B.Tech (CSE/ECE/IT/MAE)

FIRST SEMESTER

Code	Course Title	L	T/P	Credit
THEORY				
BAS-101	Applied Mathematics - I	3	1	4
BAS-103	Applied Physics-I	3	1	4
BAS-105	Applied Chemistry	3	1	4
BMA-107	Elements of Mechanical Engineering	3	1	4
BCS-109	Introduction to Computers &Programming in C	3	1	4
BAS-111	Communication Skills - I	2	1	3
PRACTICALS				
BAS-113	Applied Physics Lab-I	-	2	1
BAS-115	Applied Chemistry Lab	-	2	1
BCS-117	Computers and Programming Lab	-	2	1
BMA-119B	Workshop Practice*(CSE, IT)	-	3	2
BMA-121B	Engineering Graphics Lab*(ECE,MAE)		3	2
	TOTAL	**17**	**15**	**28**

SECOND SEMESTER

Code	Course Title	L	T/P	Credit
THEORY				
BAS-102	Applied Mathematics - II	3	1	4
BAS-104	Applied Physics-II	3	1	4
BAS-106	Environmental Sciences	3	1	4
BEC-108	Electrical Science	3	1	4
BMA-110	Engineering Mechanics	2	1	3
BAS-112	Communication Skills - II	2	1	3
PRACTICALS				
BAS-114	Applied Physics Lab-II	-	2	1
BAS-116	Environmental Sciences Lab	-	2	1
BEC-118	Electrical Science Lab	-	2	1
BMA-120	Engineering Mechanics Lab	-	2	1
BMA-119B	Workshop Practice*(ECE,MAE)	-	3	2
BMA-121B	Engineering Graphics Lab*(CSE, IT)		3	2
	TOTAL	**16**	**17**	**28**

*Workshop Practice (BMA-119B) will be conducted for CSE and IT Streams and Engineering Graphics (BMA-121B) for ECE and MAE streams in I semester

*Workshop Practice (BMA-119B) will be conducted for ECE and MAE Streams and Engineering Graphics (ETMA-121B) for CSE and IT streams in II semester.

* Letter 'B' in the paper code denotes that the course is taught in both semesters.

Paper Code:	BAS-101	**L**	**T**	**C**

Paper Title: Applied Mathematics-I   **3**   **1**   **4**

INSTRUCTIONS TO PAPER SETTERS: **Maximum Marks :**

1. **Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of   marks.**
2. **Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be   marks**

UNIT 1

Matrices : Gauss Elimination method, Rank of a matrix, Consistency of system of linear equations, Types of matrices, Eigen values, eigen vectors and their properties, Cayley-Hamilton theorem and their applications.   (8 Hrs)

UNIT 2

Sequence and Series : Definitions, convergence and divergence of an infinite series, Tests for convergence of positive term series: Comparison tests, Ratio Test, Root test, Cauchy's Integral Test. Alternating series: Leibnitz's test for Alternating series, conditional and absolute convergence for alternating series. Improper integrals, beta and gamma function.   (12 Hrs)

UNIT 3

Differential Calculus : Successive differentiation, Leibnitz theorem, Taylor's Series of one variable; Functions of several variables: their Limits and continuity, Partial differentiation, Taylor's series, Maxima and minima, Lagrange multiplier method.

                                    (8 Hrs)

UNIT 4

Vector Calculus : Vector point functions, Gradient; directional derivatives, Divergence and Curl and their physical interpretation, Line integrals, Jacobians, Double integrals, Triple Integrals, Change of order of integration, Surface and Volume integrals, Green's Theorem (with proof), Gauss and Stokes theorems (without proof).   (12 Hrs)

Text Books:

1. Kreyszig. E. , "Advanced Engineering Mathematics", 10th Edition, John Wiley & Sons, 2011.
2. Jain R. K. and Iyengar S. R. K., "Advanced Engineering Mathematics", 3rd Edition, Narosa Publication, 2008.

References Books :

1. George B. Thomas and Ross L. Finney, "Calculus and Analytic Geometry", Pearson Education.

2. Greenberg M., "Advanced Engineering Mathematics", 9th Edition, Pearson Education, 1998.
3. D. G. Zill and W. S. Wright, "Advanced Engineering Mathematics", The Jones and Bartlett Publishers International Series in Mathematics 2011.

Paper Code: BAS-103		L	T	C

Paper Code: BAS-103 L T C

Paper Title: Applied Physics-I 3 1 4

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks :
1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of   marks. 2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be   marks

UNIT 1

Mathematical Physics and Electromagnetism : Introduction to vectors,. Gradient, divergence and curl.

Electromagnetic waves, Maxwell's equations, equation of continuity, Displacement Current, Wave Equation, Boundary Conditions of E and B, Poynting Theorem, Propogation of electromagnetic waves in free space, dielectric and conducting medium,Skin Depth.

(12Hrs)

UNIT 2

Special Theory of Relativity : Basic postulates of special theory of relativity, Lorentz transformation. Minkowiski space time interval, Time dilation, Length Contraction, velocity addition., Mass energy relation. **(08 Hrs)**

UNIT 3

Optics : Coherent Sources, Temporal and spatial coherence, , Interference due to division of wavefront and division of amplitude. Principle of superposition. Interference in parallel thin films, Newton's rings, Fresnel diffraction at straight edge, Fraunhoffer diffraction due to single slit, N slits, Diffraction grating, Polarization , Brewster's law, Malus Law, Double Refraction, Nicol Prism, Elliptically and circularly polarized light. **(12Hrs)**

UNIT 4

Lasers and Optical Fibers

Stimulated and Spontaneous Emission, Principle of LASER, Einstein's A and B Coefficients, Oscillator/ Wave Guide, Ruby Laser, He-Ne Laser, Ar ion Laser.

