DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHEME OF INSTRUCTION AND SYLLABI OF B.Tech. PROGRAM

RGUKT,Basar

I YEAR
II SEMESTER

Subject Code	Course Name	L-T-P	Credits
CS1201	Data Structures	4-0-0	4
PH1001	Physics	4-0-0	4
MA1201	Mathematics-II	4-0-0	4
HS1001	English	4-0-0	3
EC1208	Basic Electronics	4-0-0	4
HS1201	Communication Skills	2-0-0	1
HS1601	English Lab	0-0-3	2
CS1802	Data Structures Lab	0-0-3	2
PH1601	Physics Lab	0-0-3	2
Total		22-0-9	26

L-Lectures, T-Tutorials, P-Practicals, C-Credits

CS1201 DATA STRUCTURES

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **4-0-0-4**

Objectives:

- To develop proficiency in the specification, representation, and implementation of abstract data types and data structures.
- To get a good understanding of applications of data structures.
- To solve advanced computer science problems by making appropriate choice for intended applications

UNIT-I

Basic Concepts - Algorithm specification, Introduction, Recursive algorithms. Introduction to Linear and non-linear Data structures. Representation of single and two dimensional arrays, Singly Linked List Operations- Insertion, Deletion, Concatenating Single Linked Lists, Circular Linked List, Doubly Linked list.

UNIT-II

Stack ADT, definitions, Operations, array and linked representation in C, application infix to postfix conversion, postfix expression evaluation, recursion implementation. Queue ADT- definitions and operations, circular queues, double ended queue array and linked representation.

UNIT-III

Trees- Terminology, Representation of Trees, Binary tree ADT, Properties of Binary trees, array and linked representation of Binary trees, Max Heap, Min Heap. Graph- Introduction, Definition and terminology, Graph traversals- BFS and DFS.

UNIT-IV

Searching – Linear and Binary Search, Hashing, Sorting – Insertion, Bubble, Selection, Radix, Quick , Merge, Heap sorts. Comparisons of Sorting Algorithms.

UNIT-V

Search Trees- Binary search Trees, AVL Trees, B Trees, Red Black trees. Searching, insertion, deletion operations of trees.

Suggested References:

1. Ellis Horowitz, Dinesh Mehta, S. Sahani. Fundamentals of Data Structures in C++, Universities Press. 2007.
2. Mark Allen Weiss, Data Structures and Algorithm Analysis in C++, PearsonEducation 2006.
3. Michael T. Goodrich, Roberto Tamassia, David Mount, Data Structures andAlgorithms in C++, Wiley India Pvt. Ltd, 2004

PH1001 **PHYSICS**

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **4-0-0-4**

Objectives:

1. To inculcate in the Students a sense of yearning to learn the basic Physics behind the applications that we look around in day to day life.

2. To deliver the basic Principles of Physics that forms the basis for the development of Technology.

3. The basic details of Solid state Physics, Optics and Electrodynamics and Quantum Physics provided in a subtle fashion dealt in finer details to have strong basics in these areas.

UNIT – I
MATHEMATICAL PHYSICS (3)

1.1 Gradient, Divergence, Curl and their physical significance

Scalar and Vector point Functions, Differential operator, Gradient , Physical significance,

Divergence, Significance, Curl, Physical Significance, Vector Identities

1.2 Stokes theorem & Gauss theorem

Vector Integral Theorems, Line Integral, Surface and Volume Integrals, Stokes Theorem, Gauss-Divergence Theorem, Application

1.3 Curvilinear coordinates

Types of Coordinate systems, Polar coordinates, Cylindrical and Spherical coordinates, Equations Relating Cartesian, Spherical and Cylindrical coordinate

UNIT – II
ELECTRODYNAMICS (6)

2.1 Maxwell's Equations

Electrodynamics before Maxwell, Fixing of Ampere's Law, Maxwell Equation in matter, Boundary Conditions.

