Courses	BTAM2X1B **	Mathematics - II	3	1	0	40	60	100	4
4	Engineering Science Courses	BTPS101B	Programming for Problem Solving	3	0	0	40	60	100	3
5	Engineering Science Courses	BTPS102B	Programming for Problem Solving (Lab)	0	0	4	30	20	50	2
6	Engineering Science Courses	BTM P101B	Workshop/ Manufacturing Practices	1	0	4	40	60	100	3
7	Humanities & Social Sciences including Management Courses	BTHU101B	English	2	0	0	40	60	100	2
8	Humanities & Social Sciences including Management Courses	BTHU102B	English (Lab)	0	0	2	30	20	50	1
7	Mentoring & professional development	BMPD201B		0	0	2	Satisfactory/ Not satisfactory			Non-credit
Total				**12**	**02**	**15**	**290**	**360**	**650**	**20.5**

**X: 1 for CSE, 2 for EE, ECE, CE & ME, 3 for CHEM

CHEMISTRY-1(BTCH101B)

Subject Code: BTCH101B **L T P C** **Duration: 42 Hrs.**
3 1 0 4

UNIT-I

1. Atomic and Molecular Structure (12 Hrs.)

Bohr Model and its limitations, Line spectrum of H-atom and its explanation, Dual nature of electron, De-Broglie equation, Aufbau principle, Pauli's Exclusion Principle ,Hund's Rule of max.multiplicity, Molecular orbitals and energy level diagrams of homonuclear and heteronuclear diatomic molecules . Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

UNIT-II

2. Spectroscopic Techniques and Applications (8 Hrs.)

Elementary idea of Principles, Instrumentation and applications of spectroscopy : Electronic spectroscopy and Fluorescence, Vibrational and rotational spectroscopy of diatomic Molecules , Nuclear magnetic resonance and magnetic resonance imaging.

3. Intermolecular Forces and Potential Energy Surfaces (4 Hrs.)

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H_3, H_2 F and HCN .

UNIT-III

3. Use of Free Energy in Chemical Equilibria (6 Hrs.)

Introduction to Thermodynamic functions: energy, entropy and free energy. Simple Numerical problems based on of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Electrochemical Corrosion and its mechanism. Use of free energy considerations in metallurgy through Ellingham diagrams.

4. Periodic Properties (4 Hrs.)

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases.

UNIT-IV

5. Stereochemistry (4 Hrs.)

Representations of 3-dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis of butane. Isomerism in transitional metal compounds.

6. Organic Reactions and Synthesis of a Drug Molecule (4 Hrs.)

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of commonly used drug molecule – Paracetamol, Chloroquine , Aspirin and Metronidazole.

Recommended Text Books

1. B.H. Mahan, 'University Chemistry'.
2. M.J. Sienko and R.A. Plane 'Chemistry: Principles and Applications'.
3. C.N. Banwell, 'Fundamentals of Molecular Spectroscopy'.
4. B.L. Tembe, Kamaluddin and M.S. Krishnan, 'Engineering Chemistry (NPTEL Web-book).

5. P.W. Atkins, 'Physical Chemistry'.
6. K.P.C. Volhardt and N.E. Schore 'Organic Chemistry: Structure and Function', 5th Edn., http://bcs.whfreeman.com/vollhardtschore5e/default.asp

Course Outcomes

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications. Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

1. Analyze microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
2. Rationalize bulk properties and processes using thermodynamic considerations.
3. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
4. Rationalize periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
5. List major chemical reactions that are used in the synthesis of molecules.

CHEMISTRY-I LAB.

Subject Code: BCHM0-101 L T P C

0 0 31.5

Objectives

1. **To learn the preparation and standardization of solutions**
2. **To learn the estimation of various physical properties of given liquid samples**
3. **To estimate various crucial parameters for water sample**
4. **To learn the preparation of various molecules and detection of functional groups.**

Choice of 10-12 experiments from the following:

1. Preparation of a standard solution
2. Determination of surface tension and viscosity
3. Thin layer chromatography
4. Determination of total Alkalinity/ Acidity of a water sample.
5. Determination of residual chlorinein water sample
6. Estimation of total, temporary and permanent hardness of water
7. Determination of the rate constant of a reaction
8. Determination of strength of an acid conductometrically
9. Potentiometry - determination of redox potentials and emfs
10. Synthesis of a polymer
11. Saponification /acid value of an oil
12. Detection and confirmation of organic functional groups.
13. Models of spatial orientation
14. To test the validity of Lambert Beer law/ Determination of λ_{max} / Determination of unknown concentration of a solution.
15. Determination of the partition coefficient of a substance between two immiscible liquids

