

## SEMESTER - 1

### 19Z101 CALCULUS AND ITS APPLICATIONS

3 1 0 4

**DIFFERENTIAL CALCULUS** : Functions of two variables, limit, continuity, partial derivatives, differentiability, linearization and total differential, extreme values and saddle points, Taylor's formula for two variables. (9 + 3)

**MULTIPLE INTEGRALS I** : Double integrals over rectangles, double integrals as volumes, Fubini's theorem, double integrals over general regions, changing the order of integration, double integrals in polar form, applications to area, volume. (9 + 3)

**MULTIPLE INTEGRALS II** : Triple integrals in rectangular coordinates, spherical and cylindrical coordinates, applications to volume. (9 + 3)

**SECOND ORDER LINEAR ORDINARY DIFFERENTIAL EQUATIONS** : Homogeneous equations with constant coefficients, superposition principle, initial value problem, general solution, Euler-Cauchy equation, non-homogeneous linear equations, method of variation of parameters, modeling of electric circuits. (9 + 3)

**VECTOR CALCULUS** : Directional derivative and gradient vectors, vector fields, divergence, curl. Integration in vector field - line integrals, work, circulation and flux, path independence. Green's, Gauss divergence and Stokes's theorems. (9 + 3)

**Total L: 45 +T: 15 = 60**

#### TEXT BOOKS:

1. Maurice D. Weir, Joel Hass, Christopher Heil "Thomas' Calculus", Pearson Education., New Delhi, 2018
2. Erwin Kreyszig "Advanced Engineering Mathematics", Wiley India Pvt Ltd., New Delhi, 2015

#### REFERENCES:

1. Gilbert Strang "Calculus", Wellesley-Cambridge Press., USA, 2017
2. Marsden J E, Tromba A J, Weinstein A "Basic Multivariable Calculus", Springer Verlag., New York, 2019
3. James Stewart "Multivariable Calculus", Cengage Publishing., Boston, 2017
4. Howard Anton, Irl Bivens, Stephen Davis "Calculus", John Wiley and Sons, INC., USA, 2016

### 19Z102 ELECTRICAL AND ELECTRONICS SYSTEMS

3 0 0 3

**DC CIRCUIT** : current-voltage –power-energy, electrical circuit elements: resistors-inductor- capacitor, source of electrical energy. Ohm's law-Kirchhoff's laws, series and parallel circuits, Maxwell's loop current method, Network theorems: superposition theorem-thevenin's theorem-Norton's theorem-maximum power transfer theorem. (9)

**AC CIRCUITS** : Single phase AC circuits: Average and RMS values of sinusoidal wave form-RLC Circuit-Phasor representation-active ,reactive apparent power –power factor, analysis of RLC Circuit, three phase circuit: star and delta connection-phase and line quantities-balance and unbalance systems (9)

**ELECTROMAGNETISM AND MAGNETIC CIRCUITS** : Electromagnetic induction: induced currents, Faraday's law, induction and energy, motional emf and Lenz's law. Magnetic field-magnetic circuit-inductance and mutual inductance-magnetic materials –ideal transformers and real transformers (8)

**SEMICONDUCTOR DEVICES** : Basic diode concepts-diode circuit: half wave rectifier-full wave rectifier-bridge rectifier-special purpose diodes-zener diode –transistor fundamentals –transistor biasing- bipolar junction transistors-basis amplifier concept-loading effect-power supplies and efficiency. (10)

**OPERATIONAL AMPLIFIERS** : Definition of terms — Inverting and non-inverting amplifiers, inverting summing amplifier, integrators and differentiators. (9)

**Total L: 45**

#### TEXT BOOKS:

1. John Hiley, Keith Brown, Ian McKenzie Smith, Edward Hughes "Electrical and Electronic Technology", Pearson education., New Delhi, 2016 , twelfth edition
2. Murugesh Kumar K "Basic Electrical Science and Technology", Vikas Publishing House., New Delhi, 2009

