# PANJAB UNIVERSITY, CHANDIGARH

## SYLLABI OF FIRST YEAR COURSES IN

**B.E. (Electronics and Communications Engineering)**

### Semester I

<table>
<thead>
<tr>
<th>S. No</th>
<th>Subject</th>
<th>Code</th>
<th>L-T-P</th>
<th>Credits Theory</th>
<th>Credits Practical</th>
<th>University External Marks</th>
<th>University Internal Marks</th>
<th>Practical Marks Internal</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Calculus</td>
<td>MATHS101</td>
<td>4-1-0</td>
<td>4</td>
<td></td>
<td>50</td>
<td>50</td>
<td></td>
<td>100</td>
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<tr>
<td>2.</td>
<td>Introduction to Electronics</td>
<td>EC102</td>
<td>3-0-2</td>
<td>3</td>
<td>1</td>
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<td>50</td>
<td>50</td>
<td>150</td>
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<td>3.</td>
<td>Workshop</td>
<td>ME103</td>
<td>0-0-4</td>
<td>2</td>
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<tr>
<td>4.</td>
<td>Applied Chemistry</td>
<td>CH101</td>
<td>4-0-3</td>
<td>3</td>
<td>1</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>150</td>
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<tr>
<td>5.</td>
<td>Communication Skills</td>
<td>HSS102</td>
<td>2-0-0</td>
<td>2</td>
<td></td>
<td>50</td>
<td>50</td>
<td></td>
<td>100</td>
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<tr>
<td>6.</td>
<td>Computer Programming (MATLAB Programming for Engineers) / Computer Programming</td>
<td>EC103 / CS104</td>
<td>2-0-2 / 3-0-2</td>
<td>2</td>
<td>1</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>150</td>
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### Total

<table>
<thead>
<tr>
<th>University External Marks</th>
<th>University Internal Marks</th>
<th>Practical Marks Internal</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td>250</td>
<td>200</td>
<td>700</td>
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### Semester II

<table>
<thead>
<tr>
<th>S. No</th>
<th>Subject</th>
<th>Code</th>
<th>L-T-P</th>
<th>Credits Theory</th>
<th>Credits Practical</th>
<th>University External Marks</th>
<th>University Internal Marks</th>
<th>Practical Marks Internal</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Differential Equations and Transforms</td>
<td>MATHS201</td>
<td>4-1-0</td>
<td>4</td>
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<td>50</td>
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<td></td>
<td>100</td>
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<td>2.</td>
<td>Ethics and Self Awareness</td>
<td>HSS201</td>
<td>2-0-0</td>
<td>2</td>
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<td>50</td>
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<td>100</td>
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<td>3.</td>
<td>Physics Course 1</td>
<td>-</td>
<td>4-0-3/4-0-2</td>
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<td>1</td>
<td>50</td>
<td>50</td>
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<td>4.</td>
<td>Introduction to Environment Science</td>
<td>GS201</td>
<td>3-0-0</td>
<td>3</td>
<td></td>
<td>50</td>
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<td></td>
<td>100</td>
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<td>5.</td>
<td>Analog Electronic Circuits – I</td>
<td>EC201</td>
<td>3-0-2</td>
<td>3</td>
<td>1</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>150</td>
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<td>6.</td>
<td>Digital Design</td>
<td>EC203</td>
<td>3-0-2</td>
<td>3</td>
<td>1</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>150</td>
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</table>

### Total

<table>
<thead>
<tr>
<th>University External Marks</th>
<th>University Internal Marks</th>
<th>Practical Marks Internal</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>300</td>
<td>150</td>
<td>750</td>
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</tbody>
</table>
SEMESTER I

Paper Title: Calculus
Paper Code: MATHS101
Pre Requisite: 10+2
Max (Univ. Exam) Marks: 50
Time of examination: 3hrs.
Internal Assessment: 50
Course Duration: 45 lectures of one hour each.

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

Objectives
• To understand the behaviour of infinite series and its use.
• To learn the concepts of functions of two and more than two variables and their applications.
• To learn the methods to evaluate multiple integrals and their applications to various problems.
• To understand the concepts of Vector calculus and their use in engineering problems.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Topic</th>
<th>No. of Lectures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>FUNCTIONS OF ONE VARIABLE</td>
<td>9</td>
</tr>
<tr>
<td>2.</td>
<td>DIFFERENTIAL CALCULUS OF FUNCTIONS OF TWO AND THREE VARIABLES</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Concept of limit and continuity of a function of two and three variables, Partial derivatives, total derivative, Euler’s theorem for homogeneous functions, composite function, differentiation of an implicit function, chain rule, change of variables, Jacobian, Taylor’s theorem, Errors and increments, Maxima and minima of a function of two and three variables, Lagrange’s method of multipliers (Scope as in Chapter 12, Sections 12.1 – 12.6, 12.8 – 12.9 of Reference 1).</td>
<td></td>
</tr>
</tbody>
</table>
### OUTCOMES

- The students are able to test the behavior of infinite series.
- Ability to analyze functions of more than two variables and their applications.
- Ability to evaluate multiple integrals and apply them to practical problems.
- Ability to apply vector calculus to engineering problems

### REFERENCES:

Paper Title : INTRODUCTION TO ELECTRONICS
Paper Code : EC102 / EC202
Pre Requisite : 10+2
Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50 Time of examination: 3hrs.
Internal Assessment : 50

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

Course Objectives:
1. To introduce the field of electronics along with the applications.
2. To understand the fundamental concepts of basic semiconductor devices and digital electronics.
3. To become familiar with basic principle of operational amplifier along with its applications.
4. To make students familiar with the basic concept of Communication System.

Lecture wise breakup of Lectures

**Part A**

**Introduction to Electronics**: Evolution of Electronic Devices and Integrated Circuit,
Applications of electronics, Need and application of electronics in different areas

(4)

**Semiconductor Devices**: Concept of active and passive devices, Intrinsic and Extrinsic Semiconductors, conductivity of semiconductors and its temperature dependence, Semiconductor Devices: Structure, principle of operation, characteristics and applications of PN-Junction (Rectifier, Clipper and Clamper), BJT, Current Components in BJT, Input & Output characteristics BJT configurations.