Optical fibers, Step Index and Graded Index fibers, Numerical Aperture, Pulse dispersion in optical fibers, Optical fiber communication. **(08Hrs)**

Text Books:

1. Ajoy. K. Ghatak, "Optics", 5th Edition, Tata Mc Graw Hill Education, 2012.
2. H. K. Malik and A. K. Singh, "Engineering Physics" , 5th Edition, Tata McGraw Hill, 2012
3. D.J. Griffith, "Introduction to Electrodynamics ", 3rd Edition, Addison-Wesley Pub, 1999.
4. William H. Hayt and John A Buck, "Engineering Electromagnetism" 6th Edition,

5. F. K. Richtmyer, E. H. Kennard, and J. N. Cooper, "Introduction to Modern Physics ",6th Edition, Tata Mc Graw Hill, 1997.

Reference Books :

1. Murray. R. Spiegel, "Vector Analysis", 2nd Edition, Tata Mc Graw Hill Education, 2009.
2. Wilson and J.F.B Hawkes, "Optoelectronics", 3rd edition, Prentice Hall Europe, 1998.
3. Richard Phillips Feynman,"The Feynmann Lectures on Physics", Pearson Vol. 3 Millenium Edition, 2013.
4. M.C.Jain, "Engineering Physics", Vol.I and II, Latest Edition, PHI Publications.

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks :
1. **Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of marks.** 2. **In addition to Question No. 1, the rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of marks**

UNIT 1:

Water Technology: Introduction and specification of water, Total Hardness and its determination (EDTA method)

Alkalinity, DO, BOD and COD and their determination, Boiler feed water, boiler problems – scale, sludge, priming & foaming, caustic embrittlement & corrosion : causes & prevention,

Water Softening by Internal Treatment: carbonate & phosphate conditioning, colloidal conditioning & calgon treatment

Water Softening by External Treatment: Lime-Soda Process, Zeolite & Ion-Exchange Process.

Water for Domestic use: Disinfection by Breakpoint chlorination   **(10 hrs)**

UNIT 2:

Gaseous State: Gas laws and Kinetic theory of gases, Distribution of molecular velocities, Mean free path.

Real Gases: Non- ideal behaviour, Causes of deviation from ideal behaviour, Vander Waal's equation.

Liquefaction of gases.

Catalysis: Catalyst and its characteristics, Types of catalysts, Concept of promoters, inhibitors and poisons, autocatalysis, physisorption, chemisorption, surface area.

Theories of catalysis: Intermediate compound formation theory, adsorption or contact theory.

Homogenous catalysis: Enzyme catalysis- Kinetics & Mechanism (Michaelis-Menten equation), Acid-Base catalysis-Types, Kinetics & Mechanism.

Heterogeneous Catalysis: Catalysis by metal salts (Wilkinson's Catalyst), Langmuir-Hinshelwood mechanism   **(10 hrs)**

UNIT 3:

The Phase Rule: Definition of various terms, Gibb's Phase rule & its derivation, Application of phase rule to one component system- The water system and sulphur system

Application of phase rule to two component system- The Lead-Silver system (Pattinson's process), $FeCl_3$-water system, Na_2SO_4-water system

Instrumental Methods of Analysis: Spectral Analysis: Electromagnetic radiations, Regions of electromagnetic spectrum and types of spectra, Lambert-Beer's Law

Instrumentation and applications of UV-Vis and Infrared Spectroscopy.

Thermal Analysis: Basic principle, instrumentation and applications of Thermo gravimetric analysis (TGA), Differential thermal analysis (DTA) and Differential scanning calorimetry (DSC) to quantitative analysis **(10 hrs)**

UNIT 4:

Nanochemistry: Nanoscience & nanotechnology; Top-down and bottom up approaches for nanomaterial synthesis, properties of nanomaterials

Molecular and materials self-assembly, Supramolecular structures

Properties and applications of nanoscale materials: Carbon nanotubes, fullerenes, nano-metals, and biological nanomaterials

Practical applications of nanomaterials in different areas

Composite Materials: Introduction, advantages of composite materials. Roles of matrix in composites, classification of matrix material and reinforcements.

Fiber-reinforced composites and structural composites.

Effects of environment on composites, applications of composites. **(10 hrs)**

Text Books:

1. S. Rattan, "Applied Chemistry", S.K.Kataria & Sons, 2013.
2. P.C. Jain & M. Jain, "Engineering Chemistry", 15th Ed., Dhanpat Rai Publishing Co., 2007.

Reference Books:

1. P.W. Atkins, "The Elements of Physical Chemistry", 6th Ed., Oxford University Press.
2. B.S. Bahl, G.D. Tuli, A. Bahl, "Essentials of Physical Chemistry", 24th Ed., S.Chand & Co., 2000.
3. D. A. Skoog, F. J. Holler and A. N. Timothy, "Principle of Instrumental Analysis", 5th Ed., Saunders College Publishing, Philadelphia, 1998.
4. S. Chawla, "Engineering Chemistry", All India Ed., Dhanpat Rai & Co., 2003.
5. C.N. Sawyer, P.L. McCarty, and G.F. Parkin, "Chemistry for Environmental Engg. and Science", 5th Ed., The McGraw-Hill Companies.
6. O.G. Palanna, "Engineering Chemistry", The McGraw-Hill Companies, 2009.

Paper Code: BMA-107

Paper Title: Elements of Mechanical Engineering

	L	T	C
	3	1	4

UNIT 1

Fundamentals of Thermodynamics: Thermodynamic System, Microscopic and Macroscopic Point of View, Property and State, Equilibrium, Process, Concept of Reversibility, Work, Heat, Ideal Gas, Zeroth Law of Thermodynamics. First Law of Thermodynamics, Corollary of First Law of Thermodynamics, Internal Energy, The first law applied to a closed system. Second Law of Thermodynamics, Clausius and Kelvin Planck statements, Equivalence of two statements, Carnot Cycle, Carnot Theorems, Clausius Theorem. **(10 Hrs)**

UNIT 2

Engines: Classification of Engines, Four Stroke Cycle Engine, Two stroke Cycle Engine, Comparison of Two stroke and Four Stroke Engines, Working of CI and SI Engines. Simple Rankine cycle steam power plant and Brayton cycle Plant.