2.2 Poynting theorem and conservation laws

Continuity Equation, Poynting Theorem, Conservation Law Newton Third law in Electrodynamics

2.3 Wave equation

Wave equation, wave form Boundary conditions, Reflection and Transmission for a string

2.4 Electro Magnetic Waves in vacuum

Wave equation for E and B, Monochromatic Plane Waves, Energy and Momentum in EM Waves in vacuum

2.5 Electro Magnetic waves in Matter

Propagation in Linear Media, Reflection and Transmission at Normal Incidence Oblique Incidence

2.6 EM wave in conducting surface.

Reference Books :

1. Electrodyamics by David j.Griffiths

UNIT – III
OPTICS (12)

3.1 Interference by division of wave front (Biprism)

Introduction , Interference of Light Waves, Interference Pattern , Intensity Distribution, Fresnel Biprism

3.2 Interference by division of amplitude (Newton's rings)

Interference by Plane parallel Wave, Cosine Law, Interference by a film with Non-Parallel reflecting surface, Wedge, Newton's Rings.

3.3 Michelson's interferometer

Interference by Plane film illuminated by a point source, Michelson's Interferometer.

3.4 Fraunhoffer diffration (Single slit)

Introduction, Types of Diffraction,Single Slit Frauhoffer Diffraction, Position of Maxima and Minima,Graphical Method for determining roots

3.5 Frauhoffer diffraction Double slit & multiple slits

Double slit Fraunhoffer diffraction by N- Parallel slits

3.6 Diffraction Gratings, Grating and Resolving Power

Diffraction Grating, Construction of Grating, Grating Spectrum, Resolution, Resolving Power of a diffraction Grating

3.7 Fresnel diffraction and Zone Plate

Types of Diffraction, Fresnel diffraction, Fresnel Half Period zones, Zone plate Application of Zone, Lens

3.8 Production of Plane Polarised light & double refraction

Introduction , Polarisation of Light waves, Representation of various types of light, Polarization by Reflection,Brewster's Law, Laws of Malus and proof, Geometry of Calcite Crystal, Double Refraction, Nicol’s Prism, Applications.

3.9 Quarter & Half – wave plate, elliptical & circular polarized lights

Huygen's Theory of Double Refraction, Quarter Wave plate, Half Wave Plate, Elliptically and Circularly Polarised light.

3.10 Production & detection of elliptical & circular Polarised lights

Elliptically polarised Light, Circularly polarised light, Conversion of Elliptically polarized light to Circularly polarised light, Analysis of polarized light of Different Kinds.

3.11 Theory of Laser

Introduction, Spontaneous Emission, Stimulated Emission, Relation between Spontaneous and Stimulated emission Probabilities, Population Inversion, Pumping, Active systems.

3.12 Different kinds of Lasers

Ruby laser Working Semiconductor laser,He-Ne laser ,Application of Laser.

Reference Books :

1. Engineering Physics By Malik and Singh
2. Optics by Ajoy Ghatak
3. Optics by Pedrotti and Pedrotti.

UNIT – IV

QUANTUM MECHANICS (6)

4.1 Failures of classical physics

Limitations of classical physics, Blackbody Radiation, Spectral Lines, Photoelectric Effect, Planck's Quantum Hypothesis, Einstein's Theory of photoelectric Effect, Compton effect, Existence of stationary states, Stern-Gerlach Experiment

4.2 DeBroglie waves & Uncertainity Principle

Introduction, Matter waves Electron Diffraction Experiment Standing waves of an electron in orbit, Uncertainity Principle Single Slit Experiment, Application of Uncertainty Principle.

4.3 Wave function, Schrodinger Equation & probablity interpretation

Time Dependent Schrodinger Equation ,1- D Equation for a free particle, extension to 2-D, Inclusion of forces, Probability current Density

4.4 Operators , expectation values & Time independent Schrodinger Equation

Operators ,Expectation Value, Ehrenfest Theorem, time independent schrodinger Equation and Admissibility Conditions on Wave function.

4.5 Solution for generalised potential

Motion of a particle in a Potential – Classical view .

4.6 Particle in a box

Square well potential with Rigid walls, Energies and Wave functions

Reference Books:

1. Modern Physics by A. Beiser
2. Quantum Mechanics by Aruldhas.

UNIT – V
CONDENSED MATTER PHYSICS (6)

5.1 CRYSTALLOGRAPHY-I

Introduction, Crystal ,Single, poly and Amorphous state, Lattice Points and Space Lattice, Unit cell, Primitive Unit Cell in 2-D ,Non-primitive Unit Cell in 2-D lattice ,Primitive unit cell in 3-D ,Non Primitive unit cell in 3-D,Bravais Lattice and crystal systems, Atomic Packing, Crystal structure

5.2 Crystallography-II

Miller Indices, Positions, Directions, Planes Obtaining Miller indices, Important Cubic crystal structures, SC, BCC, FCC, Closed Packed structures, Packing fraction, NaCl Structure, Diamond , ZnS Structure.

