### Chhattisgarh Swami Vivekanand Technical University, Bhilai

#### Scheme of Teaching and Examination

**B.E. III SEMESTER**

**ELECTRONICS AND INSTRUMENTATION**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Board of studies</th>
<th>SUBJECT CODE</th>
<th>Subject Name</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>ESE</th>
<th>CT</th>
<th>TA</th>
<th>Theory / Practical</th>
<th>Total Marks</th>
<th>Credit</th>
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**L**-Lecture, **T**-Tutorial, **P**-Practical, **ESE**-End Semester Examination, **CT**-Class Test, **TA**-Teacher's Assessment

Note (1): Duration of all theory papers will be of **Three Hours**.
CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, 
BHILAI (C. G.)

Semester: B.E. III Sem. 
Branch: Electronics & Instrumentation, 
Electronics and Telecom Engg., 
Appl. Electronics & Instru,

Subject: Mathematics-III 
Code: 328311 (14)

Total Theory Periods: 40 
Total Tutorial Periods: 10

Total Marks in End Semester Exam: 80
Minimum number of class tests to be conducted: 02

UNIT - 1 FOURIER SERIES (No. of periods 8+2)
Periodic functions, Definition of Fourier series, Euler's formulæ, Dirichlet conditions, Change of interval, Even and odd functions, Half range Fourier Sine & Cosine series, Parseval’s identity, Practical harmonic analysis.

UNIT - 2 FOURIER TRANSFORM (No. of periods 8+2)

UNIT – 3 LAPLACE TRANSFORM (No. of periods 8+2)
Definition, Linearity, shifting & scaling properties, Transform of elementary functions, Transform of derivatives and integrals, Multiplication by t & division by t. Inverse Laplace transform, Convolution theorem, Transform of periodic functions, Unit step function & Dirac delta function, Initial value & final value theorems, Application to solution of ordinary differential equations.

UNIT - 4 COMPLEX VARIABLES (No. of periods 8+2)

UNIT – 5 CORRELATION AND REGRESSION (No. of periods 8+2)
Linear correlation, Measures of correlation, Karl Pearson’s coefficient of correlation, Spearman’s rank correlation coefficient, Bivariate frequency distribution, Regression, lines of regression & coefficients of regression, Standard error estimate.

TEXT BOOKS: -

REFERENCE BOOKS: -
3. Applied Mathematics for Engineers & Physicists by Louis A. Pipes- TMH.
Unit – I

Unit – II

Unit - III

Unit – IV

Unit – V

Name of Text Books:
1. Integrated Electronics: Analog & Digital Circuit Systems – Jacob Millman & Halkias, TMH.
2. Electronic Devices & Circuits – Allen Mottershead, PHI.

Name of Reference Books:
1. Electronic Devices and Circuit Theory – Boylestad & Nashelsky, 8th Ed. PHI.
Unit 1 Measurement & Instrumentation

Unit 2 Potentiometer
DC Potentiometer: - Basic potentiometer circuit, Laboratory type potentiometer, Multiple Range Potentiometer, Constructional Details of Potentiometer, Precision type potentiometer, Volt ratio Box, Application of D.C. Potentiometer, Self balancing potentiometer.
AC Potentiometer:- Standardizing AC potentiometer & use of Transfer instruments, Types of AC potentiometers, Drysdale polar potentiometer, Gall -Tinsley AC Potentiometer, Quadrature Adjustment of Currents, Application of AC Potentiometer.

Unit 3 Bridges

Unit 4 Analog Instruments

Unit 5 Measurement of Power & Energy
Power in DC & AC Circuits, Electrodynamometer wattmeters, Ferrodynamic wattmeters, Low power factor wattmeters, Measurement of power in three phase circuits, Three phase wattmeter, Measurement of Reactive power.

Name of the Text Books :
2. D.S. Kumar, “Mechanical Measurements & Control”, Metropolition Publication

Name of Reference Books :
1. Albert Helfrik & Cooper, “Modern Electronic Instrumentation & Measurement Technique”, Prentice Hall Of India
CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY,
BHILAI (C.G.)

Semester: III Branch: Electronics & Instrumentation,
Applied Electronics & Instrumentation

Subject: Electrical Engg. Materials Code: 327312 (24)
Total Theory Periods: 40 Total Tut Periods: 10
Total Marks in end Semester Exam.: 80
Minimum number of class tests to be conducted: 02

Unit 1: Dielectric Properties of Insulators in Static Fields.
Static dielectric constant, Polarization and dielectric constant, Atomic interpretation of the dielectric constant of monatomic gases Qualitative remarks on the dielectric constant of polyatomic molecules, Internal field in solids and liquids, Static dielectric constant of solids, Some properties of ferroelectrics materials, Spontaneous polarization, Piezoelectricity.