Refrigeration and Air-conditioning: Unit of Refrigeration, COP, Simple Vapour Compression Refrigeration System, Domestic Refrigerator, Window Air Conditioner, Desert Air Cooler.

(10 Hrs)

UNIT 3

Engineering Materials and Machining Processes: Ferrous materials: classification. Various types of carbon steels, alloy steels and cast irons, its properties and uses.

Casting Processes, Pattern making, Welding Process: Electric arc welding, Edge preparations, Various types of welding joints, Bead formation in horizontal, vertical and overhead positions. Gas Welding: Oxy-Acetylene welding and cutting of ferrous metals. Soldering and Brazing.

(10Hrs)

UNIT 4

Mechanics of Deformable Bodies: Stress and strain, stress-strain relationship, Different elastic constants, mechanical properties of materials, Introduction, state of plane stress, Mohr's circle for plane stress.

Power Transmission Devices: Fundamentals of Belt and Gear drives   **(10 Hrs)**

Reference Books:

1. P. K. Nag, ―Engineering Thermodynamics
2. G. J. Van Wyle and R. E. Santag, ―Fundamentals of Classical Thermodynamics.
3. Kalpakjian ―Manufacturing Processes.
4. S. K. Hazara Chowdhary, ―Workshop Practices Volume 1.
5. W. A. J. Chapman ―Workshop Technology.
6. R. K. Jain, ―Production Engineering.
7. Rajender Singh, - Introduction to basic manufacturing processes and workshop technology, 2nd edition, New Age International.

Paper Code: BCS-109   L   P   C

Paper: Introduction to Computers & Programming in C   3   1   4

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks :

1. **Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of   marks.**
2. **Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of   marks**

UNIT I

Basic Computer Fundamentals: Introduction to computer systems, number system, integer, signed integer, fixed and floating   point representations. IEEE standards integer and floating point arithmetic. CPU organization, ALU, registers, memory. Concepts of the finite storage, bits bytes, kilo, mega and gigabytes. Idea of program execution at micro level.

Introduction to system software: operating systems, compilers, assemblers, interpreter and multi-user environments.. Concept   of   flow   chart   and   algorithms, algorithms to programs.
                                                                        10 Hours

UNIT II

Programming using C: Concept of variables, program statements and function calls from the library (Printf for example), C data types: int, char, float etc., C expressions, arithmetic operation, relational and logic operations, C assignment statements, extension of assignment of the operations. C primitive input output using getchar and putchar, exposure to scanf and printf functions, C Statements, conditional executing using if, else , switch case, goto and break statements.   10 Hours

UNIT III

Iterations , array and Subprogram: Concept of loops in C using for, while and do-while.

Arrays: single and two--dimensional arrays, initializers, array parameters, example of iterative programs using arrays and use in matrix computations.

Concept of Sub-programming: Functions, parameters and return values, standard library functions.
                                                                        10 Hours

UNIT IV

Pointers , Strings and Structure: Pointers, relationship between arrays and pointers, Call by reference. Array of pointers, passing arrays as arguments.

Character strings: processing strings using loops, and string library functions
Structure and Unions: structure concepts, structures as parameters, arrays of structures.   10 Hours

Text Books
1. The Complete Reference C - Fourth Edition, Herbert Schild, McGraw-Hill.
2. Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.

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

UNIT 1

Introducing Language : Errors of Accidence and Syntax with reference to Parts of Speech, Agreement of Subject and Verb, Tense and Concord, Narration, Voice, Punctuation   (08Hrs)

UNIT 2

Vocabulary and Usage : Word Formations (by adding suffixes and prefixes), Synonyms, Antonyms, Homophones and Homonyms, Indianisms, Phrasal Verbs, Idioms, Changing words from one form to another, Important Vocabulary building techniques.   (08Hrs)

UNIT 3

Speaking Better : Introduction to Phonetics: IPA system (as in Oxford Advanced Learner's Dictionary), The Description of Speech Sounds, Phoneme, Diphthong, Syllable, Stress, Prosodic Features, Conversion of words to phonetic symbols and from phonetic symbols to words, Comparison between British, American and Indian English. Reading and speaking for different purposes: formal and informal (with special focus on pronunciation)   (08Hrs)

UNIT 4

Writing Better : Formal and Informal Writing, Technical Description (objects, instruments, processes), Basics of Paragraph Writing (topic sentence, introduction and the conclusion, variety in sentences and paragraphs), E-mail Writing(Formal and Informal), Giving Opinion, Comprehension of Unseen/Textual Passages.   (08Hrs)

Text Book:

Reflections on Vital Issues, edited by PJ George. Chennai: Orient BlackSwan, 2010.

Text to be used for teaching of all the units and no direct questions to be based on the text. However, themes/issues related to the text should be asked in the questions on writing skills (paragraph, giving opinion).

Note: Students should be tested on the usage of grammar and not asked theoretical questions.

References Books :

1. Weiss, Edmund, Basics of Writing.
2. M. Raman and S. Sharma, Technical Communication, Oxford University Press, 2011.
3. M. Ashraf Rizvi,   Effective Technical Communication, Tata McGraw Hill Publication, 2005.
4. Lynne Truss, Eats, Shoots & Leaves, London: Profile Books, 2004.

Paper Code: BAS-113   **L**   **P**   **C**

Paper Title: Applied Physics Lab- I   0   2   1

Preliminary study

1. To determine the least count of different Vernier scales fitted on Vernier calipers, b. Spectrometer c. Screw gauge, and to learn how to take measurements with them.