5.3 X-ray diffraction

Introduction, Bragg's Law, Diffraction Direction Experimental Methods of x-Ray Diffraction, Powder method Debye - Scherrer Method Measurement of Bragg Angle

5.4 Defects in crystals

Introduction, Classification of Imperfections, Point Defects, vacancies, Schottky defects, Intersitial, Frenkel defects, Impurities, Colour centres, Line defect Planar Defects, Volume Defects, Thermodynamical consideration for Existence of Defect equilibrium concentration of Schottky defects in metals, Equilibrium concentration of schottky defects in Ionic crystals, Frenkel defect in metals, Frenkel defects in ionic crystals

5.5 Electron theory of metals

Important properties of metals, electron theory of solids, classical free elecrtron theory, DC Electrical Conductivity, Gains of Drude Model, Sommerfeld quantum Model, Fermi Energy, Density of Energy States, carrier Concentration, Drawbacks of Sommerfeld Theroy

5.6 Band theory of solids

Introduction, Formation of Energy Bands in Crystals, Characteristics, Bonding, Classification, Intrinsic and Extrinsic Semiconductors, Band structure, Energy Bands, Fermi Level and Fermi Energy, Carrier Concentration, Density of electrons in Conduction band, Position of Fermi level, Hall Effect, Applications

Reference Books:

1. Solid state Physics by Dekker
2. Solid state Physics By C.Kittel

MA1201 MATHEMATICS – II

Externals: 60 Marks **L-T-P-C**
Internals: 40 Marks **4-0-0-4**

Objectives:

- To learn the concepts of eigen values, eigen vectors, vector spaces and its basis.
- To provide an overview of ordinary differential equations
- To study the methods of solving improper integrals and the concepts of multiple integrals
- To study vector differential and integral calculus

UNIT-I

Linear Algebra: Rank and inverse of a matrix, Eigen values and eigenvectors, properties of eigen values, Cayley - Hamilton Theorem, Hermitian and skew Hermitian matrices. Vector spaces - linear dependence of vectors, basis, linear transformations and its matrix representations, Quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation.

UNIT-II

Ordinary Differential Equations: Ordinary differential equation, order, degree, First order differential equations – Exact, finding integral factors, linear differential equations, equations reducible to linear form, Bernoulli's form,

UNIT-III

Ordinary Differential Equations: Linear dependent and independent functions, wronskian of functions, Second and higher order differential equations (homogeneous & non-homogeneous) with constant coefficients, Method of variation of parameters, Euler's equation.

UNIT-IV

Integral Calculus: Convergence of improper integrals, tests of convergence, Beta and Gamma functions - elementary properties, differentiation under integral sign, differentiation of integrals with variable limits - Leibnitz rule. Rectification, double and triple integrals, computations of surface and volumes, change of variables in double integrals - Jacobians of transformations, integrals dependent on parameters – applications.

UNIT-V

Vector Calculus : Scalar and vector fields, level surfaces, directional derivative, Gradient, Curl, Divergence, Laplacian, line and surface integrals, theorems of Green, Gauss and Stokes, orthogonal curvilinear coordinates.

Suggested References:

1. Advanced Engineering Mathematics (3rd Edition) by R. K. Jain and S. R. K. Iyengar, Narosa Publishing House, New Delhi.
2. Advanced Engineering Mathematics (8th Edition) by Erwin Kreyszig, Wiley-India.
3. Dr. M.D. Raisinghania, Ordinar and Partial differential equations, S.CHAND,1 7th Edition 2014.

HS1001 **ENGLISH**

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **4-0-0-4**

Objectives:

Objectives:

- To improve the English language learning ability of the students by emphasizing on LSRW.
- To complement the comprehensibility of the Technical subjects in a better way.
- To make them competent to attempt and qualify in various tests.
- To develop the study skills in formal and informal situations.