(12)

**Digital Electronics I**: Number System and conversion, Binary arithmetic, basic and universal logic gates, minimization of Boolean expression using Boolean Algebra and K-map.

(4)

**Part B**

**Digital Electronics II**: Concept of flip-flops, RS, D, JK and T types, basic operation of counters and registers, Introduction to RAM & ROM, Basic principle and characteristics of Analog to Digital Converters (ADCs) and Digital to Analog Converters (DACs).

(8)

**Operational Amplifier and its applications**: Block diagram, characteristics, inverting and non-inverting configurations, Op-amp as summing amplifier, difference amplifier, integrator and differentiator

(8)

**Communication Systems**: Various frequency bands used for communication, Block diagram of Analog and Digital communication, need of modulation, comparison of Analog and Digital communication systems.

(6)

**Recommended Books**:
1. Integrated Electronics, Millman & Halkias (Mc-Graw Hill)
2. Electronics Devices & Circuit Theory, RL Boylestead & L Nashelsky (PHI)

Course Name : INTRODUCTION TO ELECTRONICS (Practical)

List of Experiments:

1. Familiarization with electronic components and usage of Multimeter
2. Familiarization with CRO and Signal Generator.
3. To study the V-I characteristics of pn junction diode and determine static resistance and dynamic resistance.
4. To implement clipper and clamper circuits.
5. To plot the characteristics of BJT configurations.
6. To verify Truth Table of different logic gates.
7. To verify Truth Table of different flip-flops.
8. To study Op-amp as summing amplifier.
9. To study Op-amp difference amplifier.
10. To study Op-amp integrator and differentiator.
11. A project related to implementation of application based Electronic Circuit on a general purpose PCB.
Paper Title: Workshop Practice  
Paper Code: ME 203 / ME103  
Time of examination: 3hrs.  
Internal Assessment : 50  
Course Prerequisites: Basic Workshop Practices

<table>
<thead>
<tr>
<th>Course Objectives (CO)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student will be able to:</strong></td>
<td></td>
</tr>
<tr>
<td>1. Know different machines, tools and equipment, Identify different Engineering materials, metals and non-metals.</td>
<td></td>
</tr>
<tr>
<td>2. Understand different Mechanisms, Use of Machines, Tools and Equipment.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Outcome</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>This course is designed to help students achieve the following outcomes.</strong></td>
<td></td>
</tr>
<tr>
<td>1) Familiarity with common machines, Tools and Equipment in basic Workshop Practices.</td>
<td></td>
</tr>
<tr>
<td>2) On hand basic workshop practices in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal, Smithy, Foundry and Carpentry Workshops in Engineering professions.</td>
<td></td>
</tr>
<tr>
<td>3) Applications of Basic Workshop Practices.</td>
<td></td>
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</table>

**SYLLABUS**  
8u98  

**Instruction for Students:** The candidate will be attending a laboratory session of three hours weekly.  
Practice of basic exercises related with different shops. On hand basic workshop practices in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal, Smithy, Foundry and Carpentry Workshops in Engineering professions.  
Jobs: Butt Joint in Flat Position using SMAW.  
Lap Joint using Spot Welding  
Edge Joint in Horizontal Position using SMAW  
Tee Joint in Flat position using SMAW  
Corner Joint in vertical position using SMAW.  
Defect Identification and marking.  
Edge preparation and Fillet making, Tacking, Distortion identification
Electronics Workshop : To know about Soldering mechanism and techniques
Familiarity with Electronic Components / symbols
Testing of electronic components
Application of Soldering : Circuit Assembly
List of Jobs :
Practice of Soldering and de-soldering
Identification and testing of a) passive electronic components b) Active electronic components
Assembly of Regulated Power supply circuit

Electrical Workshop:
Introduction of Various Electric wirings, Wiring Systems, Electrical wiring material and fitting, different type of cables, Conduit pipe and its fitting, inspection points, switches of all types, Distribution boards, M.C.B’s etc.
Electric Shock and its management.
Electric Tools: Conversance with various tools and to carry out the following:
   a) Measurement of wire sizes using SWG and micrometer
   b) Identification of Phase and neutral in single phase supply

Jobs:
To control a lamp with a single way switch
To control a lamp from two different places
To assemble a fluorescent lamp with its accessories
To control a lamp, fan and a three pin socket in parallel connection with single way switches

Fitting Shop:
Introduction of Fitting, different type of operations, Tools, materials, precision instruments like Vernier caliper and Micrometer etc,
Safety precautions and Practical demonstration of tools and equipments

Jobs: To make a square from MS Flat, Punching, Cutting, Filling techniques and practice, Tapping, Counter Drilling

Smithy Workshop:
Jobs: Drawing and Upsetting Practice using Open Hearth Furnace.
Cold working process practice
Heat Treatment \ Annealing and hardening process

Jobs: To perform Marking, Facing, Turning, taper Turing, Grooving, Knurling, parting, Drilling, Reaming operations on lathe machine, Hacksawing practice on Power hacksaw, Shaping operation practice on Shaper
Carpentry Shop: Classification of Tree, Timber. Advantages and uses of Timber, Seasoning of Wood, Tools Used, Defects and Prevention of Wood,

Jobs:
Tee Joint
Cross Joint
Tenon Joint,
L Shape Joint
Practice of Wood Working Lathe
Practice on multi-purpose Planer

Foundry Shop: Introduction to Foundry, Advantages and Disadvantages of castings process, Introduction to pattern and various hand tools, Ingredients of Green sands, Various Hand Molding processes, Introduction to Casting Defects,

Jobs: Identification and uses of hand tools, Preparation of Green sand in Muller, Preparation of Sand Mould of Single piece solid pattern, Split pattern, Preparation of Green sand Core, casting of a Mould and study its defects.

