B. Tech. II Semester

Credits	L	T	P	Course Code	Course Title	Category of Course
04	3	1	0	BSC 104	ENGINEERING PHYSICS-II	BSC

UNIT I

Electromagnetic Theory (EMT): Motion of Charged Particles in crossed electric & magnetic fields, Velocity Selector & Magnetic focussing, Gauss law, continuity equation, inconsistency in Ampere's Law, Maxwell's equations (differential and integral forms), poynting vector, Poynting Theorem (Statement only), propagation of plane electromagnetic waves in conducting and non-conducting medium.

UNIT II

Quantum Mechanics & Statistical Physics: De-Broglie Hypothesis, Davisson Germer experiment, wave function and its properties, expectation value, Wave Packet, Uncertainity principle. Schrodinger Equation for free Particle, Time Dependent Schrodinger Equation, Particle in a box (1-D), Single step Barrier, Tunneling effect.

Qualitative Features of Maxwell Bollzman, Bose-Einstein and Fermi-Dirac statistics distribution, functions & their comparison (no derivation)

UNIT III

Solid State Physics: Formation of energy bands in metals, semiconductors and insulators; intrinsic and extrinsic semiconductors, Fermi energy levels for doped, undoped semiconductors and pn junction; Tunnel diode, Zener diode.

Superconductivity: Meissner Effect, Type I and Type II Superconductors, BCS theory (Qualitative only), London's equation, properties of superconductors & applications.

Unit IV

X-Rays: production and properties, Crystalline and Amorphous solids (Brief) Bragg's Law, Applications.

Ultrasonics: Introduction, Production of Ultrasonics (Magentostriction and piezoelectric methods), engineering applications.

Unit V

Nuclear Radiation: Nuclear Detectors, Characteristics of gas filled detectors: general considerations, Constructions, Working and properties of: Ionization chamber, proportional counter, G. M.Counter and Scintillation Counter.

Text and Reference Books:

1. Concept of Modern Physics: A. BEISER
2. Quantum Physics: Greiner
3. Introduction to Electrodynamics: Griffith
4. Introduction to Superconductivity: Michael Tinkham
5. A Textbook of Nanoscience and Nanotechnology: T Pradeep
6. Electromagnetic waves and Radiating Systems: Jordan & Balmain
7. Solid State Physics: Kittel
8. Solid State Physics: R.L. Singhal
9. Quantum Mechanics: Schiff

B. Tech. II Semester

Credits	L	T	P	Course Code	Course Title	Category of Course
04	**3**	**1**	**0**	**BSC 105**	**ENGINEERING MATHEMATICS-II**	**BSC**

Unit I

Coordinate Geometry of Three Dimensions: Equation of a sphere, Intersection of a sphere and a plane, tangent plane, Intersection of two spheres, orthogonality of two spheres, Right circular cone. Right circular cylinder.

Unit II

Matrices: Rank of a matrix, Rank of matrix by reducing to normal forms, Consistency of systems of linear simultaneous equations and its solution, Eigen values and Eigen vectors, Cayley Hamilton theorem (without proof), Diagonalization of matrix.

Unit III

Vector Calculus: Scalar and vector field, differentiation & integration of vector functions, Gradient, Divergence, Curl and Differential Operator, Line, Surface and volume Integrals.

Unit IV

Application of Vector Calculus: Green's Theorem in a Plane, Gauss's and Stoke's Theorem (without proof) and their Applications. Fourier Series: Expansion of simple functions in Fourier Series, half range Fourier sine and cosine series, change of interval. Harmonic Analysis.

Unit V

Differential Equations: Series Solutions of Second Order Linear Differential Equations with Variable Coefficients (Complementary Functions only), Partial Differential Equations of First Order : Lagrange's Form, Standard Forms, Charpit's Method .

Text and Reference books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, Wiley 9th Edition.

2. Calculus and Analytical Geometry, Thomas and Finney, Narosa Publishing House N. Delhi.

3. A Text Book of Differential Equations, M.Ray and Chaturvedi, Students Friends & Co. Publisher, Agra.

4. Higher Engineering Mathematics, B.V.Ramana, Tata Mcgra Hill.

B. Tech. II Semester

Credits	L	T	P	Course Code	Course Title	Category of Course
04	3	1	0	ESC 106	BASICS OF MECHANICAL ENGINEERING	ESC

UNIT I

Basic Concepts of Thermodynamics: Macroscopic and Microscopic Approaches, Thermodynamic Systems, Surrounding and Boundary, Thermodynamic Properties – Intensive and Extensive, Thermodynamic Equilibrium, State, Path, Process and Cycle, Concept of Thermodynamic Work and Heat, Zeroth Law of Thermodynamics, Energy and First law of Thermodynamics, First law applied to non-flow processes, Internal Energy and Enthalpy. Numerical Problems.