UNIT-I

What's Up? An Excerpt from The Hindu (September 29, 2015): Article,Tenses, Prepositions and Speech: A Revision -Common Errors in English Usage -Commonly Mispronounced Words -Punctuation

UNIT-II

The Nightingale and the Rose by Oscar Wilde : Recollecting the Rules of Spelling - Commonly Misspelt Words list -Dialogue writing: Seeking Permission, Requesting, Interrupting - Skimming and Scanning

UNIT-III

Phonetics : Consonants - Vowels – BBC Phonetic Transcription – Syllabification - Word Stress - Voiced and Voiceless - Rules of Pronunciation - Tongue Twisters

UNIT-IV

Malala's Speech: An Excerpt from www.noble.org (10 December 2014) :Interviews/Self-Introduction - Debate - Group Discussion

UNIT-V

A Missile Man – Dr. APJ Kalam: An Excerpt from The Hindu (Sept 25, 2006) -Binomials and Portmanteau - Words often Confused - Reading Comprehension - Affixes (Prefixes and Suffixes) - One Word Substitutes on How to Describe People -Homophones, Homonyms and Homographs - Antonyms and synonyms - Spotting the Error -Commonly Used Phrasal Verbs/Idioms

UNIT –VI

Anand's Super 30 for IIT - JEE : An Excerpt from The India Today (July 11,15): Essay Writing- How to Write a Report- Formats of report writing- Letter writing - Formal Letter - Informal Letter- Notice Writing - On various events e.g. Annual Day -Email writing - Emailing e.g. Formal and In Formal - Curriculum Vitae or Resume preparation

UNIT -VII

A Road Not Taken by Robert Frost : Understanding the Poem - Decision Making -Themes of the Poem -Figures of Speech –Simile- Alliteration- Onomatopoeia

UNIT –VIII

Education and Technology - Burj Khalifa : www.natgeotv.com : Burj Khalifa (Documentary Video)-JAM/PPT Presentations

Supplementary Sources:

The King's Speech : Speech Therapy Tricks
Invictus : Inspirational Story
Lord of the Flies : Thematic Movie
Tangled : A Fairy Tale

- Debates from (BBC and NDTV)
- A course in Spoken English

Suggested References:

*L-T-P-C stands for number of lectures, tutorials, practices and credits

EC1208 BASIC ELECTRONICS

Externals: 60Marks **L-T-P-C**

Internals: 40Marks **4-0-0-4**

Objectives:

Unit-I: Introduction to Electronics

Introduction to Electronics and Electronic systems, Theory of Semiconductors, pn Junction Diode, Rectifiers: Half Wave Rectifier, Full Wave Rectifier, LEDs, Photo Diodes, Silicon Controlled Rectifier.

Unit-2:Transistors

Bipolar Junction Transistor, Transistor in CB and CE Configurations, Junction Field Effect Transistor, JFET Characteristics, MOSFET, Biasing of Transistors, Biasing of JFET.

Unit-3:Amplifiers and Transister models

Introduction to Amplifiers, Transistor Re Model, Transistor h parameter model, BJT Small Signal Analysis, JFET Signal Analysis, feedback Amplifiers, Phase Shift Oscillators, Wein Bridge Oscillators

Unit-4:Operational Amplifiers

Differential Amplifiers, operational amplifiers, applications of operational amplifiers:, Constant-Gain Multiplier , Voltage Summing , Voltage Buffer , Controller Sources, Instrumentation Circuits ,Active Filters .

Unit-5:Digital Electronics:

Logic gates, realization of logic gates, flip-flops, registers and counters.

TEXT BOOKS:

1. Electronic Devices and Circuit Theory – Robert L.Boylestad, Louis Nashelsky, 9th edition, 2008 PE
2. Electronic Devices and Circuits- David A. Bell- 5th Edition, Oxford University Press.

REFERENCE BOOKS:

1. Electronic Circuits Analysis and Design – Donald A Neamen, Third Edition, Tata McGraw-Hill, 2007.
2. Introductory Electronic Devices and Circuits- Robert T. Paynter, 7th edition, 2009, PEI.
3. Microelectric circuits- sedra/ Smith- 5th edition, 2009, Oxford University Press.

HS1201 COMMUNICATION SKILLS

Externals: **L-T-P-C**
Internals: **2-0-0-1**

Objectives:

- To complement the comprehensibility of the Technical subjects in a better way.
- To make them competent to attempt and qualify in various tests.