RECOMMENDED BOOKS

<table>
<thead>
<tr>
<th>NAME</th>
<th>AUTHOR(S)</th>
<th>PUBLISHER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Introduction to Basic Manufacturing Processes and Workshop Technology</td>
<td>Rajender Singh</td>
<td>New Age International Publication</td>
</tr>
</tbody>
</table>
Paper Title       : Applied Chemistry

Paper Code       : CH101 / CH201

Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50            Time of examination: 3hrs.

Internal Assessment : 50

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

Objective: To teach fundamentals of basic chemical sciences essential for the development of new technologies to all branches of engineering.

Details of the Course:

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Contents</th>
<th>Contact hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PART A</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>CATALYSIS: Catalysis and general characteristics of a catalytic reactions, homogenous catalysis, kinetics of acid, base and enzyme catalysis – Michealis Menten equations. Heterogenous catalysis. Application of catalysis for industrially important processes– hydrogenation (Wilkinson’s catalyst), hydroformylation, acetic acid process and Wacker process.</td>
<td>6</td>
</tr>
<tr>
<td>3.</td>
<td>ELECTROCHEMISTRY: Introduction to electrochemistry, types of electrodes, Ion selective electrodes, Reference electrodes, Fuel cells (hydrogen-oxygen, propane-oxygen, methanol-oxygen fuel cells), Corrosion: Types of corrosion, dry and wet corrosion and their mechanisms, types of electrochemical corrosion (galvanic, pitting, waterline, differential aeration, soil, microbiological, inter-granular, stress corrosion), Factors influencing corrosion, Prevention of corrosion.</td>
<td>8</td>
</tr>
<tr>
<td><strong>PART B</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>POLYMER CHEMISTRY: Classification of polymers, Mechanism and methods of polymerisation, idea of number average and weight average molecular masses of polymers, preparation, properties and uses of polystyrene, polyester, polyamide, phenol-formaldehyde, silicones and epoxy resins,</td>
<td>5</td>
</tr>
</tbody>
</table>
transition of organic molecules, Woodward-Fieser Rules for calculating $\lambda_{\text{max}}$ for dienes. IR- Introduction, Principle of IR spectroscopy-Fundamental vibrations, Application to simple organic molecules (effect of masses of atoms, bond strength, nature of substituent, hydrogen bonding on IR frequency), sample preparation for IR.

6. **COORDINATION CHEMISTRY:** Introduction, Crystal Field Theory, Splitting of octahedral, tetrahedral and square planner complexes, crystal field stabilization energies of octahedral and tetrahedral complexes and its applications.

**Books suggested:**


**Practicals:**

Instruction for Students: The candidate will be attending a laboratory session of two hours weekly and has to perform any eight experiments.

- Volumetric analysis: iodometric titrations, complexometric titrations, Acid-base titrations
- Analysis of lubricants: Viscosity/surface tension/saponification value/acid value
- Instrumental techniques for chemical analysis: conductometry, potentiometry, UV-visible/IR spectrophotometer.
- Preparation of few organic compounds/inorganic complexes/polymer
Books Recommended:


Paper Title : Communication Skills
Paper Code : HSS102 / HS202

Max (Univ. Exam) Marks : 50 Time of examination: 3hrs.
Internal Assessment : 50

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

Part –A

Lecture Wise Breakup No. of Lectures

1. Fundamentals of Communication Skills (02)
   Scope and Significance of Communication Skills, Listening, Speaking, Reading and Writing
2. Writing Skills (04)
   Basics of Grammar – Word Order, Sentence Construction, Placing of Subject and Verbs, Parts of Speech, Use of Tenses, Articles, Prepositions, Phrasal Verbs, Active-Passive, Narration
3. Vocabulary Building and Writing (03)
   Word Formations, Synonyms, Antonyms, Homonyms, One-Word Substitutes, Idioms and Phrases, Abbreviations of Scientific and Technical Words
4. Speaking Skills (03)
   Introduction to Phonetic Sounds, English Phonemes, Stress, Rhythm and Intonation, Countering Stage Fright and Barriers of Communication
5. Reading and Comprehension (02)

Part –B

Lecture Wise Breakup No. of Lectures

1. Advanced Communication Skills (02)
   Scope, Significance, Process of Communication in an organization, Types and Levels, Communication Networks, Technical Communication, Tools of Effective Communication
2. Speaking Skills and Personality Development (05)
   Interpersonal Communication, Presentation Skills, Body Language and Voice Modulation, Persuasion, Negotiation and Linguistic Programming, Public Speaking, Group Discussions, Interviews and Case Studies, Power Point
Presentations, Relevant to the context and locale, Technical Presentations, Conducting, Meeting and Conferences

3. **Communication and Media** (01)
   Social and Political Context of Communication, Recent Developments in Media

4. **Advanced Techniques in Speaking Skills** (02)
   Importance of Listening/Responding to native and global accents, Telephonic Interviews and Video Conferencing

5. **Advanced Techniques in Technical Writing** (04)
   Job Application, CV Writing, Business Letters, Memos, Minutes, Reports and Report Writing Strategies, E-mail Etiquette, Blog Writing, Instruction Manuals and Technical Proposals

**Practical Sessions**

1. Individual presentations with stress on delivery and content
2. Overcoming Stage Fright - Debates, extempore
3. How to discuss in a group - Group Discussion
4. Discussion on recent developments and current debates in the media
5. How to prepare for an Interview and face it with confidence
6. Conducting meeting and conferences
7. Exercises on Composition & Comprehension, Reading Improvement

**TEXT BOOKS**


**REFERNCE BOOKS**

11. Lock, R., “Student Activities for taking charge of your Career Direction and Job Search”, Cole Publishing
Paper Title       : Matlab Programming for Engineers  
Paper Code        : EC103  
Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50 Time of examination: 3hrs.
Internal Assessment : 50

Course Assessment Methods
End semester Assessment (University Exam) : 50 marks
Continuous Assessment (Sessional): 50 marks (30-sessional, 20-quiz, objective test)

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

Course Prerequisites: No specific prerequisites are needed. It is advisable to have a have a good familiarity with PC operations and a working knowledge of some basic application software (Excel). Basic knowledge of computer programming and an understanding of matrix and linear algebra are highly beneficial.