UNIT II

I.C. Engines: Introduction, classification, Constructional details and working of 2 stroke & 4 stroke petrol engine & diesel engine, Otto, diesel and dual cycles, simple problems on Otto & diesel cycles.

Refrigeration, Air-Conditioning: Refrigerants: properties of refrigerants, list of commonly used refrigerants. Refrigeration –Definitions – Refrigerating effect, Ton of Refrigeration, Ice making capacity, COP, Relative COP, unit of Refrigeration. Principle and working of vapor compression refrigeration and vapour absorption refrigeration: Principles and applications of air conditioners, Room air conditioner.

UNIT III

Simple Lifting Machines: Definition of machine, velocity ratio, Mechanical advantage, Efficiency, Laws of machines, Reversibility of machine, Wheel and axle, Differential pulley block, Single, Double and Triple start worm and worm wheel, Simple and compound screw jacks, Problems.

Basics of Power Transmission: Transmission of mechanical power: introduction belt drives, gear drives, their advantages and disadvantages. Introduction to brakes and clutches.

UNIT IV

Stresses and Strains: Introduction, Concept & types of Stresses and Strains, Poisons ratio, stresses and Strains in simple and compound bars under axial loading, Stress– Strain diagrams, Hook's law, Elastic constants and Mechanical Properties of metals like mild steel and cast iron.

UNIT V

Basics of Manufacturing Processes and Measurements: Brief introduction to classification of different manufacturing processes: Primary shaping processes, metal cutting processes, joining processes, finishing processes and processes bringing change in properties, Working principle, parts and specification of commonly used machine tools in workshop such as Lathe, Shaper and

Milling. Measuring Instruments: introduction to slip gauges, Go and No Go gauges, dial gauges, vernier calliper, micrometer, sine bar, vernier height gauges.

Text and Reference Books:

1. Basics of Mechanical Engineering- R.K Rajput Laxmi Pub, Delhi.
2. Elements of Mechanical Engineering- D.S Kumar, S.K Kataria and Sons.
3. Engineering Thermodynamics- P.K Nag TMH, New Delhi.
4. Workshop Technology Vol I & II –Hazra & Chaudhary, Asian Book Comp., New Delhi.
5.Engineering Thermodynamics- C.P Arora, Pub- TMH, New Delhi.
6. Manufacturing Science- Amitabha Ghosh & Ashok Kumar Malik, - East- West Press.
7. Manufacturing Process & Systems- Oswald, Munoz, John Wiley.
8. Workshop Technology Vol I, II & III- Chapman, WAJ, Edward Arnold.
9. Basics of Mechanical Engineering – Vineet Jain, Dhanpat Rai Publications
10. Automobile Engineering by Dr Kirpal Singh, standard Publishers Distributors

Credits	L	T	P	Course Code	Course Title	Category of Course
04	3	1	0	ESC 107	BASIC ELECTRICAL ENGINEERING	ESC

UNIT - I

A.C. CIRCUITS: Sinusoidal signal, instantaneous and peak values, RMS and average values, phase angle, polar & rectangular, exponential , R,L and C components, behaviors of these components in A.C. circuits. Concept of complex power, power factor.

SERIES AND PARALLEL A.C. CIRCUITS: Series and parallel A.C. circuits, series and parallel resonance, Q factor, cut-off frequencies and bandwidth.

UNIT -II

DC NETWORK THEOREMS: Thevenin's theorem, Norton's theorem, superposition theorem, maximum power transfer theorem, Star to Delta & Delta to Star transformation. Nodal and Loop methods of analysis

UNIT - III

THREE PHASE CIRCUITS: Phase and line voltages and currents, balanced star and delta circuits, Relation between star and delta quantities, power equation, measurement of power by two wattmeter method.