16. Adsorption of acetic acid by charcoal
17. Synthesis of a drug – Acetaminophen, Aspirin

Laboratory Outcomes

The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering. The students will learn to:

1. Estimate rate constants of reactions from concentration of reactants/products as a function of time
2. Measure molecular/system properties such as surface tension, viscosity, conductance of solutions, redox potentials, chloride content of water, etc.
3. Synthesize a small drug molecule and analyze a salt sample

English (BTHU-101B)
Semester: I/II

L	T	P
2	0	1

Internal Marks: 40
External Marks: 60
Total Marks: 100

COURSE OUTCOMES

After studying this course, the students shall be able to:

- Understand the significance of effective communication in English at work place.
- Enhance vocabulary and acquire effective reading skills for academic and professional efficiency.
- Utilise suitable writing styles while expressing their thoughts and ideas in an organized way in written form..
- Produce effectively different forms of professional writing.
- Enhance grammatical competence in English language

Detailed contents

Importance of Communication in English

Communication: Its meaning, Process, Types, Channels and Barriers to effective communication.
Language as a tool of communication, significance of communicating in English

Reading Skills &Vocabulary Building

Reading Process; Reading Strategies, Reading Comprehension.
Synonyms, Antonyms, and Standard abbreviations.

Basic Writing Skills & Writing Styles

Sentence Structure; Use of phrases and clauses in sentences; creating coherence; organizing principles of paragraphs in documents, Paragraph writing.
Describing, Defining, Providing examples or evidence, Writing introduction and conclusion: Essay writing, Précis writing

Writing Practices

Business Writing-Business letters: Complaint letter, Collection Letter, Sales Letter, Inquiry Letter, Order Placement Letter; Job Applications and Resume/CV Writing, Business Emails, Memorandum and Report Writing.

Identifying Common Errors in Writing

Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles and Prepositions

Suggested Readings:

(i) Fundamentals of Technical Communication ,Meenakshi Raman & Sangeeta Sharma,Oxford university Press.

(ii) Effective business Communication,Asha Kaul, Prentice Hall of India.

(iii) Communication Skills For Engineers, Sunita Mishra & C. Mualikrishna, Pearson Education.

(iv) Effective Technical Communication, M. Ashraf Rizvi, McGraw Hill

(v) Remedial English Grammar. F.T. Wood. Macmillan.2007

(vi) On Writing Well. William Zinsser. Harper Resource Book. 2001

(vii) Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006

(viii) Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.

English Laboratory (BTHU-102B)
Semester: I/II

L	T	P
0	0	2

Internal Marks: 30
External Marks: 20
Total Marks: 50

COURSE OUTCOMES

After studying this course, the students shall be able to:

- Receive and understand spoken material accurately besides developing ability to converse fluently.
- Demonstrate fluency in speech in acceptable accent.
- Acquire proficiency in skills involved in effective workplace communication.
- Develop a knack for structured public talk.
- Imbibe the skills required to perform satisfactorily in job interviews.

Detailed Contents:

Interactive practice sessions in Language Lab on Oral Communication

- Listening Comprehension: Listening to a recorded talk and participation in conversation.
- English Sound System, Pronunciation and Stress Placement.
- Communication at Workplace: Self-introduction, Discussion Skills, Meeting Skills and Telephonic Skills.
- Oral Presentations: Power Point Presentation.
- Interviews: Pre-interview Preparation, Question-answer Strategies, Projecting a positive image.

Suggested Readings/Books

- Practical English Usage. Michael Swan. OUP. 1995.
- Handbook of Practical Communication. Chrissie Wright. Jaico Publishers.
- Effective Technical Communication, M.Ashraf Rizvi Tata McGraw Hills.
- Spoken English , R.K. Bansal & J.B. Harrison Orient Longman.
- A Practical Course in English Pronunciation, J.Sethi, Kamlesh Sadanand & D. V. Jindal , Prentice Hall of India Pvt. Ltd. New Delhi.
- A Text book Of English Phonetics for Indian Students T. Balasubramaniam, Macmillan
- English Pronouncing Dictionary ,Daniel Jones, Current Edition with CD
- Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

Common to B.Tech. ECE, EE, ME & CIVIL

Mathematics –I **BTAM121B** **3L:1T:0P 4credits**

Objectives:

The objective of this course is to familiarize the prospective engineers with techniques in Calculus, multivariate analysis and linear algebra to tackle any mathematical challenge that occurs during their engineering problems.