Course Objectives (CO) : The course provides a gentle introduction to the MATLAB computing environment, and is intended for beginning users and those looking for a review. It is designed to give students a basic understanding of MATLAB, including popular toolboxes. The course consists of lectures and sample MATLAB problems given as assignments and discussed in class. No prior programming experience or knowledge of MATLAB is assumed. Concepts covered include basic use, graphical representations and tips for designing and implementing MATLAB code. The main objectives are: understanding the MATLAB environment; being able to do simple calculations using MATLAB; being able to carry out simple numerical computations and analyses using MATLAB.

Course Outcome : Upon successful completion of this course, the student should be able to: understand the main features of the MATLAB development environment; use the MATLAB GUI effectively; design simple algorithms to solve problems; write simple programs in MATLAB to solve scientific and mathematical problems; know where to find help.

PART-A

<table>
<thead>
<tr>
<th>Lectures</th>
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</thead>
<tbody>
<tr>
<td>Introduction:</td>
</tr>
<tr>
<td>Introduction to basic features of Matlab and Matlab desktop</td>
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<tr>
<td>(2)</td>
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<tr>
<td>Basic Programming Operations:</td>
</tr>
<tr>
<td>Script M-files, Arrays and array operations, Multidimensional arrays, Numeric data types, Cell arrays and structures, Character strings, Relational and logical operations, Control flow</td>
</tr>
<tr>
<td>(6)</td>
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</tbody>
</table>
3 **Advance Programming Operations:**
Functions, M-file debugging and profiling, File and directory management, Set, bit and base functions, Time computations

4 **Basic Mathematical Applications:**
Matrix Algebra, Data analysis, Data interpolation, Polynomials, Cubic splines

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**PART-B**

5 **Advance Mathematical Applications:**
Fourier analysis, Optimization, Integration, Differentiation, Differential equations

6 **Basic Graphical Operations:**
Two-dimensional graphics, Three-dimensional graphics, Use of colors and light in graphics, Generation of images

7 **Advance Graphical Operations:**
Development of movies and sounds, Printing and exporting graphics, Handling graphics, Development of graphical user interfaces

8 **Classes and Interfacing:**
Matlab classes and Object-Oriented Programming, Matlab programming interfaces

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**Books Suggested:**

1. **Mastering MATLAB 7**
   D. Hanselman and B. Littlefiels, Pearson Education, New Delhi, 2009

2. **Getting started with Matlab: A quick introduction for scientists and engineers**
   Rudra Pratap, Oxford University Press, USA, 2009.

3. **Programming in MATLAB for Engineers**

4. **MATLAB An Introduction with Applications**
   Amos Gilat, John Wiley and Sons, New Delhi, 2009

5. **Essential Matlab for Engineers and Scientists**
   Brian H Hahn, Elsevier India

6. **Matlab: A practical Introduction To Programming**
   Attaway, Elsevier India
Paper Title : Matlab Programming for Engineers (Practical)
Max (Univ. Exam) Marks : 50

Internal Assessment : 50

Course Assessment Methods
End semester Assessment (University Exam) : Nil
Continuous Assessment: 50 marks (25 day to day work, 25 assignments)

Course Prerequisites: No specific prerequisites are needed. It is advisable to have a good familiarity with PC.

Course Objectives(CO): The course provides a gentle introduction to the MATLAB computing environment. It is designed to give students a basic understanding of MATLAB, including popular toolboxes. The main objectives are: understanding the MATLAB environment; being able to do simple calculations using MATLAB; being able to carry out simple numerical computations and analyses using MATLAB.

Course Outcome: Upon successful completion of this course, the student should be able to: understand the main features of the MATLAB development environment; use the MATLAB GUI effectively; design simple algorithms to solve problems; write simple programs in MATLAB to solve scientific and mathematical problems; know where to find help.

Syllabus

List of Experiments

1. Basics such as command window, workspace, m-files, clc, clear, who, save, load, format, ;, ..., if, else, switch, for, while, continue, break, try, catch, return, ctrl+C, entering matrices, transpose, subscripts, colon operator, modifying or deleting rows and columns, addition, subtraction, matrix multiplication, element-by-element multiplication / division / left-division, sum, diag, eye, zeros, ones, rand, randn, det, inv, variables, numbers, strings, numeric operators, relational operators, functions.

2. 2-D and 3-D plotting. Modifying graph properties such as title, labels, limits, colors, line-types, line-weights, lights etc. using graphic handles. Exporting graphs as TIFF, PDF and JPEG files.


4. Curve fitting and simple regression analysis of some simulated data.
5. Use of FFT method to find the frequency components of a signal buried in a noisy time domain signal.


7. Differentiation and integration of a function using symbolics.

8. Solution of an ordinary differential equation and development of a corresponding GUI.
Paper Title : Computer Programming
Paper Code : CS104 / CS204
Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50
Internal Assessment : 50

Time of examination: 3hrs.

Course Duration: 45 lectures of one hour each with four lectures per week.

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

Objective: To get basic knowledge of computers, its components and Operating systems and Linux. Shell Commands. To acquire programming skills in C and basic knowledge of Object Oriented Programming.

PART A

1. Introduction: (8 hrs)
   Computer Basic, Block Diagram of Computer, Memory Hierarchy, Types of RAM, Secondary Memory Introduction to Operating Systems, Programming Languages, Program Structure, Linux Shell Commands, Bourne Shell, C Shell, Korn Shell

2. Basic Constructs of C: (8 hrs)
   Keywords, Identifiers, Variables, Symbolic Constants, Data Types and their storage, Operands, Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Increment & Decrement Operators, Expressions, Conditional Expressions, Assignment Operators and Expressions, Type Conversions, Precedence and Order of Evaluation, External Variables and Scope of Variables. Basic Input Output, Formatted I/O.