UNIT - IV

1-φ TRANSFORMERS: Principle of operation, construction & working of transformer, E.M.F-Equation, Phasor –diagrams, Voltage Regulation, S.C and O.C Test , losses and Efficiency , Auto Transformer.

BASIC INSTRUMENTS: Basics of Moving coil & Moving Iron instruments, Basics of indicating instruments – Wattmeter & Single phase Energy Meter.

UNIT - V

D.C. Machine: Principle of operation, construction, working & applications of D.C machines , Types of Machine.

Induction motor: Principle of operation, construction, working & applications, Types of motors, slip concept.

Synchronous motor: Principle, construction, Types of motors.

TEXT REFERENCE BOOKS:

1.Basic Electrical Engg (2nd Edition) : Kothari & Nagarath, TMH
2. Electrical Technology (Vol-I) : B.L Theraja & A K Theraja, S.Chand
3 . Electrical Engineering Fundamentals : Deltoro, PHI
4.Network Analysis :Valkenburg, PHI

B. Tech. II Semester

Credits	L	T	P	Course Code	Course Title	Category of Course
03	3	0	0	ESC 108	COMPUTER PROGRAMMING	ESC

UNIT I

Introduction to Programming: Concept of algorithms, Flow Charts, Data Flow diagrams etc., Introduction to the Editing tools such as vi or MS-VC editors, Concepts of the finite storage, bits bytes, kilo, mega and gigabytes. Concepts of character representation, Number System & Binary Airthmatic.

UNIT II

Programming using C: The emphasis should be more on programming techniques rather than the language itself. The C Programming language is being chosen mainly because of the availability of the compilers, books and other reference materials.

Example of some simple C program. Concept of variables, program statements and function calls from the library (Print f for example)

UNIT III

Operation Using C: 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 the scanf and printf functions, C Statements, conditional executing using if, else. Optionally switch and break statements may be mentioned.

UNIT IV

Iterations and Subprograms

Concept of loops, example of loops in C using for, while and do-while. Optionally continue may be mentioned. One dimensional arrays and example of iterative programs using arrays, 2-d arrays Use in matrix computations. Concept of Sub-programming, functions Example of functions. Argument passing mainly for the simple variables.

UNIT V

Pointers and Strings: Pointers, relationship between arrays and pointers Argument passing using pointers Array of pointers. Passing arrays as arguments.

Strings and C string library.

Structure and Unions. Defining C structures, passing strings as arguments Programming examples.

Text and Reference Books:

1. Yashwant Kanetkar, "Let us C", BPB Publications, 2nd Edition, 2001.

2. Herbert Schildt, "C:The complete reference", Osbourne Mcgraw Hill, 4th Edition, 2002.

3. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.

4. Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2nd Edition.

B. Tech. II Semester

Credits	L	T	P	Course Code	Course Title	Category of Course
03	3	0	0	BSC 106	ENGINEERING CHEMISTRY	BSC

UNIT I

Chemical Bonding: Potential Energy curve for H_2 molecule, co-ordinate bond, Werner's theory, effective atomic numbers, isomerism in co-ordinate compounds. Hydrogen bonding, Vander Waal's forces, hybridization including d-orbitals, Valence shell Electron Repulsion Theory (VSEPR). Discussion of structures of IF_3, $SnCl_2$, CO_3^{2-}, Molecular Orbital theory, Linear combination of atomic orbitals (LCAO) method. Structures of simple heteronuclear diatomic molecules such as CO, NO, HF, HCl.

UNIT II

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. Numericals based on above topics.

Thermo chemistry: Hess's Law, Heat of a reaction, Effect of temperature on heat of reaction at constant pressure (Kirchoff's eq.), heat of dilution, heat of hydration, heat of neutralization and heat of combustion, Flame temperature.

UNIT III

Catalysis: Criteria for catalysis : Homogeneous catalysis – acid-base, Enzymatic catalysis, Catalysis by metal salts, Heterogeneous catalysis, concepts of promoters, inhibitors and poisoning, physiosorption, chemisorption, surface area.

The Phase Rule: Definitions of various terms, Gibb's Phase rule, Application of phase rule to one component system – the water system and Sulphur system. Two component system : Lead – Silver, $FeCl_3$ – water, Na_2SO_4 – water.

