# UNIT - I

### CALCULUS OF SEVERAL VARIABLES:

Partial differentiation, ordinary derivatives of first and second order in terms of partial derivaties, Euler's theorem on homogeneous functions, change of variables, Taylor's theorem of two variables and its application to approximate errors. Maxima and Minima of two variables, Langranges method of undermined multipliers and Jacobians.

### UNIT - II

### FUNCTIONS OF COMPLEX VARIABLES:

Derivatives of complex functions, Analytic functions, Cauchy-Riemann equations, Harmonic Conjugates, Conformal mapping, Standard mappings – linear, square, inverse and bilinear. Complex line integral, Cauchy's integral theorem, Cauchy's integral formula, Zeros and Singularities / Taylor series, Laurents series, Calculation of residues. Residue theorem, Evaluation and real integrals.

### Unit - III

## **VECTOR CALCULUS:**

Scalar and Vector point functions, Gradient, Divergence, Curl with geometrical physical interpretations, Directional: derivatives, Properties.

Line integrals and application to work done, Green's Lemma, Surface integrals and Volume integrals, Stoke's theorem and Gauss divergence theorem (both without proof).

### UNIT - IV

### LAPLACE TRANSFORMATION:

Existence condition, Laplace transform of standard functions, Properties, Inverse Laplace transform of functions using partial fractions, Convolution and coinvolution theorem. Solving linear differential equations using Laplace transform. Unit step function, Impulse function and Periodic function and their transforms.

### **TEXT BOOKS:**

- 1. Ramana "Higher Engineering mathematics" TMH.
- 2. E. Kresyzig, "Advanced Engineering Mathematics", John Wiley and Sons. (Latest edition).

### **REFERENCE BOOKS:**

- 1. V. V. Mitin, M. P. Polis and D. A. Romanov, "Modern Advanced Mathematics for Engineers", John Wiley and Sons, 2001.
- 2. R. K. Jain and S. R. K. Iyengar, "Advanced Engineering Mathematics", Narosa, 2003 (2<sup>nd</sup> Ed.).
- 3. Dr. A. B. Mathur, V. P. Jaggi, "Advanced Engineering Mathematics", Khanna Publishers.
- 4. R Wylie, "Advanced Engineering Mathematics", Mc Graw Hill, 1995

# BTCS 202 (Applied Physics – II)

### 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 Bolzman, 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.

### **TEXT BOOKS:**

- 1. A. BEISER, "Concept of Modern Physics" TMH
- 2. Rajam, "Atomic Physics"
- 3. Greiner, "Quantum Physics"
- 4. Griffth, "Introduction to Electrodynamics"

## **REFERENCE BOOKS:**

- 1. Jordan & Balmain, "Electromagnetic waves and Radiating Systems"
- 2. Kittel, "Solid State Physics"
- 3. R.L. Singhal, "Solid State Physics"
- 4. Schiff, "Quantum Mechanics"
- 5. S S Islam, "Semiconductor physics and devices", Oxford press

## BTCS 203 (Applied Chemistry – II)

### 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<sub>3</sub>, SnCl<sub>2</sub>, CO<sub>3</sub><sup>2-</sup>, 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.

**Thermochemistry:** 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.

# TEXT BOOKS:

- 1. J.D. Lee, "Inorganic Chemistry", Latest ed.
- 2. J.C. Kuriacose & J. Rajaram, "Chemistry in Engineering & Technology, Vol I & II, Latest ed.
- 3. Puri, Sharma & Pathania, "Principles of Physical Chemistry", Latest ed.
- 4. V.R. Gowarikar, N.V. Viswanathan & Jayadev Sreedha, "Polymer Science", Latest ed.

# **BTCS 204 (Introduction to Computer Programming)**

# 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 Systems & Binary Arithmetic.

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

# UNIT - III

**Iterations and Subprograms:** Concept of loops, example of loops in C using for, while and dowhile. 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 - IV

**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 BOOKS:

1. Yashwant Kanetkar, "Let us C", BPB Publications, 2<sup>nd</sup> Edition, 2001.

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

# **REFERENCE BOOKS:**

- 1. Raja Raman, "Computer Programming in C", Prentice Hall of India, 1995.
- 2. Kernighan & Ritchie, "C Programming Language", The (Ansi C Version), PHI, 2<sup>nd</sup> Edition.

# **BTCS 205 (Engineering Mechanics)**

**Friction:** Static and Kinetic friction, laws of dry friction, co-efficient of friction, angle of friction, angle of repose, cone of friction, friction lock, friction of flat pivot and collared thrust bearings, Belt drive- derivation of equation.

 $T_1/T_2 = e^{\mu\theta}$  and its application

## UNIT - II

**Structure:** Plane truss, perfect and imperfect truss, assumption in the truss analysis, analysis of perfect plane trusses by the method of joints, method of section.