Calculus: (6 lectures)

Evaluation of definite and improper integrals, Beta and Gamma functions and their properties, Applications of definite integrals to evaluate surface areas and volumes of revolutions.

Calculus: (6 lectures)

Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders, indeterminate forms and L'Hospital's rule, Maxima and minima.

Sequences and series: (10 lectures)

Convergence of sequence and series, tests for convergence, Power series, Taylor's series, series for exponential, trigonometric and logarithm functions.

Multivariable Calculus (Differentiation): (8 lectures)

Limits, continuity and partial derivatives, directional derivatives, total derivative, Tangent plane and normal line, Maxima, minima and saddle points, Method of Lagrange multipliers.

Matrices (10 lectures)

Inverse and rank of a matrix, System of linear equations, Symmetric, skew-symmetric and orthogonal matrices, Determinants, Eigenvalues and Eigenvectors, Diagonalization of matrices, Cayley-Hamilton Theorem and Orthogonal transformation.

Suggested Text/Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
5. D. Poole, Linear Algebra: A Modern Introduction, second Edition, Brooks/Cole, 2005.
6. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
7. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Course Outcomes:

On successful completion of the course, students would learn:

- To apply differential concept in practical problems of engineering.
- To apply Rolle's theorem for analysis and application to Engineering problems.
- To apply tool of sequence and series for learning convergence of infinite series.
- To learn the uses of multivariable functions that are essential in most branches of engineering.
- The essential tool of matrices and linear algebra in a comprehensive manner.

B.Tech. (Chemical Engineering)

Mathematics –I **BTAM131B** **3L:1T:0P 4credits**

Objectives

Basic concepts of linear algebra and vector calculus.

1.Linear Algebra: Matrices, Vectors, Determinants, Linear Systems:

Systems of Equations, Gauss Elimination, Linear Independence. Rank of a Matrix. Vector Space, Solutions of Linear Systems: Existence, Uniqueness, Determinants, Cramer's Rule, Inverse of a Matrix. Gauss-Jordan Elimination method.

2.Linear Algebra: Matrix Eigenvalue Problems:

Eigenvalues, Eigenvectors, Applications of Eigenvalue Problems, Symmetric, Skew-Symmetric, and Orthogonal Matrices.

3.Vector Differential Calculus.

Grad, Div, Curl: Vectors in 2-Space and 3-Space, Inner Product (Dot Product), Vector Product (Cross Product)

Vector and Scalar Functions and Fields, Derivatives, Curves. Arc Length. Curvature, Gradient of a Scalar Field,Directional Derivative, Divergence of a Vector Field, Curl of a Vector Field.

4.Integral Calculus. Integral Theorems:

Line Integrals, Path Independence of Line Integrals, Green's Theorem in the Plane, Surfaces for Surface Integrals, Surface Integrals.

Course outcomes

Students will be able to solve System of linear algebraic equations, Vector algebra, vector differential calculus and vector integral calculus.

Textbooks/References:

1. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
3. D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
4. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.
5. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

B.Tech. (Computer Science & Engineering)

Mathematics-I **BTAM111B** **3L:1T:0P** **4 credits**

Improper Integrals and applications: Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions. (6hrs)

Applications of derivatives: Rolle's theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Indeterminate forms and L'Hospital's rule; Maxima and minima.

(6hrs)

Matrices: Inverse and rank of a matrix, System of linear equations, Symmetric, skew-symmetric and orthogonal matrices, Determinants, Eigenvalues and Eigenvectors, Diagonalization of matrices, Cayley-Hamilton Theorem and Orthogonal transformation.

(8hrs)

Vector spaces: Vector Space, linear dependence and independence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, rank and nullity, Inverse of a linear transformation, rank nullity theorem, composition of linear maps, Matrix associated with a linear map. (10hrs)

Vector spaces: Eigenvalues, eigenvectors, symmetric, skew-symmetric, Hermitian matrices and orthogonal Matrices, Diagonalization; Inner product spaces.