2. To study the construction and working of a mercury vapor and sodium vapor lamps.

3. To study the working of a spectrometer, its different parts and uses.

4. To study the errors in measurement, least count, significant digits in calculation, log error and percentage error.

List of Experiments (Minimum eight experiments to be performed)

1. To determine the acceleration due to gravity using bar pendulum
2. To determine the acceleration due to gravity using kater's pendulum.
3. To determine the moment of inertia of a flywheel about its axis of rotation.
4. To determine the Young's modulus of the material of a given bar by bending.
5. To study different modes of oscillations using coupled pendulum.
6. To determine the frequency of A.C. mains using sonometer and an electromagnet.
7. To determine the refractive index of a prism using spectrometer.
8. To determine the wavelength of sodium vapour lamp by Newton's Ring.
9. To determine the wavelength of sodium light using diffraction grating.
10. To determine the specific rotation of cane sugar solution with the help of polarimeter.
11. To find the wavelength of He-Ne Laser using transmission diffraction grating.
12. To determine the numerical aperture of an optical fiber.
13. To study the RLC circuit.
14. Measurement of logarithmic decrement of a damped harmonic oscillator.

Recommended books

1. Geeta Sanon, B. Sc. "Practical Physics", Ist Edition, R. Chand and Company, 2007.
2. Indu Prakash and Ramakrishana, "A textbook of Practical Physics", 11th Edition, 2011.
3. C L Arora, "Practical Physics", 28th Edition, S. Chand & Company Ltd., 2007
4. Manjeet Singh, Surender Duhan and Anita Devi, "Applied Physics Theory and Experiments", Vayu Education of India Publications

Paper Code: BAS-115   L   P   C

Paper Title: Applied Chemistry Lab.   0   2   1

List of Experiments:

1. Determine the percentage composition of sodium hydroxide in the given mixture of sodium hydroxide and sodium chloride.
2. Determine the amount of oxalic acid and sulphuric acid in one litre of solution, given standard sodium hydroxide and potassium permanganate solutions.
3. Determine the amount of copper in the copper ore solution, provided hypo solution (Iodometric Titration).
4. Determine the amount of chloride ions present in water using silver nitrate (Mohr's Precipitation Method).
5. Determine the surface tension of a liquid using drop number method.
6. Determine the viscosity of a given liquid using Ostwald's viscometer method.
7. Determine the cell constant of conductivity cell and titration of strong acid/strong base conductometrically.
8. To determine (a) λmax of the solution of $KMnO_4$ (b) Verify Beer's law and find out the concentration of unknown solution using spectrophotometer.
9. Determination of concentration of Fe in the given sample using spectrophotometer.
10. Determination of eutectic point and congruent melting point for a two component   system by method of cooling curve.
11. Determine the concentration and dissociation constants of a polyprotic acid potentiometrically.
12. Determine strength of $KMnO_4$ solution using sodium oxalate.

(Minimum 8 to 10 experiments are to be performed)

Suggested Books:

1. Vogel A.I., "Quantitative Inorganic Analysis", 5th Ed., Oxford ELBS

2. S. Chawla, "Essentials of Experimental Engineering Chemistry", Third Edition, Dhanpat Rai & Co., 2008.

3. S. Rattan, "Experiments in Applied Chemistry", Second Edition, S.K.Kataria & Sons, 2003.

Paper Code : BCS-117   L   T   C

Paper Title : Computers and Programming Lab   0   2   1

Experiments will be based on "Introduction to Computers & Programming in C" theory course.

Paper Code: BMA-119B   **L   P   C**
Paper Title: Workshop Practice   **0   3   2**

UNIT 1
Safety Precautions & Knowledge Of Hand Tools: Importance, general safety precautions on different shop floors. Personal, tools and general safety. Study about first aid.
Foundary Shop : Introduction of foundry shop and its tools, to make a sand mould with single piece pattern or two piece patterns.
Exercises
Preparation of sand
Sand moulding process   **(8 Hrs)**

UNIT 2
Fitting Section: Introduction of fitting operations, Study of hand tools and measuring instruments, Hacksaw cutting practice, Filing practice, Male female joints, Jobs made out of MS Flats.
Exercises
1. Flat Joint or L Joint
2. Drilling and tapping   **(8 Hrs)**

UNIT 3
Welding: Identify welding materials and processes, Gas and Electric arc weldings and its equipments, Use of welding equipment and tools and accessories, Electric arc welding, Edge preparations, Exercises making of various joints. Bead formation in horizontal, vertical and overhead positions.
Exercises
Welding Practice: Butt joint or Lap joint or T joint   **(8 Hrs)**

UNIT 4
Sheet Metal Work: Introduction to sheet metal, Study and demonstration of sheet metal tools, joints and operations procedure, Making jobs out of GI sheet metal.
Exercises
Simple Development of the job, to make hand and seam joints.
Rectangular or Cylindrical container or Hexagon shape.   **(8 Hrs)**

Important Note: - The demonstration/instructions shell given by Faculty of concerned Group and supporting staffs will assists the concerned faculty.

Text Books:
1. Shop Theory by Anderson (Tata McGraw Hill)
2. Workshop Technology by Chapmen
3. Workshop Technology by Hajra & Choudhary
Reference Books:
1. Workshop Practice by Rajeev Upadhayay
2. Workshop Practice by N.T.T.I. Chandigarh

Paper Code: BMA-121B   **L**   **P**   **C**
Paper Title: Engineering Graphics Lab   **0**   **3**   **2**

UNIT 1
General: Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Orthographic Projection, B.I.S. Specifications, Engineering curves.
Projections of Point and Lines: Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines. **(8 Hrs)**

UNIT 2
Projections of Plane Figures: Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.
Projection of Solids: Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles. **(8 Hrs)**

UNIT 3
Section of Solids: Introduction, conventions, sections of various solids.
Development of Surfaces: Method of development, Development of surfaces of oblique solids. **(8 Hrs)**

UNIT 4
Projections: Perspective, orthographic, isometric and oblique projections, isometric scale, isometric drawing.
Computer Aided Drafting: Basic concepts and use. **(8 Hrs)**

Text Books:
1. Engineering drawing by N.D.Bhatt (Charotar Publications).