UNIT IV

Polymers and Composites: Functionality, Degree of polymerization, concept of molecular weight (number average, weight average & numerical based on them), Linear, branched and cross-linked polymers, Tacticity of polymers, Homo and Copolymers (Classification based on repeat unit), Structure – property relationship of polymers. Industrial applications of important thermoplastic, thermosetting polymers, Elastomers, Natural Polymers.

Conducting Polymers : Properties and applications.

Composites : Classification, Fibre and particle reinforced composites.

UNIT V

Alkenes: Nomenclature of alkenes, mechanisms of dehydration of alcohols and dehydrohalogenation of alkyl halides, The Saytzeff rule, Hofmann elimination, physical properties and relative stabilities of alkenes. Chemical reactions of alkenes and mechanisms involved in hydrogenation, electrophilic and free radical additions, Markownikoff's rule, hydroborationoxidation, oxymercurationreduction, ozonolysis, hydration, hydroxylation and oxidation with KMnO4.

Text and Reference Books:

1. Inorganic Chemistry (Latest ed.) By J.D. Lee

2. Chemistry in Engineering & Technology (Vol I & II) (Latest ed.) By J.C. Kuriacose & J. Rajaram

3. Principles of Physical Chemistry (Latest ed.) By Puri, Sharma & Pathania

4. Polymer Science (Latest ed.) By V.R. Gowarikar, N.V. Viswanathan & Jayadev Sreedha

B. Tech. II Semester

Credits	L	T	P	Course Code	Course Title	Category of Course
01	**0**	**0**	**2**	**ESC 109**	**BASIC ELECTRICAL ENGINEERING LAB**	**ESC**

List of Experiments:

1. To study working principle of Fluorescent Tube Light.

2. To study working of single phase Induction motor & vary its speed by single phase Auto- Transformer.

3. To prepare connections of Ceiling Fan & vary its speed by regulator.

4. To study working of three phase Induction motor & vary its speed by three phase Auto- Transformer.

5. To study Stair – Case wiring.

6. To study Thevenin & Nortons Theorem

7. To study & verify Superposition Theorem

8. To study & verify Maximum power Transfer Theorem.

9. To study speed control of D.C motor.

10. To study open circuit & short circuit test of single phase Transformer.

11. To study power measurement by two wattmeter method.

12. To study the frequency response of series RLC circuit.

B. Tech. II Semester

Credits	L	T	P	Course Code	Course Title	Category of Course
01	**0**	**0**	**2**	**BSC 107**	**PHYSICS-II LAB**	**BSC**

List of Experiments:

1.To study and plot V-I characteristics of PN junction diode.

2. To Study and plot V-I characteristics Zener Diode.

3. To draw common emitter characteristics of a transistor and calculate transistor characteristics parameters.

4. To draw common base characteristics of a transistor and calculate transistor characteristics parameters.

5. To plot the waveform of the half wave rectifier and find the ripple factor for H.W.R.

6. To plot the waveform of the full wave bridge rectifier and analyze its output.

7. To study verify the truth table of all the logic gate.

8. To study Cathode Ray Oscilloscope (CRO).

B. Tech. II Semester

Credits	L	T	P	Course Code	Course Title	Category of Course
02	3	0	3	ESC 110	ENGINEERING GRAPHICS & DESIGN	ESC

UNIT - I

Introduction: Drawing Instruments and their uses, BIS conventions, Lettering, dimensioning Line conventions and free hand practicing.

UNIT - II

Orthographic Projections: Introduction, Definitions - Planes of projection, reference line and conventions employed, Projections of points in all the four quadrants, Projections of straight lines (located in First quadrant/first angle only), True and apparent lengths, True and apparent inclinations to reference planes. Projections of plane surfaces–triangle, square, rectangle, rhombus, pentagon, hexagon and circle, planes in different positions by change of position method only.

UNIT - III

Projections of Solids (First Angle Projection Only): Introduction, Definitions – Projections of right regular tetrahedron, hexahedron (cube), prisms, pyramids, cylinders and cones in different positions.

UNIT - IV

Sections And Development of Lateral Surfaces of Solids: Introduction, Section planes, Sections, Section views, Sectional views, Apparent shapes and True shapes of Sections of right regular prisms, pyramids, cylinders and cones resting with base on HP.

UNIT - V

Isometric Projection (Using Isometric Scale Only): Introduction, Isometric scale, Isometric projection of simple plane figures, Isometric projection of tetrahedron, hexahedron(cube), right regular prisms, pyramids, cylinders, cones, spheres, cut spheres.