(10hrs)

Suggested Text/Reference Books :

(i) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
(ii) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
(iii) D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
(iv) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
(v) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
(vi) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
(vii) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
(viii) V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra, Affiliated East–West press, Reprint 2005.

Course Outcomes:

1. The objective of this course is to familiarize the prospective engineers with techniques in basic calculus and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines. The students will learn:
2. To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from various applications, they will have a basic understanding of Beta and Gamma functions.
3. The essential tools of matrices and linear algebra including linear transformations, eigenvalues, diagonalization and orthogonalization.

Common to B.Tech. ECE, ELEC, ME AND CIVIL

Mathematics –II **BTAM221B** **3L:1T: 0P 4credits**

Objective:

The objective of this course is to familiarize the prospective engineers with techniques in multivariate integration, ordinary differential equations and complex variables. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential to tackle their mathematical challenges in their engineering problems.

Multivariable Calculus (Integration): (10 lectures)

Multiple Integration: Double integrals (Cartesian), change the order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities), Triple integrals (Cartesian), Simple applications involving cubes, sphere and rectangular parallelepipeds.

Vector Calculus: (10 lectures)

Line Integral,Vector Integral, gradient, divergence, curl, Theorems of Green, Gauss and Stokes, orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds

Ordinary differential equations of first order: (8 lectures)

Exact, linear and Bernoulli's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Ordinary differential equations of higher orders: (8 lectures)

Second order linear differential equations with constant and variable coefficients, method of variation of parameters, Cauchy-Euler equation,

Power series solutions: (8 lectures)

Legendre polynomials, Bessel functions of the first kind and their properties.

Suggested Text/Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4. S. L. Ross, Differential Equations, third Ed., Wiley India, 1984.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., McGraw Hill, 2004.
7. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
8. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
9. B. V. Ramana, Higher Engineering mathematics,Tata Mcgraw Hills, New Delhi.

Course Outcomes:

On successful completion of the course, students would learn:

- The mathematical tools needed in evaluating multiple integrals and their usage.
- The effective mathematical tools for the solutions of differential equations that model physical processes.
- The tools of differentiation and integration of functions of a complex variable that are used in various techniques dealing engineering problems.

B.Tech. (Chemical Engineering)

Mathematics –II **BTAM231B** **3L:1T:0P 4credits**

Objectives:

Basic concepts of transforms, ordinary and partial differential equations.

Contents :

1.Transforms:

Laplace Transforms, Fourier Series and Transforms.

2. First-Order ODEs:

Basic Concepts, Solutions of Separable ODEs, Exact ODEs, Linear ODEs, solving ODEs by Laplace Transforms.

3. Second-Order Linear ODEs:

Homogeneous Linear ODEs of Second Order, Euler-Cauchy Equations, Wronskian, Non-homogeneous ODEs, Solution by Variation of Parameters.

4. Series Solutions of ODEs, Special Functions:

Power Series Method, Legendre.'s Equation, Legendre Polynomials, Bessel's Equation, Bessel Functions, Sturm-Liouville Problems, Orthogonal Functions.

5.Partial Differential Equations:

Basic Concepts, Classification, solution of PDEs: Separation of Variables by D'Alembert (wave Equation) and Laplace Transforms..

Textbooks/References:

1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
3. R. Haberman, Elementary Applied Partial Differential equations with Fourier Series and Boundary Value Problem, 4th Ed., Prentice Hall, 1998.
4. Ian Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1964.
5. E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.

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B.Tech. (Computer Science & Engineering)

Mathematics –II **BTAM211B** **3L:1T:0P 4credits**

Module 1: Basic Probability: Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution, infinite sequences of Bernoulli trials, sums of independent random variables; Expectation of Discrete Random Variables, Moments, Variance of a sum, Correlation coefficient **12hrs**

Module 2: Continuous Probability Distributions: Continuous random varibales and their properties, distribution functions and densities, normal, exponential and gamma densities. 4hrs

Module 3: Bivariate Distributions: Bivariate distributions and their properties, distribution of sums and quotients, conditional densities, Bayes' rule. 4hrs

Module 4: Basic Statistics: Measures of Central tendency: Moments, skewness and Kurtosis - Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions, Correlation and regression – Rank correlation. 8hrs

Module 5: Applied Statistics: Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations. 8hrs

Module 6: Small samples: Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes. 4hrs

Suggested Text/Reference Books

(i) Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
(ii) P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
(iii)S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
(iv) W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968.
(v) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
(vi) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2000.
(vii) Veerarajan T., Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

Course Outcomes

The objective of this course is to familiarize the students with statistical techniques. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.