Reference Books:
1. Engineering Drawing by P.S.Gill (S.K. Kataria & Sons)
2. Engineering Drawing by Venugopal (New Age International Publishers)
3. Engineering Drawing by S.C.Sharma & Navin Kumar (Galgotia Publications)
4. Narayana, K.L. and Kannaiah, P.,"Engineering Graphics", Tata McGraw Hill

Paper Code: BAS-102   L   T   C

Paper Title: Applied Mathematics-II   3   1   4

INSTRUCTIONS TO PAPER SETTERS: Maximum Marks :

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of   marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be   marks

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UNIT 1

Differential Equations : Linear Differential Equations of higher order with constant coefficients, Method of undetermined Coefficients and Variation of parameters, Solution of homogeneous nonlinear differential equations (Cauchy's and Legendre's form). Legendre's, Bessel's differential, Partial differential equations : Heat and wave equation (method of separation of variables).

(14 Hrs)

UNIT 2

Laplace transforms : Definition, Laplace transforms of some standard functions, inverse Laplace transforms, solving linear differential equations using Laplace transforms and its applications to unit step function, Dirac-delta function and periodic function, Convolution theorem .

(7 Hrs)

UNIT 3

Complex Analysis-I : Functions of a complex variable, Limits, continuity and differentiability of complex functions, Analytic functions, Cauchy-Riemann equations, Transformations : some standard transformations, Simple Conformal Mapping and Bilinear transformations**.**   (7 Hrs)

UNIT 4

Complex Analysis-II : Complex line integrals, Cauchy's integral theorem and integral formulae, Zeroes, poles and singularities, Complex Integration, Taylor's and Laurent's series, Calculation of residues, residue theorem and its applications.

(12 Hrs)

Text Books:

1. Kreyszig. E. , "Advanced Engineering Mathematics", 10th Edition, John Wiley & Sons, 2011.
2. Jain R. K. and Iyengar S. R. K., "Advanced Engineering Mathematics", 3rd Edition, Narosa Publication, 2008.

References Books :

1. George B. Thomas and Ross L. Finney, "Calculus and Analytic Geometry", Pearson Education.

2. Greenberg M., "Advanced Engineering Mathematics", 9th Edition, Pearson Education, 1998.

3. D. G. Zill and W. S. Wright, "Advanced Engineering Mathematics", The Jones and Bartlett Publishers International Series in Mathematics 2011.

Paper Code: BAS-104   L   T   C

Paper Title: Applied Physics-II   3   1   4

INSTRUCTIONS TO PAPER SETTERS:	Maximum Marks :

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of   marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be   marks

UNIT 1
Classical Mechanics : Equation of Motion, Simple Harmonic Oscillator, Damped Harmonic Oscillator, Forced Harmonic Oscillator, Compound Pendulum, Bar Pendulum, Kater Pendulum, Central and non-central forces. Conservative nature of central forces.
                                                                                           (08Hrs)

UNIT 2
Quantum Mechanics : De Broglie hypothesis, Heisenberg Uncertainity Principle, Postulates of Quantum Mechanics, Wave function and properties, Time independent, and time dependent Schrodinger Wave equation, Particle in 1-D box, infinite potential step, finite potential barrier, Quantum Mechanical Tunneling, Hamiltonian, energy and momentum operators, expectation value.
                                                                                           (12Hrs)

UNIT 3
Solid State Physics : Crystalline and amorphous substances, Translation Vector, Miller indices, X Ray Diffraction, Bloch Theorem, Formation of bands in metals , semiconductors and insulators, Intrinsic and extrinsic semiconductors. Fermi energy level for undoped and doped semiconductors, pn junction, LED, Semiconductor Laser , Zener diode, Tunnel Diode, Solar cell and solar energy. Solar constant. Photoconductivity.
                                                                                           (12Hrs)

UNIT 4
Nuclear Physics and X-rays
 Nuclear forces and binding energy, Mass defect, Nuclear fission, Liquid drop model, , Nuclear Fusion, radiation detectors, ionization chamber, Geiger Muller Counter, Semiconductor detector.
Production of x-rays, properties of x-rays, x-ray diffraction, Bragg's law, applications of x-rays.
                                                                                           (08Hrs)

Text Books:
1. H.K.Malik and A.K.Singh, "Engineering Physics" , Latest Edition, TMH , 2009.
2. Arthur Beiser, "Concepts of Modern Physics", 6th Edition, Mc Graw Hill College, 2009.

Reference Books :

1. C.Kittle, "Mechanics" , Berkeley Physics Course, Vol-I, Latest edition
2. Irving Kaplan, "Nuclear Physics" Addison-Wesley Pub. Co., Latest Edition
3. P.Arun, "Electronics" , Narosa Publications
4. F. K. Richtmyer, E. H. Kennard, and J. N. Cooper, "Introduction to Modern Physics ",6th Edition, Tata Mc Graw Hill, 1997.

Paper Code: BAS-106	L	T	C
Paper Title: Environmental Sciences	3	1	4

UNIT 1:

Natural Resources, Conservation and Management: Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forest 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.
Food resources: World food problems, changes caused by agriculture and over-grazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity.
Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.
Energy resources: Growing energy needs, renewable and non renewable energy sources. Biodiversity conservation and threats.
Resource Management-Concept of Sustainable development, Environmental Acts and regulations, Environmental Management Systems, Environmental Impact Assessment   **(8 hrs)**

UNIT 2:

Environmental Pollution And Control: Air Pollution: Types of air pollutants; Source, effects, sink & control of common air pollutants (CO, oxides of nitrogen & sulphur, hydrocarbons and particulates), Photochemical smog, acid rain, green house effect, global warming, Carbon dioxide sequestration and the concept of Carbon Credits
Water Pollution: Classification of pollutants and their sources, Waste water treatment (Primary, secondary and tertiary treatment), Impact of water pollution on hydrological ecosystems.
Solid and Hazardous Waste Pollution: Classification, waste treatment and disposal methods: Sanitary landfill, thermal processes, chemical and biological processes, disposal methods for nuclear waste, nuclear disaster (case study), disposal methods for e-waste.
Green Technology And Green Chemistry: Introduction to concept of Green Technology and Zero Waste Technology, Green Chemistry & its basic principles, Atom Economy, evaluation of feedstock, reaction types, methods, reagents and solvents.   **(10 hrs)**

UNIT 3:

Fuels and Alternate Energy Sources: Classification, Calorific value of fuels (gross and net), Dulong's formula, Determination of calorific value of fuels using bomb's calorimeter, Determination of calorific value of fuels using Boy's Gas Calorimeter.
Proximate and ultimate analysis of Coal, High & Low temperature carbonization, Manufacture of coke (Otto – Hoffmann oven)
Liquid fuels-petroleum chemical composition, fractional distillation, Cracking – Thermal & catalytic cracking, Octane & Cetane numbers with their significance.
Analysis of flue gases (Orsat's Apparatus), Combustion of fuels.

Use of alternate energy sources including solar energy harnessing (photovoltaics), wind energy, hydroenergy, geothermal energy, ocean energy, biodiesel, power alcohol, biomass energy. **(12 hrs)**

UNIT 4:

Chemical Toxicology: Toxicology: terminology & toxic effects, chemical interactions, impact of toxic chemicals on enzymes, Biochemical effects of arsenic, mercury, lead, chromium, & cadmium, Biochemical effects of pesticides.

Eco-Friendly Polymers: Introduction: Functionality of monomer, polymerization, degree of polymerization, Number average and weight average molecular weight of polymers.
Environmental degradation of polymers: Biodegradable, Photo-biodegradable polymers, Hydrolysis & Hydro-biodegradable polymers
Biopolymers & Bioplastics, Thermal degradation of plastics during recycling   **(10 hrs)**

Text Books:
1. R. Gadi, S. Rattan, S. Mohapatra, « Environmental Studies », 3rd Ed., S.K.Kataria & Sons, 2013.
2. P.C.Jain & M.Jain, "Engineering Chemistry", 15th Ed., Dhanpat Rai Publishing Co., 2007.
3. S. Rattan, " Applied Chemistry", S.K.Kataria & Sons, 2013.

Reference Books:
1. R. T. Wright, "Environmental Science", 9th Ed. Pearson Education, 2007.
2. R. Rajagopalan, "Environmental Studies from Crisis to Cure", Oxford University Press, 2011.
3. G. Kiely, "Environmental Engineering", The McGraw-Hill Companies, 2007.
4. M. Lancaster, "Green Chemistry, an Introductory Text", Royal Soc. of Chemistry, UK, 2010.
5. B. Pani, "Toxicology', I. K. International Publishing House Pvt. Ltd., 2010.
6. S. Chawla, "Polymer Science & Engineering", Dhanpat Rai & Co., 2010.

Paper Code: BEC-108   L   T   C
Paper Title: Electrical Science   3   1   4

UNIT - I
Circuit Analysis
Ohm's Law, KCL, KVL Mesh and Nodal Analysis, Circuit parameters, energy storage aspects, Superposition,
Thevenin's, Norton's, Reciprocity, Maximum Power Transfer Theorem, Millman's Theorem, Star-Delta
Transformation. Application of theorems for the Analysis of dc circuits.   [10 Lectures]

UNIT - II
A.C.Circuits
Basics of AC, effective, average and maximum values, form factor and k-factor, different types of AC power, R-L,
R-C, R-L-C circuits (series and parallel), Time Constant, Phasor- representations, Response of R-L, R-C and R-L-C
circuit to sinusoidal input, Resonance-series and parallel Circuits, Q-factor, Bandwidth.
                                                                                           [10 Lectures]

UNIT - III
Measuring Instruments
Principles, Construction and application of moving coil, moving iron, dynamometer type, induction type
instruments, extension of range of ammeter, voltmeter (shunt and multiplier), Two-wattmeter method, for the
measurement of power.   [10 Lectures]

UNIT - IV
Transformers
Construction and Working principles and phasor diagrams of Single-phase Transformer, Emf equation, Equivalent
circuit, Regulation and efficiency, and Auto transformer.
Rotating Machines
DC Machines:
Construction and working principles of dc motor and generator and its characteristics Applications
of DC machines.   [10 Lectures]

TEXT BOOKS:
1. Vincent DEL TORO "Electrical Engineering Fundamental's Prentice Hall India", Ed 2011.
2. P.C. Sen "Principles of Electric Machines and Power Electronics", Wiley Eastern 2012.

| Paper Code: BMA-110 | **L** | **T** | **C** |
| Paper Title: Engineering Mechanics | **2** | **1** | **3** |

UNIT 1

Force Systems: Introduction, Laws of Mechanics, Force Systems - Force, moment & couple, Varignon's theorem, Resultant of concurrent and non-concurrent forces, Free Body Diagram, Equilibrium conditions, Application to various problems.

Friction: Introduction, Laws of Dry Friction, Coefficients of Friction, Angle of Friction, Cone of friction, Applications of Friction in Wedges, Ladder, Inclined Plane, Belt, Screw Threads, Wheel friction etc.

(8 Hrs)

UNIT 2

Centroid & Centre of gravity: Introduction, Centre of gravity, Centroids of lines, Areas & Volumes, Centroid of Composite bodies, Pappus theorems,

Moment of Inertia: Introduction, Moment of Inertia of Area, Polar Moment of Inertia, Radius of gyration, Parallel axis and Perpendicular axis theorem, Moment of inertia of composite areas, MOI about an arbitrary axis, Radius of gyration, Moment of Inertia of masses, Moment of Inertia of Solids of Revolutions

Trusses: Introduction, Various types of trusses, Perfect and imperfect truss, Assumption in the truss analysis, Analysis of perfect plane trusses by the method of joints and method of section.