**Distributed Force**: Determination of center of gravity, center of mass and centroid by direct integration and by the method of composite bodies, mass moment of inertia and area moment of inertia by direct integration and composite bodies method, radius of gyration, parallel axis theorem, Pappus theorems, polar moment of inertia.

### UNIT - III

**Kinematics of Particles:** Rectilinear motion, plane curvilinear motion-rectangular coordinates, normal and tangential component.

**Kinetics of Particles:** Equation of motion, rectilinear motion and curvilinear motion, work energy equation, conservation of energy, impulse and momentum conservation of momentum, impact of bodies, co-efficient of restitution, loss of energy during impact.

## UNIT - IV

**Kinematics of Rigid Bodies**: Concept of rigid body, type of rigid body motion, absolute motion, introduction to relative velocity, relative acceleration (Corioli's component excluded) and instantaneous center of velocity, Velocity and acceleration polygons for four bar mechanism and single slider mechanism.

**Kinetics of Rigid Bodies:** Equation of motion, translatory motion and fixed axis rotation, application of work energy principles to rigid bodies conservation of energy.

Shear force and bending Moment Diagram.

### **TEXT BOOKS:**

- 1. A.K.Tayal, "Engg Mechanics", Umesh Publications
- 2. Sadhu Singh, "Engg Mechanics", Khanna Publishers

# **REFERENCE BOOKS:**

- 1. Irving H. Shames, "Engg Mechanics", PHI publications
- 2. U.C.Jindal, "Engg Mechanics", Galgotia Publications
- 3. "S Timoshenko, DH Young & JV Rao" Engineering Mechanics TMH.
- 4. Subramanyam, "Engg Mechanics"
- 5. K L Kumar, "Engineering Mechanics", TMH

# **BTCS 206 (Electrical Science)**

### 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 theorem to the Analysis of dc circuits.

### UNIT – II

### A.C.Circuits

R-L, R-C, R-L-C circuits (series and parallel), Time Constant, Phasor representation, Response of R-L, R-C and R-L-C circuit to soinusoidal input Resonance-series and parallel R-L-C Circuits, Q-factor, Bandwidth.

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, Cathol-ray Oscilloscope and Applications.

# UNIT – IV

# Transformers

Construction and Working principles and phaser diagrams of Single-phase Transformer, Emf equation, Equivalent circuit, Regulation and efficiency, and Auto transformer.

### **Rotating Machines**

Construction and working principles of dc motor and generator and its characteristics Applications of DC machines

Construction and working principles of  $3-\phi$ -Induction motor, Torque-speed characteristics, and Industrial applications.

## **TEXT BOOKS:**

- 1. Vincent DEL TORO "Electrical Engineering Fundamental's Prentice Hall India", Ed 2002.
- 2. D.P. Kothari & L.J. Nagrath, "Basic Electrical Engineering", TMH.
- 3. B L Thareja, "Basic Electrical and Electronics"

## **REFERENCE:**

- 1. P.C. Sen "Principles of Electric Machines and Power Electronics", Wiley Eastern 2003.
- 2. Basic Electrical Engineering. "Mittle/Mittal" TMH.
- 3. A.K.Sawhney, Electrical & Electronics Measurement & Instrumentation, Hanpat Rai & Sons, India.

## BTCS 207 (Communication Skills – II)

## UNIT – I

**Basic Concepts in Communication:** Communication as sharing; context of communication; the speaker/writer and the listener/reader; medium of communication; barriers to communication; accuracy, brevity, clarity and appropriateness in communication.

# UNIT - II

**Writing Skills:** Types of writings (Expository, Descriptive, Analytic, Argumentative, Narrative etc) and their main features. Resumes and CV's and Cover letters. Memos and Notices. Basics of Formal Reports.

### UNIT - III

**Verbal, Non-Verbal and Listening Skills:** Elementary Phonetics (Speech Mechanism, The Description of Speech Sounds, The Phoneme, the syllable; Prosodic Features, Word Accent, Features of Connected Speech); Paralanguage and Body language; and Classroom Presentations, Hearing and Listening; Essentials of Good Listening: Achieving ability to comprehend material delivered at relatively fast speed.

### UNIT - IV

**Group Discussion:** Use of persuasive strategies including some rhetorical devices for emphasizing (for instance; being polite and firm; handling questions and taking in criticism of self; turn-taking strategies and effective intervention; use of body language).