The students will learn: The ideas of probability and random variables and various discrete and continuous probability distributions and their properties. The basic ideas of statistics including measures of central tendency, correlation and regression. The statistical methods of studying data samples.

Shaheed Bhagat Singh State Technical Campus, Ferozepur

B. Tech. 1st Year Batch 2018 onwards

Guidelines regarding Mentoring and Professional Development:

The objective of mentoring will be the development of

- Overall Personality
- Aptitude (Technical and General)
- General Awareness (Current Affairs and GK)
- Communication Skills
- Presentation Skills

The course shall be split in two sections i.e. outdoor activities and class activities.
For achieving the above, suggestive list of activities to be conducted are:

Part – A (Class Activities)

1. Expert and video lectures
2. Aptitude Test
3. Group Discussion
4. Quiz (General/Technical)
5. Presentations by the students
6. Team building Exercises

Part – B (Outdoor Activities)

1. Sports/NSS/NCC
2. Society Activities of various students chapter i.e. ISTE, SCIE, SAE, CSI, Cultural Club, etc.

Evaluation shall be based on rubrics for Parts A & B.

Mentors/ Faculty incharges shall maintain proper record student wise of each activity conducted and the same shall be submitted to the department.

SHAHEED BHAGAT SINGH STATE TECHNICAL CAMPUS, FEROZEPUR

Syllabus of Physics for B. Tech. Programme (Common to all branches)

Course Code	BTPH101B & BTPH102B			
Category	Basic Science Course			
Course title	**Physics (Theory & Lab.)**			
Scheme and Credits	**L**	**T**	**P**	**Credits**
	3	**1**	**3**	**5.5 (4:T+L & 1.5: P)**

I. Physics Theory: L: 3; T: 1 (Credits 4)

Objectives and expected outcome

The objective of the course is to develop a scientific temper and analytical capability in the engineering graduates through the learning of physical concepts and their applications in engineering and technology. Comprehension of some basic physical concepts will enable graduates to think logically the engineering problems that would come across due to rapidly developing new technologies. The student will be able to understand the various concepts effectively; logically explain the physical concepts; apply the concept in solving the engineering problem; realize, understand and explain scientifically the new developments and breakthroughs in engineering and technology; relate the developments on Industrial front to the respective physical activity, happening or phenomenon.

The syllabus and course layout for Physics Theory and Laboratory (BSC 101) of first year of all B. Tech. programmes conform to outcome based teaching learning process. Following Course Outcomes (a-d) have been identified for this course and syllabus has been structured in such a way that each of the units meets one or more of these outcomes. Student outcomes describe what students are expected to know and be able to achieve at the end of the course. These relate to the skills, knowledge, and proficiency that students acquire as they undergo the course. The mapping of instructional objectives to the student outcomes has also been done.

Course outcomes

(1) Augmenting the students into theoretical concepts required for various engineering courses.

(2) Basic understanding of different types of materials and their applications.

(3) Understanding of electromagnetic waves and its propagation in free space.

(4) Knowledge of various physical processes and their applications.

(5) An ability to identify, formulate and solve engineering problems.

Instructional objectives

1. To understand the general scientific concepts required for technology.

2. To apply the Physics concepts in solving engineering problems.

3. To educate scientifically the new developments in engineering and technology.

4. To emphasize the significance of newer technologies through principles of Physics.

Mapping

S. No.	B. Tech. (Common Courses): Physics (BTPH101B)					
1	Course Outcomes	(1)	(2)	(3)	(4)	(5)
2	Mapping of course contents with course outcomes	Units 1 & 4	Unit 5 & 6	Units 2	Units 3	Units 1, 2,3, 4, 5 & 6