(8 Hrs)

UNIT 3

Shear Force and Bending Moment in Beams : Introduction, Various type of Beams, Various type of Supports, Reactions at supports, Shear force and bending moment at any section of a beam, Methods for determination of S.F. and B.M. diagrams of beams (simply supported, overhanging and cantilever) subjected to various loads, Relation between Shear Force and Bending Moment, Point of contraflexture.

Kinematics of Particles : Equation of motion, Rectilinear motion and plane curvilinear motion, Rectangular coordinates, Normal and tangential components.

Kinetics of Particles: Work energy equation, Conservation of energy, Principle of Impulse and momentum, Linear and angular momentum, D'Alembert's principle, Conservation of momentum, Impact of bodies, Co-efficient of restitution, Loss of energy during impact.

(8 Hrs)

UNIT 4

Kinematics of Rigid Bodies: Concept of rigid body, Rotation, translation and general plane motion of rigid bodies, Analysis by relative velocity and instantaneous center of rotation methods. Application to various problems.

Kinetics of Rigid Bodies: Rotary motion and torque, Moment of momentum, Laws of Rotary motion, Torque and angular momentum, Kinetic energy due to rotation, Work energy principle and principle of conservation of energy applied to rigid bodies, Equation of motion.

(8 Hrs)

Text Books:

1. D. S. Kumar, Engineering Mechanics, S.K. Kataria & Sons, Delhi, 2006.
2. I.B.Prasad: A Text Book of Applied Mechanics, Khanna Pub. Delhi.
3. A.K. Tayal: Engineering Mechanics (Statics and Dynamics) Umesh Pub. Delhi.

Reference Books:

1. I. H. Shames, Engineering Mechanics—Statics and Dynamics, 4th Edition, Prentice Hall of India, 1996.
2. F.P. Beer and E.R. Johnston, Vector Mechanics for Engineers – Statics, McGraw Hill Book Company, 2000.

Paper Code: BAS-112	L	T	C
Paper Title: Communication Skills – II	2	1	3

UNIT 1
Introducing Communication: Importance and function of Communication, Communication Cycle, Characteristics and Types of Communication, Channels and Medium of Communication, 7 C's of Communication, Barriers to Communication. Ethics of Communication (plagiarism, language sensitivity towards gender, caste, race, disability etc.)

(07Hrs)

UNIT 2
Everyday Communication: Non-Verbal Language (Symbols, Appearance, Paralanguage and Body Language, Proxemics, Chronemics), Listening Skills (Importance, Barriers, Essentials of Good Listening),

Communication Skills (greetings, introducing, making requests, asking and giving permission, offering help and giving instructions and directions etc.), Understanding Telephone Skills (handling calls, leaving a message, asking and giving information and instructions etc.), Net Etiquettes

(07Hrs)

UNIT 3

Effective Communication: Classroom Presentations (purpose, types, preparing and presenting - use of visual aids/ power point presentations), Group Discussion (purpose, strategies, guidelines etc.), Interview Skills (purpose, types of interviews, guidelines and preparing for facing the interviews)

 Presentation, Group discussion and Mock interview practice should be undertaken in class.

(09Hrs)

UNIT 4
Writing on the Job: Letters at the workplace, Job Application (Resume and Cover Letter), Meeting documentations (notice, memo, circular, agenda and minutes of meeting etc.), Report Writing (characteristics, types, structure of formal report)

(09Hrs)

Reference Books :

1. Lewis and Hedwig, Body Language: A Guide For Professionals, New Delhi, Response Books, 2000
2. Sides and H. Charles, How to Write & Present Technical Information, Cambridge, CUP, 1999.
3. M. Raman and S. Sharma. Technical Communication, Oxford University Press, 2011.
4. M. Ashraf Rizvi, Effective Technical Communication, Tata McGraw Hill Publications, 2005.

Paper Code: BAS-114   **L   P   C**

Paper Title: Applied Physics Lab- II   **0   2   1**

Preliminary study

1. Working and connection of a bread board.
2. To study the working of a digital mulitmeter and measurement of resistance, dc voltages, capacitance.
3. To study the working of a CRO and measurement of voltage and frequency of signals coming from a function generator.
4. AC bridges for measurement of capacitance, inductance etc.

List of Experiments(Minimum eight experiments to be performed)

1. To study the IV characteristics of a pn junction diode.
2. To study the IV characteristics of a Zener diode.
3. To determine the value of e/m by J J Thompson method.
4. To study the charging and discharging of a capacitor to find the time constant.
5. Measurement of velocity of light.
6. To find the thermal conductivity of a poor conductor by Lee's disk method.
7. To measure the frequency of a sine-wave voltage obtained from signal generator and to obtain lissajous pattern on the CRO screen by feeding two sine wave voltage from two signal generator.
8. To study Hall effect and to measure carrier concentration and Hall coefficient for unknown semicondutor.
9. To determine plank's constant.
10. To study construction and working of a fuel cell.
11. Measurement of high resistance by ballistic galvanometer.
12. To trace the B-H curve for a feorrmagnetic material using CRO and to find the magnetic parameters from the B-H hysteresis loop.