#### REFERENCES:

1. Leach D P "Digital Principles & Applications", Tata McGraw Hill., 2014 , eighth edition
2. Hambley A R "Electrical Engineering Principles and Applications", PHI Learning Pvt. Ltd., New Delhi, 2011
3. Boylestad R. L., Nashelsky L "Electronic Devices and Circuit Theory", Pearson Education., Noida, 2014 , eleventh edition
4. Theraja B. L. "Basic electronic Solid State", S. Chand & Company Ltd.,, New Delhi, 2010

## 19Z103 CHEMISTRY OF ELECTRONIC MATERIALS

3 0 0 3

**CONDUCTING PROPERTIES OF MATERIALS** : Molecular orbital treatment of bonding in metals, insulators, semiconductors — direct band and indirect band, elemental, p-doped, n-doped, stoichiometric compound semiconductors and chalcogen semiconductors. Crystal defects and their influence on properties of materials — intrinsic defects - schottky and frenkel, non-stoichiometric compounds, extrinsic defects - oxide ion conductors - applications. Nanoscale materials – Quantum dots-band gap – size dependant optical properties. (9)

**POLYMERIC MATERIALS** : Classification, degree of polymerization, average molecular weights, polydispersity. Polymerization reactions — chain and condensation. Thermal properties -glass transition temperature(T<sub>g</sub>) — factors affecting T<sub>g</sub> - determination by DSC. Mechanical properties — significance in fabrication of electronics. Electrical insulating properties - dielectric breakdown - aging of polymer insulations - discharges in voids, electrical treeing. Thermal and photochemical degradations. Additives - plasticisers, stabilisers, functional additives. (9)

**FLEXIBLE ELECTRONIC MATERIALS** : Conjugated polymers — electronic energy bands - mechanism of charge transport — intrachain and interchain - solitons, polarons and bipolarons. Factors influencing charge transport — structural features - defects, molecular weight, crystalline/amorphous nature, doping- oxidative and reductive. Synthesis, properties and applications of polyaniline, polythiophene and polypyrrole. Molecular electronics - graphene, fullerenes, carbon nanotubes – structure, synthesis, properties and applications. (9)

**OPTOELECTRONIC MATERIALS** : Electroluminescence- exciton, OLED materials– emitters- charge transfer complexes, metal chelates, polycyclic aromatic oligomers, conjugated polymers — polyphenylenes, polyfluorenes. Liquid crystalline polymers- classification of liquid crystals, chemical constitution, stability and applications. Organic and dye sensitized photovoltaics — working principle, materials, advantages and disadvantages. Preparation of ultrathin polymer films - Langmuir-Blodgett Films –self assembled monolayers. (9)

**MATERIALS FOR ELECTRONICS PROCESSING** : Semiconductor wafer fabrication -Overview and challenges –high purity chemicals, air filters for clean rooms, electronic grade water- quality parameters, water treatment stages for ultrapure water production — membranes and ion-exchange resins, electrodialysis. Photoresists for wafer fabrication — microlithography, resist requirements, material chemistry. Electronic packaging materials-adhesives, connectors, eutectic alloys, phase change materials-phase diagrams, applications. (9)

**Total L: 45**

### TEXT BOOKS:

1. Lesley E.Smart, Elaine A.Moore "Solid State Chemistry - an Introduction", CRC Press., London, 2005. , fourth edition
2. Cowie J.M.G, Valeria Arrighi "Polymers: Chemistry and Physics of modern materials", CRC Press., London, 2007. , third edition

### REFERENCES:

1. Bansil D. Malhotra "Handbook of Polymers in Electronics", Rapra Technology Ltd., UK, 2002. , first edition
2. Stergios Logothetidis "Handbook of Flexible Organic Electronics Materials - Manufacturing and Applications", WoodHead publishing., London, 2015. , first edition
3. Peter Van Zant "Microchip Fabrication: A Practical Guide to Semiconductor Processing", Mc Graw Hill,., 2014. , sixth edition
4. Shashi Chawla "A Textbook of Engineering Chemistry", Dhanpat Rai and Co., New Delhi, 2005 , first edition

## 19Z104 PROBLEM SOLVING AND PYTHON PROGRAMMING

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**INTRODUCTION TO PROBLEM SOLVING** : Introduction - Problem solving and Decomposition - Abstraction - Notations - Pseudo code - Flow chart - Programming language (8)