UNIT-I

Writing – Letter Writing **– Formal** – Inquiry – Application - Acceptance – Apology – Complaint – Seeking leave- **Informal - E mail –** Formal **- Speaking -** Introducing oneself - Introducing others - Asking for/giving directions **- Conversations** –Developing conversation skill in specific contexts (another sub-title is SITUATIONAL VARIATIONS IN TELEPHONE OPENINGS) – Leaving a message – How to make an appointment – **(Add more**) - Conversation Practice –-

Suggestions: Check the following site for better understanding - http://www.bbc.co.uk/worldservice/learningenglish/business/talkingbusiness/unit1telephone/1connecting.shtml

Suggested References:

*L-T-P-C stands for number of lectures, tutorials, practices and credits

HS1601 ENGLISH LAB

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **0-0-3-2**

Objectives:
* To sensitize students to their communication skills.
* To make the students practice the language skills (L, S, R, W).

UNIT-I –

Grammar – Adjectives – Comparatives and Superlatives – Adverbs – Countable and Uncountable Nouns – Pronouns – Simple present – Present continuous – Simple past- Conjunctions – Prepositions – Plurals – Articles a, an, the – Infinitive or –ing – Questions and Negatives -1 - Questions and Negatives -2

UNIT-II
Pronunciation – Pill/Fill – Buy/My – Tie/Die – Ship/Chip – Yet/ Jet – Game/ Came – Wail/Veil – Think/Sink – There/Dare – Price/ Prize – Asia/ Hard – Ran/Rang – Right/Light – Ship/Sheep – Head/Had- Schwa – Luck/ Look - Hat/Heart – But/Boot – Who/ Her – Pot/Port – Hair/ Hear – Pay/Pie – Boy/Buy – Know/ Now

UNIT-III
Writing – Writing a Thank You Letter – Writing about your life – Writing Instructions – Writing a Story – Writing an Essay – Writing a Business Letter – Writing a Film Review – Writing a Biography – Writing a Complaint Letter – Writing a Covering Letter - Writing a Pen friend Post - Writing about a Special Day - Writing an E-mail of Apology - Writing a Short Report - Writing a Post Card

UNIT – IV
Reading - The diamond thief – The guru and sweets – Taking a course – Reading a story - Using a dictionary – Making a journey – Reading a newspaper – Making friends – Reading an email – Finding information – A pen friend letter – The doctor says…- Choosing a holiday – Struck by lightning – Health matters :Yoga

UNIT – V
Listening – What shall we play? – An exciting weekend – A school outing – The morning assembly – Instructions on planting – Excuse me, can you lend me…- Manish's summer – Vignesh's hobby – What can I do for you? – What are you doing Ramesh? – I've got a few questions…- Geetha's day – Anil's new purchase – What are we having tonight? – What is the problem?

Suggested References:
1. Clarity English Success

CS1802 DATA STRUCTURES LAB

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **0-0-3-2**

Objectives:

- To provide experience on design, testing, and analysis of Algorithms and Data Structures.
- To acquaint the students with the Data Structures used in the Computer Science field.

Experiments:

1. Representation of Polynomials using Arrays and Linked List and the different operations that can be performed on Polynomials
2. Representation of Sparse Matrix using Arrays and Linked List and the different operations that can be performed on Sparse Matrices
3. Representation of Stacks using Arrays and Linked List and the different operations that can be performed on Stacks
4. Representation of Queues using Arrays and Linked List and the different operations that can be performed on Queues
5. Representation of Double Ended Queue using Arrays and Linked List and the different operations that can be performed on Double Ended Queue
6. Representation of Priority Queues using Arrays and Linked List and the different operations that can be performed on Priority Queues
7. Representation of Binary Trees using Arrays and Linked List and the different operations that can be performed on Binary Trees
8. Representation of Graphs using Arrays and Linked List and the different operations that can be performed on Graphs
9. Infix, Postfix and Prefix conversions.
10. Different Sorting and Searching methods.
11. String representation using Arrays and Linked List and different pattern matching algorithms
12. Implementation and operations on B-Tree and B+ Tree

For the detailed list of programs refer the lab manual.

Note: Any experiment according to the syllabus of CS1201 can be substituted.

PH1601 **PHYSICS LAB**

Externals: 60Marks **L-T-P-C**
Internals: 40Marks **0-0-3-2**

Objectives:

1. Coupled Pendula
2. Specific rotation - Polarimeter
3. Diffraction Grating
4. Dispersive power of a prism
5. Franck Hertz experiment
6. Photoelectric effect
7. Four probe Experiment
8. Hall effect
9. Ultrasonic Waves