Recommended books

1. Geeta Sanon, B. Sc. "Practical Physics", Ist Edition, R Chand and Company, 2007.
2. Indu Prakash and Ramakrishana, "A textbook of Practical Physics", 11th Edition, 2011.
3. C L Arora, "Practical Physics", 28th Edition, S. Chand & Company Ltd., 2007
4. Manjeet Singh, Surender Duhan and Anita Devi, "Applied Physics Theory and Experiments", Vayu Education of India Publications

Paper Code: BAS-116   L   P   C

Paper Title: Environmental Sciences Lab.   0   2   1

List of Experiments:

1. Determination of alkalinity in the water sample.

2. Determination of hardness in the water sample.

3. Determination of dissolved oxygen (DO) in the water sample.

4. Determination of Biological Oxygen Demand (BOD) in the water sample.

5. Determination of Chemical Oxygen Demand (COD) in the water sample.

6. Determination of pH and conductivity in different drinking water samples and report writing.

7. Determination of Residual Chlorine in the water sample.

8. Determination of calorific value of fuels using Bomb calorimeter.

9. Proximate analysis of coal.

10. Estimation of sulphur in the given coal sample gravimetrically.

11. Determination of the molecular weight of polystyrene sample using viscometric method.

12. Acetylation of primary amines using green methodology.

13. Preparation of Urea formaldehyde resin.

(Minimun 8 to 10 experiments are to be performed)

Suggested Books:

1. Vogel A.I., "Quantitative Inorganic Analysis", 5th Ed., Oxford ELBS

2. S. Chawla, "Essentials of Experimental Engineering Chemistry", Third Edition,   Dhanpat Rai & Co., 2008.

3. S. Rattan, "Experiments in Applied Chemistry", Second Edition, S.K.Kataria &   Sons, 2003.

4. dst.gov.in/green-chem.pdf (monograph of green chemistry laboratory experiments)

Paper Code: BEC- 118   **L**   **P**   **C**
Paper: Electrical Science Lab   **0**   **2**   **1**

List of Experiments

1. Verification of Thevenin's Theorem

2. Verification of Superposition Theorem

3.   Verification of Reciprocity Theorem

4.   Verification of Maximum Power Transfer Theorem

5. Phasor Diagram and Power factor of LCR circuit.

6. Measurement of Power and Power factor in single phase Load using three ammeters/voltmeters.

7. Calibration of Energy Meter/Wattmeter/Voltmeter/Ammeter

8. Two wattmeter method of measuring power in three phase circuit (resistive load only)

9. Load test on Single Phase Transformer, Regulation and Efficiency of Transformer

10. Short Circuit/Open Circuit tests on Single Phase transformer

11. To Measure the armature and field resistance of a D.C. Machine

12. Starting and Speed Control of a D.C. shunt motor

13. Resonance

Paper Code: BMA-120 L P C
Paper Title: Engineering Mechanics Lab 0 2 1

Experiments will be based on "Engineering Mechanics" theory course.

Paper Code: BMA-119B   **L   P   C**
Paper Title: Workshop Practice   **0   3   2**

UNIT 1
Safety Precautions & Knowledge Of Hand Tools: Importance, general safety precautions on different shop floors. Personal, tools and general safety. Study about first aid.
Foundary Shop : Introduction of foundry shop and its tools, to make a sand mould with single piece pattern or two piece patterns.
Exercises
Preparation of sand
Sand moulding process   **(8 Hrs)**

UNIT 2
Fitting Section: Introduction of fitting operations, Study of hand tools and measuring instruments, Hacksaw cutting practice, Filing practice, Male female joints, Jobs made out of MS Flats.
Exercises
1. Flat Joint or L Joint
2. Drilling and tapping   **(8 Hrs)**

UNIT 3
Welding: Identify welding materials and processes, Gas and Electric arc weldings and its equipments, Use of welding equipment and tools and accessories, Electric arc welding, Edge preparations, Exercises making of various joints. Bead formation in horizontal, vertical and overhead positions.
Exercises
Welding Practice: Butt joint or Lap joint or T joint   **(8 Hrs)**

UNIT 4
Sheet Metal Work: Introduction to sheet metal, Study and demonstration of sheet metal tools, joints and operations procedure, Making jobs out of GI sheet metal.
Exercises
Simple Development of the job, to make hand and seam joints.
Rectangular or Cylindrical container or Hexagon shape.   **(8 Hrs)**

Important Note: - The demonstration/instructions shell given by Faculty of concerned Group and supporting staffs will assists the concerned faculty.

Text Books:
1. Shop Theory by Anderson (Tata McGraw Hill)
2. Workshop Technology by Chapmen
3. Workshop Technology by Hajra & Choudhary
Reference Books:
1. Workshop Practice by Rajeev Upadhayay
2. Workshop Practice by N.T.T.T.I. Chandigarh

Paper Code: BMA-121B   **L**   **P**   **C**
Paper Title: Engineering Graphics Lab   **0**   **3**   **2**

UNIT 1

General: Importance, Significance and scope of engineering drawing, Lettering, Dimensioning, Orthographic Projection, B.I.S. Specifications, Engineering curves.

Projections of Point and Lines: Introduction of planes of projection, Reference and auxiliary planes, projections of points and Lines in different quadrants, traces, inclinations, and true lengths of the lines, projections on Auxiliary planes, shortest distance, intersecting and non-intersecting lines. **(8 Hrs)**

UNIT 2

Projections of Plane Figures: Different cases of plane figures (of different shapes) making different angles with one or both reference planes and lines lying in the plane figures making different given angles (with one of both reference planes). Obtaining true shape of the plane figure by projection.

Projection of Solids: Simple cases when solid is placed in different positions, Axis faces and lines lying in the faces of the solid making given angles. **(8 Hrs)**

UNIT 3

Section of Solids: Introduction, conventions, sections of various solids.

Development of Surfaces: Method of development, Development of surfaces of oblique solids. **(8 Hrs)**

UNIT 4

Projections: Perspective, orthographic, isometric and oblique projections, isometric scale, isometric drawing.

Computer Aided Drafting: Basic concepts and use. **(8 Hrs)**

Text Books:
2. Engineering drawing by N.D.Bhatt (Charotar Publications).

Reference Books:
5. Engineering Drawing by P.S.Gill (S.K. Kataria & Sons)
6. Engineering Drawing by Venugopal (New Age International Publishers)
7. Engineering Drawing by S.C.Sharma & Navin Kumar (Galgotia Publications)
8. Narayana, K.L. and Kannaiah, P.,"Engineering Graphics", Tata McGraw Hill