3. Program Control Flow: (4 hrs)
Statements and Blocks, Conditional Statements, IF, ELSE-IF, Switch Case statements, Control Loops, For, While and Do-While, Go to and Labels.

4. **Arrays & Functions: (8 hrs)**
   Pointers and Addresses, Arrays, Multi dimensional arrays, strings, pointer arrays, Functions, Function Prototyping, Scope of functions, Arguments, Call by value and call by references, static variables, recursion.

**PART B**

5. **Structures: (4 hrs)**
   Structures, Array of Structures, pointer to structures, Typedef, Unions, Bit fields, passing structures as an argument to functions, C-Preprocessor and Macros, Command line arguments.

6. **Input and Output** (7 hrs)
   Standard and Formatted Input and Output, File Access & its types, Line Input and Output, Types of Files, Binary & ASCII Files, Error handling, stderr and exit functions

7. **Introduction to Object Oriented Programming:** (6 hrs)
   Classes and Objects, Structures vs Classes, Abstraction, Encapsulation, Polymorphism, Inheritance.

**Recommended Books:**

Paper Title : Computer Programming Practical

Internal Assessment : 50

Instruction for Students: The candidate will be attending a laboratory session of 2 hours weekly and students have to perform the practical related to the following list.

1. Introduction to UNIX Shells, C Shell, Bourne Shell, Korn Shell
2. Writing and compiling C Program in Linux.
3. Introduction to basic structure of C program, utility of header and library files.
4. Implementation of program related to the basic constructs in C
5. Program using different data types in C
6. Programs using Loops and Conditional Statements in C
7. Programs using arrays single dimension and multi dimensions in C.
8. Implementation of Matrices and their basic functions such as addition, subtraction, multiplication, inverse.
9. Programs using functions by passing values using call by value and call by reference method
10. Programs related to structures and unions
11. Program to implement array using pointers
12. Programs related to string handling in C
13. Program to manage I/O files
14. Introduction to classes and program related to basic use of classes showing their advantages over structures.
15. Any other program related to theory program to enhance the understanding of students in the subject.
**SEMMESTER II**

**Paper Title**: Differential Equations and Transforms  
**Paper Code**: MATHS201  
**Pre Requisite**: Calculus (MATHS101)  
**Course Duration**: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50  
**Internal Assessment**: 50  
**Time of examination**: 3hrs.

**Note for the examiner**: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

**Objectives**
- To learn the methods to formulate and solve linear differential equations and their applications to engineering problems
- To learn the concepts of Laplace transforms and to evaluate Laplace transforms and inverse Laplace transform
- To apply Laplace transforms to solve ordinary differential equations
- To learn the concept of Fourier series, integrals and transforms.
- To learn how to solve heat, wave and Laplace equations.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Topic</th>
<th>No. of Lectures</th>
</tr>
</thead>
<tbody>
<tr>
<td>PART A</td>
<td><strong>ORDINARY DIFFERENTIAL EQUATIONS</strong></td>
<td>13</td>
</tr>
<tr>
<td>1.</td>
<td>Review of geometrical meaning of the differential equation ( y' = f(x, y) ), directional fields, Exact differential equations (Scope as in Chapter 8, Section 8.7 of Reference 5), Integrating factors (Scope as in Chapter 8, Section 8.8 of Reference 5), Solution of differential equations with constant coefficients: method of differential operators. Non – homogeneous equations of second order with constant coefficients: Solution by method of variation of parameters (Scope as in Chapter 9, Section 9.7 of Reference 5). Power series method of solution (Scope as in Chapter 10, Section 10.2 of Reference 2)</td>
<td></td>
</tr>
</tbody>
</table>
### Part B

#### 2. Laplace Transforms

Laplace transform, Inverse transforms, shifting, transform of derivatives and integrals. Unit step function, second shifting theorem, Dirac’s Delta function. Differentiation and integration of transforms. Convolution Theorem on Laplace Transforms. Application of Laplace transforms to solve ordinary differential equations with initial conditions (Scope as in Chapter 5, Sections 5.1 – 5.5 of Reference 1).

<table>
<thead>
<tr>
<th>2. Laplace Transforms</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Laplace Transforms</strong>: Periodic functions, Fourier series, Even and odd series, half range expansions, Complex Fourier Series, Approximation by trigonometric polynomials. Fourier integrals, Fourier Cosine and Sine transforms, Fourier Transforms (Scope as in Chapter 10, Sections 10.1 – 10.5, 10.7 – 10.10 of Reference 1).</td>
<td>8</td>
</tr>
<tr>
<td><strong>Partial Differential Equations</strong>: Partial differential equations of first order, origin, solution of linear partial differential equations of first order, Integral surfaces passing through a given curve (Scope as in Chapter 2, Sections 1, 2, 4, 5 of Reference 4).</td>
<td>6</td>
</tr>
<tr>
<td><strong>Boundary Value Problems</strong>: D’Alembert’s solution of wave equation, separation of variables: one dimension and two dimension heat and wave equation, Laplace equation in Cartesian and Polar coordinates (Scope as in Chapter 11, Sections 11.1, 11.3 – 11.5, 11.8 – 11.9 of Reference 1).</td>
<td>8</td>
</tr>
</tbody>
</table>

### Outcomes

1. The student will learn to solve Ordinary Differential equations.
2. The students will be able to apply the tools of Laplace Transforms to model engineering problems and solve the resulting differential equations.
3. Students will understand the nature and behavior of trigonometric (Fourier) series and apply it to solve boundary value problems.

### References:

Paper Title : Ethics and Self Awareness

Paper Code : HSS201 / HSS101

Max (Univ. Exam) Marks : 50
Internal Assessment : 50

Time of examination: 3hrs.