PART - A

1. **Waves & Oscillations (06 Lectures):** Harmonic oscillator: free, damped and forced oscillators; Impedance matching and resonance; Concept of stress and strain at a point.
2. **Electromagnetic Theory (05 Lectures):** Maxwell's equations, Statements of Gauss's and Stoke's theorems; Electromagnetic wave equation in vacuum, their transverse nature and polarization; Introduction to Poynting vector.
3. **Laser & Fibre optics (10 Lectures):** Spontaneous and stimulated emissions; Einstein's theory, and A and B coefficients; Population Inversion; Components of a laser system; Ruby, He-Ne, CO_2 and semiconductor lasers; applications of lasers in science, engineering and medicine. Introduction to fibre optics; Acceptance angle and numerical aperture; Step index and graded index optical fibres; Definition and significance of normalized frequency; Modes of propagation; Single mode and multimode optical fibres; Loss in optical fibres (qualitative); Fibre connectors, splices and couplers; applications of optical fibres.

PART - B

4. **Quantum Mechanics (07 Lectures):** Introduction; Wave-particle duality; Matter waves; Group and Phase velocities (qualitative); Statement of uncertainty principle; Wave function, Born probability interpretation, significance and normalization of wave function; Time independent and time dependent Schrodinger wave equations; Eigen functions and Eigen values; particle in a box (one dimension only).
5. **Physics of materials(10 Lectures):** Electronic materials: dielectrics and ferroelectrics; Magnetic materials: dia, para, ferro and ferromagnetic, Basics of domain theory, Feerites, B-H curve, Magnetic anisotropy and magnetostriction; Superconductivity; meissner effect, Type I and Type II superconductors, London equations, Qualitative idea of BCS theory, Applications of superconductivity; Nanomaterials; Introduction, Surface to volume ratio, Qualitative idea of 1D, 2D & 3D nanomaterials, Propertties of nanomaterials, Applications of nanomaterials.
6. **Semiconductors (07 Lectures):** Intrinsic and extrinsic semiconductors: Dependence of Fermi level on carrier concentration and temperature (equilibrium carrier statistics); Carrier generation and recombination; Carrier transport: diffusion and drift, p-n junction; Introduction to LED and solar cell.

Total Lectures: 45

Text/ Reference books:

(i). Engineering Mechanics, 2nd edition by MK Harbola.
(ii). Introduction to Mechanics by MK Verma.
(iii). Theory of Vibrations with Applications by WT Thomson.
(iv). Mechanical Vibrations by JP Den Hartog.
(v). An Introduction to the Mechanics of Solids, 2nd edition with SI Units by SH Crandall, NC Dhall and TJ Lardner.
(vi). Engineering Mechanics of Solids by EP Popov.
(vii).Quantum Mechanics by DJ Griffiths, Pearson Education, 2008.
(viii).Quantum Mechanics by Richard Robinett, OUP Oxford, 2006.
(ix). Introduction to Electrodynamics by DJ Griffiths.
(x). Optics by A Ghatak, McGraw Hill Education, 2012.
(xi). An Introduction to Fibre Optic System by John Power.
(xii). Principles of Lasers by O. Svelto, Springer Science & Business Media, 2010.
(xiii).Semiconductor Devices: Physics & Technology by SM Sze.
(xiv).Integrated Circuits by Milman and Helkias.
(xv). Solid State Electronic Devices by BG Streetman, Prentice Hall of India, 1995.
(xvi).Physics for Scientists & Engineers (Vol. I & II), Serway & Jewett, 6th Edition, Cengage Learning.
(xvii).Physics by Halliday and Resnick.
(xviii).Online courses on NPTEL.

II. Physics Laboratory: P: 3 (1.5 Credits)

Instructional objectives:

1. Proficiency in making experimental measurements of different Physical variables.
2. Develop the skills in arranging and handling different measuring instruments and standard scientific Methods of data analysis.
3. Get familiarized with the techniques of experimental errors analysis and thus plan for measurements with minimum possible errors.

Course outcomes

1. An ability to apply knowledge of Physical processes & Materials Physics.
2. An ability to design and conduct experiments, as well as to analyze and interpret data.
3. An ability to design a system, component, or process to meet desired specific needs within the framework of sustainability.
4. An ability to identify, formulate, and solve engineering problems.