**ALGORITHMIC PROBLEM SOLVING** : Algorithm Implementation - Top down design - Simple strategies for developing algorithms - Iteration - Recursion - Fundamental algorithms - Anticipating and Dealing with Errors (8)

**BASICS BUILDING BLOCKS OF PYTHON** : Variables - Immutable variables - Data types - Operators - Python Reserved Words - Understanding error messages (9)

**CONTROL STATEMENTS AND STRUCTURED TYPES** : Control Flow - Indenting - if Statement - while Loop - break and continue - for Loop - String - Lists - Tuples - Sets - Dictionaries (10)

**FUNCTIONS , MODULES AND FILES** : Definition - Hiding redundancy - Arguments and return values - Variable Number of Arguments - Scope - Passing Functions to a Function - Mapping Functions in a Dictionary - Lambda function - Recursive Functions - Modules: Standard Modules - OS and SYS modules - User defined Modules - Importing modules - Writing into a File - Reading from a File - File Methods (10)

**Total L: 45**

### TEXT BOOKS:

1. R. G. Dromey "How to Solve it by Computer", Pearson Education., 2015

2. Charles Dierbach "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India., 2015

#### REFERENCES:

1. John V. Guttag "Introduction to Computation and Programming using Python", The MIT press., 2016
2. Paul Gries, Jennifer Campbell, Jason Montojo "Practical Programming: An Introduction to Computer Science using Python 3", Pragmatic Programmers., 2013, Second edition
3. Robert Sedgewick, Kevin Wayne, Robert Dondero "Introduction to Programming in Python: An Inter-disciplinary Approach", Pearson India., 2016
4. Karl Beecher "Computational Thinking - A beginner's guide to problem solving and Programming", BCS Learning & Development., 2017

### 19G105 ENGLISH LANGUAGE PROFICIENCY

**2 1 0 3**

**LEARNING LANGUAGE THROUGH STANDARD LITERARY AND GENERAL TEXTS :** Integrated tasks focusing on language skills ; Training based on Text based vocabulary, tone, register and Syntax features (12 + 0)

**GRAMMAR IN CONTEXT :** Word Order ; Subject Verb Concord ; Style features - Tenses, Conditionals, Prepositions, Active and Passive Voice, Modals, Cloze and Spotting Error exercises (10 + 0)

**GUIDELINES FOR WRITTEN COMMUNICATION :** Principles of clear writing, Paragraph writing, Essay writing, Emphasis Techniques, Summarizing and Paraphrasing, Analytical writing (8 + 0)

**FOCUS ON SPOKEN ENGLISH :** Task — based activities: Graded levels of difficulty and with focus on language functions - Level 1: Self — expression — Greetings in Conversation, Hobbies, Special interests, Daily routine - Level 2: General Awareness — Expression of Concepts, Opinions, Social Issues, Description of a process / picture/chart, news presentation / review - Level 3: Advanced Skills — Making Short Speeches and Participating in Role Plays (0 + 10)

**LISTENING ACTIVITY :** Task based activities using Language Laboratory. (0 + 5)

**Total L: 30 +T: 15 = 45**

#### TEXT BOOKS:

1. Faculty Incharge "Course Material on "English Language Proficiency", PSG College of Technology., Coimbatore, 2019

#### REFERENCES:

1. Jill Singleton "Writers at Work: The Paragraph", Cambridge University Press., New York, 2012
2. Simon Haines, Mark Nettle and Martin Hewings "Advanced Grammar In Use", Cambridge University Press., New Delhi, 2008
3. Anne Laws "Writing Skills", Orient Black Swan., Hyderabad, 2011
4. Sinha DK "Specimens of English Prose", Orient Black Swan., Hyderabad, 2012

### 19Z110 BASIC SCIENCES LABORATORY

**0 0 4 2**

#### PHYSICS (ANY EIGHT EXPERIMENTS) :

1. Determination of Hysteresis loss of a ferromagnetic material
2. Determination of resistivity of metal and alloy using Carey Foster bridge
3. Determination of Temperature Coefficient of Resistance of metallic wire using post office box
4. Determination of capacitance using LCR bridge
5. Study of reverse bias characteristics of Germanium diode and determination of its band gap
6. Study of I-V characteristics of solar cell and determination of its efficiency
7. Thermistor: Measurement of temperature and band gap
8. Study of characteristics of Photo Diode
9. Operational Amp. (741) – Inverting and non inverting modes
10. Operational Amp. (741) – Integrator and differentiator (30)