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

Lecture Wise Breakup

PART A

1. Introduction to Ethics (06)
   Concept of Ethics – Nature, Scope, Sources, Types, Functions and Factors influencing Ethics, Approaches to Ethics – Psychological, Philosophical and Social, Broader Ethical Issues in Society.

2. Values, Norms, Standards and Morality (04)
   Concept and Role, Relation with Ethics, Psycho-Social Theories of Moral Development – Kohlberg and Carol Gilligan

3. Ethics and Business (05)
   Concept of Business Ethics – Nature, Objectives and Factors influencing Business Ethics, 3 C’s of Business Ethics, Ethics in Business Activities, Ethical Dilemmas in Business, Managing Ethics

PART B

4. Self-Awareness (04)
   Concept of Self Awareness – Need, Elements, Self Assessment – SWOT Analysis, Self Concepts – Self-Knowledge, Assertiveness and Self-Confidence, Self-Esteem

5. Self-Development (11)
   Concept of Self-Development, Social Intelligence, Emotional Intelligence, Managing Time and Stress, Positive Human Qualities (Self-Efficacy, Empathy, Gratitude, Compassion, Forgiveness and Motivation), Personality Development Models – Johari Window, Transactional Analysis, Myers Briggs Type Indicator, Self-Awareness and Self-Development Exercises

BOOKS
8. Twain, Allan, “Self-Awareness”
Physics Course 1

Any one of the following three papers to be chosen by institute

Paper Title : Oscillations And Optics (Theory)
Paper Code : APH 101 / APH 201
Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50  Time of examination: 3hrs.
Internal Assessment : 50

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

PART A

Ultrasonics: Production and detection of ultrasonics (2)

SHM: Review of SHM, superposition of two SHM in one dimension, charge oscillations in LC circuits (3)

Damped Oscillations: Concept and cause of damping, differential equation of a damped oscillator and different kinds of damping, Methods of describing damping of an oscillator - logarithmic decrement, relaxation time, quality factor, band width. Series LCR circuit as a damped oscillator. (3)

Forced Oscillations: States of forced oscillations, differential equation of forced oscillator – its displacement, velocity and impedance, behaviour of displacement and velocity with driver’s frequency, Power, bandwidth, Quality factor and amplification of forced oscillator, resonance in forced oscillators, forced oscillations in series LCR circuit (4)

Wave Motion: Wave equation and its solution, characteristic impedance of a string, reflection and transmission of waves on a string at a boundary, reflection and transmission of energy, the matching of impedances (3)

PART B

Interference: Division of wave front and amplitude; Fresnel’s biprism, Newton’s rings, Michelson interferometer and its applications for determination of λ and dλ. (4)

Diffraction: Fresnel and Fraunhofer diffraction, qualitative changes in diffraction pattern on moving from single slit to double slit, plane transmission grating, dispersive power & resolving power of a grating. (5)
**Polarization:** Methods of polarization, analysis of polarized light, quarter and half wave plates, double refraction. (4)

**Lasers:** Elementary idea of LASER production, spontaneous emission, stimulated emission, Einstein’s coefficients, Helium-Neon, Ruby and semiconductor lasers, applications of lasers. (4)

**Fibre Optics:** Basics of optical fibre - its numerical aperture, coherent bundle, step index and graded index fibre, material dispersion, fibre Optics sensors, applications of optical fibre in communication systems. (3)

**Holography:** Basic principle, theory and requirements, applications (2)

**References:**

1. Physics for Engineers (Prentice Hall India) - N.K. Verma
3. Optics – Ajoy Ghatak

**Paper Title:** Oscillations and Optics Practical

**Internal Assessment:** 50

1. To study Lissajous figures obtained by superposition of oscillations with different frequencies and phases.
2. To find the wavelength of sodium light using Fresnel’s biprism.
3. (i) To determine the wavelength of He-Ne laser using transmission grating.
   (ii) To determine the slit width using the diffraction pattern.
4. To determine the wave length of sodium light by Newton’s rings method.
5. To determine the wave length of sodium light using a diffraction grating.
6. To find the specific rotation of sugar solution using a Bi-quartz Polarimeter.
7. To design a hollow prism and used it find the refractive index of a given liquid.
8. To determine the wavelength of laser using Michelson interferometer.
**PART A**

**SPECIAL THEORY OF RELATIVITY**

Inertial and non-inertial frames of reference, Galilean transformation, Michelson Morley Experiment, postulates of special theory of relativity, Lorentz transformation, Simultaneity, Length contraction, Time dilation, Doppler effect, Addition of velocities, variation of mass with velocity, mass-energy relation (7)

**ORIGIN AND POSTULATES OF QUANTUM PHYSICS**

Quantum theory of light, X-rays production, spectrum & diffraction (Bragg’s law), photoelectric effect, Compton effect, pair production, photons & gravity, black holes, de-Broglie hypothesis, particle diffraction, uncertainty principle and applications (7)

Postulates of quantum mechanics, Schrodinger theory, time-dependent and time-independent Schrodinger equation, wave function, Born interpretation and normalization, expectation values (3)

**PART B**

**APPLICATIONS OF QUANTUM PHYSICS**

Particle in a box (infinite potential well), finite potential step and barrier problems, tunneling, linear harmonic oscillator (one-dimensional) (4)

Hydrogen atom (qualitative), radiative transitions and selection rules, Zeeman effect, Spin-orbit coupling, electron spin, Stern-Gerlach experiment, exclusion principle, symmetric and antisymmetric wavefunctions (5)

**STATISTICAL PHYSICS**

References:


2. Solid State Physics, by C. Kittel (Wiley Eastern)

3. Solid State Physics, by S.O. Pillai (New Age International)

4. Statistical Physics and Thermodynamics by V.S. Bhatia

Paper Title: Quantum And Statistical Physics (Practical)