TEXT AND REFERENCE BOOKS:

1. Engineering Drawing - N.D. Bhatt & V.M. Panchal, 48th edition, 2005-Charotar Publishing House, Gujarat
2. Engineering graphics for degree - K.C. John, 2nd Edition, 2009 – PHI Learning Private Limited.
3. Engineering Graphics - K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore
4. Engineering Graphics and Drafting :P.S. Gill, Milenium Edition, S.K. Kataria and Sons.

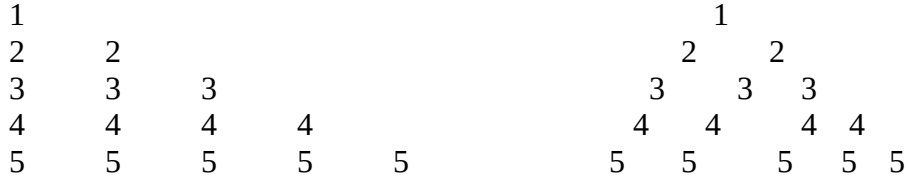
B. Tech. II Semester

Credits	L	T	P	Course Code	Course Title	Category of Course
01	**0**	**0**	**2**	**ESC 111**	**COMPUTER PROGRAMMING LAB**	**ESC**

List of Experiments:

1. Write a program to produce ASCII equivalent of given number
2. Write a program to find divisor or factorial of a given number.
3. Write a program to evaluate the following algebraic expressions after reading necessary values from the user
   (ax+b)/(ax-b)
   2.5 log x-cos 30+ | x^2-y^2|+sqrt (2xy)
   (x^5+10x^4+8x^3+4x+2
4. Write a program to find sum of a geometric series
5. Write a program to cipher a string
6. Write a program to check whether a given string follows English capitalization rules
7. Write a program to find sum of the following series
   1+ 1/2+ 1/3 +_____+1/20
8. Write a program to search whether a given substring exist in an input string or not and then delete this string from input string.
9. Write a recursive program for tower of Hanoi problem
10. The fibonacci sequence of numbers is 1,1,2,3,5,8……. Based on the recurrence relation
    F(n)=F(n-1)+F(n-2)for n>2
    Write a recursive program to print the first m Fibonacci number
11. Write a menu driven program for matrices to do the following operation depending on whether the operation requires one or two matrices
    a) Addition of two matrices
    b) Subtraction of two matrices
    c) Finding upper and lower triangular matrices
    d) Trace of a matrix
    e) Transpose of a matrix
    f) Check of matrix symmetry
    g) Product of two matrices.
12. Write a program that takes two operands and one operator from the user perform the operation and then print the answer

13. Write a program to print the following outputs:



14. Write functions to add, subtract, multiply and divide two complex numbers (x+iy) and (a+ib) Also write the main program.

15. Write a menu driven program for searching an sorting with following options:-
    a) Searching (1) Linear searching
       (2) Binary searching
    b) Sorting (1) Insersection sort
       (2) Selection sorting

16. Write a program to copy one file to other, use command line arguments.

17. Write a program to mask some bit of a number (using bit operations)

18. An array of record contains information of managers and workers of a company. Print all the data of managers and workers in separate files.

Credits	L	T	P	Course Code	Course Title	Category of Course
01	**0**	**0**	**2**	**BSC 108**	**ENGINEERING CHEMISTRY LAB**	**ESC**

List of Experiments

1. Determine the heat of hydration of $CuSO_4.5H_2O/FeSO_4.7H_2O$.

2. Determine the heat of neutralization of strong Acid (say H_2SO_4/HCl) with strong base (NaOH).

3. Determine the heat of neutralization of Weak Acid with strong base.

4. Determine the molecular weight of a substance by Rast Method.

5. Determine the reaction rate constant for 1^{st} order reaction.

6. Determine the surface tension of a liquid using drop weight method.

7. To determine the viscosity of the given liquid (density to be determined).

8. Preparation of a Polymer.

9. To determine the cell constant of a conductivity cell.

10. Titration of strong acid/strong base conduct metrically.

Text and Reference Books:

1. Practical Physical Chemistry (Latest ed.), By B.D. Khosla, A. Gulati & V.C. Garg
2. Laboratory Manual on Engineering Chemistry (Latest ed.), By S.K. Bhasin and Sudha Rani