#### CHEMISTRY ( ANY EIGHT EXPERIMENTS) :

1. Determination of hardness, TDS, pH and conductivity of a water sample.
2. Determination of molecular weight of polymers by Ostwald / Ubbelohde Viscometer.
3. Construction of phase diagram for eutectic system – for application in electronic cooling system.
4. Study of a galvanic cell.
5. Conductometric estimation of acid strength of a pickling bath.
6. Potentiometric estimation of ferrous ion in an effluent.
7. Anodizing of aluminium and determination of thickness of anodised film.
8. Preparation of chloride ion sensor by anodizing silver and calibration.
9. Electroplating of nickel & copper and determination of cathode efficiency.
10. Examination of different forms of corrosion using Ferroxy indicator and determination of corrosion rate by current measurement. (30)

**Total P: 60**

**REFERENCES:**

1. Department of Chemistry "Chemistry Laboratory Manual", .., 2019
2. Department of Physics "Physics Practicals", .., 2019
3. Wilson J. D., Hernandez C. A. "Physics Laboratory experiments", Houghton Mifflin Company., New York, 2005

**19Z111 ENGINEERING PRACTICES**

**0 0 2 1**

**MODULE 1 :**

1. Foundry- Tools, preparation of moulding sand, patterns, cores, foundry exercises.
2. Welding - Metal arc welding tools and equipment, exercises on arc welding and MIG welding processes.
3. Fitting - Tools, operations, exercises on "T"-Joint and "L" Joint, types of joints.
4. Carpentry- Tools, carpentry process, exercises on types of joints.
5. Plumbing-Exercises on external thread cutting and joining.
6. Sheet metal work and soldering - Tools, operations, exercise on rectangular tray using Galvanized Iron sheet. (15)

**MODULE 2 :**

1. Study of passive and active components (resistors, capacitors, inductors, diodes and transistor).
2. Generation of Signals (DSO, Function generator).
3. Rectification of AC wave using bridge rectifier.
4. Construction of series and parallel circuits using resistors.
5. Assembling and disassembling of PC and troubleshooting.
6. Monitoring CPU Performance. (15)

**Total P: 30**

**REFERENCES:**

1. Department of Mechanical Engineering "Engineering Practices Laboratory Manual", PSG College of Technology., Coimbatore, 2019
2. Chapman W.A.J "Workshop Technology", Edward Arnold., 2001
3. Hambley A R "Electrical Engineering Principles and Applications", PHI Learning Pvt. Ltd., New Delhi, 2017
4. Wikibooks Contributors "How to assemble your Desktop PC", Platypus Global Media., 2011
5. Govindarajulu B "IBM PC and CLONES : Hardware, Troubleshooting and Maintenance", TATA McGraw-Hill Education., 2008
6. Jeff Heaton "Build a Computer from Scratch", Heaton Research Inc., 2006

**19Z112 PYTHON PROGRAMMING LABORATORY**

**0 0 4 2**

**BASICS OF PROGRAMMING:**

1. Scratch Programming
2. Algorithm and Flow Chart (24)

**PROGRAMMING USING PYTHON :**

1. Input/Output Statements and data types
2. Applications using Decision Making statements
3. Applications using Looping Statements
4. Applications using Set
5. Applications using Lists
6. Applications using Tuples
7. Applications using Dictionary
8. Applications using Functions
9. Applications using Modules
10. Applications using Files (32)

**DEBUGGING :**

1. Application Debugging (4)

**Total P: 60**

**REFERENCES:**

1. Charles Dierbach "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition., 2015
2. Kenneth Lambert "Fundamentals of Python: First Programs", Course Technology, Cengage Learning., 2016
3. John V Guttag "Introduction to Computation and Programming Using Python", MIT Press., 2015 , Revised and expanded Edition