Internal Assessment: 50

1) To study the quantized energy level of the first excited state in the Argon using the Frank-Hertz setup.
2) To find the value of Planck’s constant and evaluate the work function of cathode material by used of photoelectric cell.
3) To study various characteristics of photo-voltaic cell: (a) Voltage-current characteristics, (b) loading characteristics, (c) power-resistance characteristics and (d) inverse square law behavior of the photo-current with distance of source of light from photo-voltaic cell
4) To study the response of a photo-resistor to varying intensity of light falling on it and deduce spectral sensitivity of its semiconductor material.
5) To study the Balmer Series of Mercury and Hydrogen spectrum using diffraction grating and calculate Rydberg constant
Paper Title : Physics of Materials
Paper Code : APH207 / APH107
Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50          Time of examination: 3hrs.
Internal Assessment : 50

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

Part - A

Crystal structure: Bonding forces and energies, Primary and Secondary bonds, Space Lattices, Symmetries in a cubic lattice, Crystal Structures (cubic and hexagonal cells), Assignment of coordinates, directions and planes in crystals, Linear, Planar and Space densities in crystals, close packed morphology (Hexagonal and cubic close packing), single and polycrystalline structures, interstitial spaces (trigonal, tetrahedral and octahedral voids)
Structure of ceramics (NaCl, Zinc blende, silica and silicates, diamond crystal, Graphite, Fullerenes and carbon nanotubes)
Structure of polymers, crystallinity of long chain polymers
Crystal Structure analysis, X-ray diffraction and Bragg’s law, Powder method for study of X-ray diffraction pattern
Crystal Defects (Point, line, surface and volume imperfections)  (14hrs)

Diffusion: Diffusion mechanisms, steady state diffusion, non-steady state diffusion, factors affecting diffusion, applications based on diffusion (corrosion resistance of Duralumin, carburization of steel, decarburization of steel, doping of semiconductors)  (3hrs)

Elastic, Anelastic and Viscoelastic Behaviour Elastic behaviour and its atomic model, rubber like elasticity, anelastic behaviour, relaxation processes, viscoelastic behaviour, spring-dashpot model  (3hrs)

Part - B

Plastic Deformations and strengthening mechanisms : Tensile properties (Yield strength, Tensile Strength, Ductility, Resilience, Toughness), Dislocations and plastic deformation, characteristics of dislocations, slip systems, slip in single crystals, plastic deformation of polycrystalline materials, mechanisms of strengthening in metals (grain size reduction, solid-solution strengthening, strain hardening), recovery, recrystallization and grain growth  (5hrs)

Fracture, Fatigue and Creep : Fracture (Ductile and brittle fractures), principles of fracture mechanics, fracture toughness, ductile to brittle transitions Cyclic stresses, S-N curve, crack
initiation and propagation, factors that affect fatigue life, environmental effects, generalized creep behavior, stress and temperature effects.

(5hrs)


(6hrs)

**Phase Transformations:** Kinetics of phase transformation, kinetics of solid state reactions, Isothermal transformation diagrams, continuous cooling transformation, temper embrittlement

(4hrs)

**References:**

**Paper Title:** Physics of Materials (Practical)

**Internal Assessment:** 50

1. To find the energy band gap of the given semiconductor by four probe method.
2. To study the Hall Effect of a given semiconductor.
3. To determine the dielectric constant of the given materials.
4. To study the B-H curve of the ferromagnetic materials.
5. To determine the value of e/m for electron by long solenoid (helical) method.
6. To study the variation of magnetic field with distance along the axis of a circular coil carrying current by plotting a graph.
7. To find the Curie temperature of a Ferroelectric material by measuring Capacitance as a function of temperature.
8. To determine the thermal conductivity of an insulator material using guarded plate method (Lee's disc method).
9. To Study (a) Voltage-current characteristics (b) loading characteristics (c) Power-Resistance characteristics and (d) intensity response of photovoltaic cell.
Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

PART A

General (04)
Introduction, components of the environment, environmental degradation.

Ecology (04)
Elements of ecology: Ecological balance and consequences of change, principles of environmental impact assessment.

Air pollution and control (06)
Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, greenhouse effect, depletion of ozone layer, standards and control.

PART B

Water pollution and control (06)
Hydrosphere, natural water, pollutants their origin and effects, river/lake/ground water pollution, standards and control.

Land Pollution (06)
Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes): their origin and effects, collection and disposal of solid waste, recovery and conversion methods.

Noise Pollution (04)
Sources, effects, standards and control.
Books & References

Course Objectives:
5. To provide the capability to use abstractions to analyze and design simple electronic circuits.
6. To make students understand transistors and its biasing and how complex devices such as Bipolar Junction Transistors are modeled and the use of the mathematical models in the design and analysis of various circuits.
7. To familiarize the student with the analysis and design of basic transistor amplifier circuits, feedback amplifiers, oscillators and power amplifiers.