# TEXT BOOKS:

- 1. R. K. Bansal, and J. B. Harrison, "Spoken English For India: A Manual of Speech and Phonetics", Hyderabad: Orient Longman, 1983.
- 2. Lewis, Hedwig. "Body Language: A Guide For Professionals. New Delhi: Response Books", A division of Sage Publication, 2000
- 3. Sides, H. Charles, "How to Write & Present Technical Information", Cambridge: CUP, 1999.
- 4. Forsyth, Sandy & Lesley Hutchison, "Practical Composition", Edinburgh Oliver & Boyd, 1981

# BTCS 208 (Applied Physics Lab – II)

### List of Experiments

- 1. To determine the value of e/m of electron by J.J. Thomson method.
- 2. To determine unknown resistance of a wire by Carey Foster's Bridge.
- 3. To determine the internal resistance of Leclanche cell using potentiometer.
- 4. To study the charging and discharging of a capacitor and to find out the time constant.
- 5. To find the thermal conductivity of a poor conductor by Lee's disk method.
- 6. To study the thermo emf using thermocouple and resistance using Pt. Resistance thermometer.
- 7. To determine the velocity of ultrasound waves using an ultrasonic spectrometer in a given liquid (Kerosene Oil)
- 8. To measure the frequency of a sine-wave voltage obtain from signal generator and to obtain lissajous pattern on the CRO screen by feeding two sine wave voltage from two signal generator.
- 9. To determine the temp. coefficient of resistance of platinum by Callender & Griffith's Bridge.
- 10. To study Hall effect.
- 11. To determine plank's constant.

#### Note:

Atleast 8 experiments must be carried out. Proper error – analysis must be carried out with all the experiments.

## BTCS 209 (Applied Chemistry Lab – II)

#### List of Experiments

### **EXPERIMENT NO. 1**

**AIM:** Determine the surface tension of a given liquid by drop number method.

#### **EXPERIMENT NO. 2**

**AIM:** To determine the composition of a liquid mixture A and B (Acetic acid and water) by surface tension method.

### **EXPERIMENT NO. 3**

**AIM:** Determine of coefficient of viscosity of the given liquid by Ostwald's Viscometer method.

#### **EXPERIMENT NO. 4**

AIM: Determination of reaction rate constant of acid catalyzed hydrolysis of ester.

#### **EXPERIMENT NO. 5**

**AIM:** To Determine the heat capacity of a calorimeter.

#### **EXPERIMENT NO. 6**

AIM: Determination of heat of neutralization of hydrochloric acid with sodium hydroxide.

#### **EXPERIMENT NO. 7**

**AIM:** Determination of heat of neutralization and ionization of acetic acid with sodium hydroxide.

### **EXPERIMENT NO. 8**

AIM: Determination of Integral heat of Solution of CuSO<sub>4</sub>. 5H<sub>2</sub>O.

#### **EXPERIMENT NO. 9**

**AIM:** Determination of heat of hydration of  $CuSO_4.5H_2O$ .

#### **EXPERIMENT NO. 10**

**AIM:** To find the cell constant of conductivity cell.

### **EXPERIMENT NO. 11**

**AIM:** Determine the strength of hydrochloric acid solution by titrating it against standard hydroxide conductometrically.

### **EXPERIMENT NO. 12**

AIM: Preparation of Nylon 66.

### **EXPERIMENT NO. 13**

AIM: Preparation of urea formaldehyde resin.

#### **EXPERIMENT NO. 14**

AIM: Preparation of phenol formaldehyde resin. (Bakelite)

#### **EXPERIMENT NO. 15**

AIM: To the molecular weight of a polymer (Polystyrene) by using viscometric method.

#### **TEXT BOOKS:**

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

# BTCS 210 (C Programming Lab.)

# 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
- $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{20} + \frac{1}{20}$
- 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:

1	_					1				
2	2						2	2		
3	3	3				3		3 3	3	
4	4	4	4			4	4	4	4	
5	5	5	5	5		5	5	5	5	5
C		111.4		14:1	1 1:		1	1		: <b>&gt;</b>

- 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.

# BTCS 211 (MATLAB)

#### Introduction to the software and it's application

# **BTCS 212 (Electrical Science Lab)**

# List of Experiments

- 1. Verification of Thevenin's theorem.
- 2. Verification of Norton, s theorem
- 3. Verification of max. power theorem.
- 4. Verification of Superposition theorem
- 5. Measurement of Power and Power factor in single phase Load using Wattmeter, ammeter and voltmeter.
- 6. Calibration of Energy Meter/Wattmeter/Voltmeter/Ammeter
- 7. Load test on Single Phase Transformer, Regulation and Efficiency of Transformer
- 8. Resonance.
- 9. To find out the value of 'L' by using Anderson bridge.

#### **BTCS 212 (Electrical Science Lab)**

### **List of Experiments**

- 1. Verification of Thevenin's theorem.
- 2. Verification of Norton,s theorem
- 3. Verification of max. power theorem.
- 4. Verification of Superposition theorem
- 5. Measurement of Power and Power factor in single phase Load using Wattmeter, ammeter and voltmeter.
- 6. Calibration of Energy Meter/Wattmeter/Voltmeter/Ammeter
- 7. Load test on Single Phase Transformer, Regulation and Efficiency of Transformer
- 8. Resonance.
- 9. To find out the value of 'L' by using Anderson bridge.