Students are required to perform at least ten experiments out of the following including virtual lab.:

1. Basic knowledge of least count and error analysis of Vernier Caliper and Screw Gauge.
2. To determine the frequency of AC mains by electrically maintained tuning fork.
3. To determine the moment of inertia of a flywheel.
4. To study the variation of magnetic field along the axis of a current carrying coil.
5. To determine the polarizability of a dielectric material.
6. To determine the refractive index of the material of prism.
7. To determine the specific rotation of sugar using Laurent's half shade polarimeter.
8. To determine the angular divergence of Laser.
9. To determine the number of lines per cm on a plane grating using Laser.
10. To determine the numerical aperture of an optical fibre.
11. To study the loss of optical signal in optical fibres.
12. To determine the band gap of a semiconductor material.
13. To study the characteristics of p-n junction diode (forward bias and reverse bias).
14. To study zeener diode as a voltage regulator.
15. To study the intensity response of a solar cell.

Virtual lab.:

1. To verify that energy conservation and momentum conservation can be used with a ballistic pendulum to determine the initial velocity of a projectile, its momentum and kinetic energy.
2. To determine the wavelength of a laser using Michelson interferometer.
3. To find out the horizontal component of earth's magnetic field.
4. To determine the resistivity of semiconductors by four probe method.
5. To determine the Planck's constant from kinetic energy versus frequency graph.

Suggested Readings / Books:

1. Practical Physics, C.L. Arora, S. Chand & Co.
2. Practical Physics, R.S. Sirohi, Wiley Eastern.
3. http://vlab.amrita.edu/index.php?sub=1

Shaheed Bhagat Singh State Technical Campus, Ferozepur

Department of Computer Science& Engineering

[Batch 2018 onwards]

BTPS-101B	Programming for Problem Solving

Mid-Sem	End-Sem	MM	L	T	P	C
40	60	100	3	0	0	3

Course Objectives:

Course Outcomes:

After undergoing this course students will be able to

- To formulate simple algorithms for arithmetic and logical problems.
- To translate the algorithms to programs (in C language).
- To test and execute the programs and correct syntax and logical errors.
- To implement conditional branching, iteration and recursion.
- To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- To use arrays, pointers and structures to formulate algorithms and programs.
- To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

Unit – 1

Introduction to Programming (4 lectures): Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) - (1 lecture). Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples. (1 lecture) From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code- (2 lectures)

Unit – 2

Arithmetic expressions and precedence (2 lectures): Conditional Branching and Loops (6 lectures) Writing and evaluation of conditionals and consequent branching (3 lectures) Iteration and loops (3 lectures)

Unit – 3

Arrays (6 lectures): Arrays 1-D, 2-D and Multidimensional Arrays, Character arrays and Strings. Linear and Binary Search of Arrays, Bubble Sort Algorithm.

Unit – 4

Function (5 lectures): Functions (including using built in libraries), Parameter passing in functions, call by value, Passing arrays to functions: idea of call by reference, Introduction to Recursion and Iteration vs recursion**.**

Unit – 5

Pointers (2 lectures): Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation).

Unit-6

File handling (only if time is available, otherwise should be done as part of the lab)

Recommended Text and Reference Book:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Shaheed Bhagat Singh State Technical Campus, Ferozepur

Department of Computer Science& Engineering

[Batch 2018 onwards]

BTPS-102B	Programming for Problem Solving Laboratory

Mid-Sem	End-Sem	MM	L	T	P	C
30	20	50	0	0	4	2

Course Objectives:

Course Outcomes:

After undergoing this course students will be able to

- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program
- To be able to declare pointers of different types and use them in defining self referential structures.
- To be able to create read and write to and from simple text files.

The laboratory should be preceded or followed by a tutorial to explain the approach or algorithm to be implemented for the problem given.

Tutorial 1: Problem solving using computers: **Lab1:** Familiarization with programming environment
Tutorial 2: Variable types and type conversions: **Lab 2:** Simple computational problems using arithmetic expressions
Tutorial 3: Branching and logical expressions: **Lab 3:** Problems involving if-then-else structures
Tutorial 4: Loops, while and for loops: **Lab 4:** Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays: searching, sorting: **Lab 5:** 1D Array manipulation
Tutorial 6: 2D arrays and Strings **Lab 6:** Matrix problems, String operations
Tutorial 7: Functions, call by value: **Lab 7:** Simple functions
Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration):
Lab 8 and 9: Programming for solving Numerical methods problems
Tutorial & LAB 10: Pointers, structures and dynamic memory allocation
Tutorial 11: File handling: **Lab 11:** File operations