Lecture wise breakup

<table>
<thead>
<tr>
<th>Part A</th>
<th>No. of Lectures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transistor and its Biasing: Transistor operation and Characteristics,</td>
<td></td>
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<tr>
<td>CB, CC and CE configurations, Operating point, Bias stability, various</td>
<td></td>
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<tr>
<td>biasing circuits, stabilization against variation in Ico, Vbe and beta,</td>
<td></td>
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<tr>
<td>Bias compensation, Thermistor and Sensistor compensation, Thermal</td>
<td></td>
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<tr>
<td>Runaway, Thermal stability.</td>
<td>(8)</td>
</tr>
<tr>
<td>BJT Modeling: Transistor as an amplifier, comparison of CB, CC and CE</td>
<td></td>
</tr>
<tr>
<td>amplifier stages, BJT modeling, Important parameters: Input Impedance,</td>
<td></td>
</tr>
<tr>
<td>Output Impedance, voltage and current gain, Transistor h–parameters,</td>
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<tr>
<td>conversion formulas, re model, analysis of transistor amplifiers using</td>
<td></td>
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<tr>
<td>h-parameters.</td>
<td>(8)</td>
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<tr>
<td>Field Effect Transistors: Introduction, FET Construction, types of</td>
<td></td>
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<tr>
<td>FETs, MOSFET: types and working principle, FET biasing, FET small</td>
<td></td>
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<tr>
<td>signal model, FET applications.</td>
<td>(6)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Part B</th>
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</thead>
<tbody>
<tr>
<td>BJT Frequency Response: Frequency Response of single stage CE amplifier,</td>
</tr>
<tr>
<td>Multistage amplifiers, Direct coupled, RC coupled and Transformer</td>
</tr>
<tr>
<td>coupled, frequency response of multistage amplifiers, cascode circuits.</td>
</tr>
<tr>
<td>(6)</td>
</tr>
<tr>
<td>Oscillators: Introduction to feedback, basic principles of sinusoidal</td>
</tr>
<tr>
<td>oscillators, condition for sustained oscillations, tuned collector,</td>
</tr>
<tr>
<td>tuned base, Hartley oscillator, Colpitt’s Oscillator, Phase Shift</td>
</tr>
<tr>
<td>Oscillator, Wein Bridge Oscillator and Crystal Oscillator.</td>
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<td>(8)</td>
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<tr>
<td>Power Amplifiers: Classification of amplifiers, Single tuned and</td>
</tr>
<tr>
<td>double tuned amplifiers, analysis of class A, B, C and AB amplifiers,</td>
</tr>
<tr>
<td>push pull amplifier, complementary symmetry, amplitude distortion in</td>
</tr>
<tr>
<td>amplifiers, harmonics, power distortion, heat sinks.</td>
</tr>
<tr>
<td>(8)</td>
</tr>
</tbody>
</table>
Recommended Books:
1. Integrated electronics, Millman & Halkias, TMH.
2. Electronics Devices & Circuit Theory, RL Boylestead & L Nashelsky, PHI
3. Microelectronic Circuits, AS Sedra & KC Smith, OXFORD

Paper Title : ANALOG ELECTRONIC CIRCUITS –I (Practical)

Internal Assessment : 50

List of Experiments:

1. Familiarization with electronic components and usage of Multimeter
2. Familiarization with CRO and Signal Generator.
3. To study the V-I characteristics of pn junction diode and determine static resistance and dynamic resistance.
4. To implement clipper and clamper circuits.
5. To plot the characteristics of BJT
6. To plot the frequency response of a single stage BJT amplifier.
7. To measure the voltage and current gain of a BJT amplifier.
8. To plot the characteristics of FET.
9. To verify the operation of BJT as an amplifier and draw the frequency response RC coupled amplifier.
10. To measure the distortion in the output of a push pull amplifier.

All these experiments are to be performed on bread board and simulated in Pspice software.
Paper Title : DIGITAL DESIGN
Paper Code : EC 203
Course Duration: 45 lectures of one hour each.

Max (Univ. Exam) Marks : 50 Time of examination: 3hrs.
Internal Assessment : 50

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

Course Objectives:
8. To apply minimization techniques for reducing the functions up to six variables.
9. To design various combinational circuits
10. To write the truth table, excitation table, characteristic equations of various flip flops and to design the sequential circuits using Flip flops.
11. To familiarize the various A/D, D/A Converters, Logic families and their characteristics.
12. To design an application based on digital circuits.

Lecture wise breakup

<table>
<thead>
<tr>
<th>Lectures</th>
<th>No. of Lectures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimization Techniques</td>
<td></td>
</tr>
<tr>
<td>Sum of Products and Products of Sum forms, Minterms &amp; Maxterms, Karnaugh Map for two, three, four five and six variables, Quine-McCluskey method</td>
<td>(6)</td>
</tr>
<tr>
<td>Combinational Circuit Design</td>
<td></td>
</tr>
<tr>
<td>Half adder, full adder, subtractor, BCD adder, comparator, code converter, encoder decoder, multiplexer, demultiplexer, parity detector and generator, PLA, PAL and ROM</td>
<td>(6)</td>
</tr>
<tr>
<td>Flip Flops</td>
<td></td>
</tr>
<tr>
<td>1-bit memory cell, clocked and unclocked flip flops, S-R Flip flop, D flip flop, JK Flip flop, T flip flop, edge triggered flip flop, race around condition, Master slave flip flop, conversion of flip flops.</td>
<td>(6)</td>
</tr>
<tr>
<td>Counters</td>
<td></td>
</tr>
<tr>
<td>Ripple counter, design of Mod-N ripple counter, design of synchronous counter with and without lockout condition, decade counter, ring counter, Johnson counter</td>
<td>(4)</td>
</tr>
</tbody>
</table>

Part A

Part B

Shift Registers Serial in serial out shift register, serial in parallel out shift register, parallel in serial out shift register and parallel in parallel out shift register, bidirectional shift register, universal shift register. (5)

A/D And D/A Converters
Weighted resistor D/A converter, Binary ladder D/A converter. A/D Converters- flash type, successive approximation, counter ramp type, dual slope type, characteristics of ADC and DAC. (6)

Logic Families
Characteristics of logic families, RTL, TTL, ECL, DTL, DCTL, I^2L, HTL, CMOS logic families.

(9)

Recommended Books:
2. Digital principles and Applications, by Malvino Leach
3. Digital System Principles and Applications, by R J Tocci (PHI)
4. Modern Digital Electronics, by R P Jain, TMH
5. Digital Integrated Electronics, by Taub Schilling, TMH

Paper Title: DIGITAL DESIGN (Practical)
Internal Assessment: 50

List of Experiments
1. To Study the data sheets of TTL and ECL gates
2. Implementation of Adder and Subtractor using Logic Gates.
3. Implementation of Binary Adder/Subtractor.
5. Design & implementation of Combinational circuits using Multiplexers
6. Design and implement a Universal shift register having shift-right, shift-left, SISO, PIPO capabilities.
8. Implementations of Ripple counter.
10. Implementation of Synchronous counters with unused states and/or avoiding Lock Out condition.
11. To convert 8 bit Digital data to Analog value using DAC
12. To convert Analog value into 8 bit Digital data using ADC.