Unit 2: Behavior of Dielectric in Alternating Fields
Frequency dependence of the electronic polarizability, Ionic polarization as a function of frequency, complex dielectric constant of non-dipolar solids, dipolar relaxation, dielectric losses.

Unit 3: Magnetic Properties of Materials
Summary of concepts pertaining to magnetic fields, Magnetic dipole moment of a current loop, Magnetization from a macroscopic viewpoint, orbital magnetic dipole moment and Angular momentum of two simple atomic models, Lenz's law and induced dipole moments.

Unit 4: Atomic Interpretation of Magnetic Properties of Materials
Classification of magnetic materials, diamagnetism, origin of permanent magnetic dipoles in matter, paramagnetic spin systems, some properties of ferromagnetic materials, spontaneous magnetization and the Curie weiss law, Ferromagnetic domains and coercive force, Antiferromagnetic materials, Ferromagnetic materials.

Unit 5: Conductivity of Metals & Super Conductivity
Ohm's law and the relaxation time of electrons, Relaxation time, collision time, and mean free path, Electron scattering and the resistivity of metals, Heat developed in a current carrying conductor, Thermal conductivity of metals, Superconductivity, Type I & II super conductor.

Name of the Text Books:

Name of Reference Books:
Unit – I

Unit – II
Two Port Network Analysis: Introduction, \( z \)-parameters, \( y \)-parameters, hybrid parameter, ABCD parameters, condition of reciprocity and symmetry in two port parameter presentation. Interrelationship between parameters of two port networks. Expression of input and output impedance in terms of two port parameter, ladder network, equivalent \( T \) and \( \pi \) section representation in parametric form.

Unit – III
Properties of Network function: Introduction, Driving Point Impedance and Admittance Transfer function, Voltage And Current Transfer Ratio. Thevenin’s and Norton Theorem, Milliman Theorem, Reciprocity Theorem, Maximum Power Transfer Theorem, Superposition Theorem, Substitution Theorem.

Unit – IV
Network Graph Theory: Introduction, Concept of Network Graph, Terminology Used in Network Graph, Properties of Tree in a Graph, Formation of Incidence Matrix, Properties of Incidence Matrix, Number of Tree in a Graph, Cut Set Matrix, Tieset Matrix, Fundamental Tieset Matrix, Fundamental Cutset Matrix.

Unit – V

Name of Text Books:
1. Network Analysis by M.E. Van Valkenbarg, PHI

Name of Reference Books:
1. Network Theory: Analysis & Synthesis – Smarjit Ghosh, PHI
2. Network Synthesis – T. Lapatra, TMH.
3. Circuits and Networks: Analysis and Synthesis – A. Sudhakar & Shyam Mohan S. Palli, TMH
Unit – 1
Introduction to C Language: history and development. C compilers. Data types, types of instructions, input/output functions. Operators, precedence and associativity of operators. Type casting. Developing simple programs, compilation, debugging and testing of programs. Relevance of C language.

Unit – II
Conditional constructs: if statement, if-else statements, nested if-else, forms of if. Conditional operator, Switch case construct. Loop control structures, nested loops, break and continue statements. goto statement. Arrays: Syntax and definition, one and multidimensional arrays, reading and writing an array. Pointers and arrays.

Unit – III
Functions: Declaring and defining functions, storage classes, call by value, introduction to pointer data type, call by reference, using library functions in programs, macro definitions. Preprocessor directives - #if, #elif, #define etc. Passing arrays into functions. Recursion.

Unit – IV
Strings: reading and writing strings, passing a string into a function, using library functions to manipulate strings. Array of strings. Structures: Declaring and using structures. Array of structures, passing structures into function. Unions and enums, Pointers to structures Bit fields.

Unit – V

Name of Text Books:
1. Let us C – Yashwant Kanetkar, BPB Publication
Experiments to be performed: (Minimum 10 experiments)
1. To draw the characteristics of a semiconductor diode and to find cut-in voltage, reverse resistance, static resistance and dynamic resistance.
2. To design a full wave rectifier and to determine its efficiency and ripple factor.
3. To design a full wave rectifier and determine the ripple factor and efficiency with filter.
4. To design a full wave rectifier and determine the ripple factor and efficiency without filter.
5. To draw the characteristics of FET using BFW – 10
6. To draw the characteristics of a zener diode.
7. To draw the characteristics of CE configuration of a transistor amplifier.
8. To draw the characteristics of CB configuration of a transistor amplifier.
9. To design a Zener regulator circuit and to find the regulation characteristics.
10. To design the load line of a transistor amplifier under CE configuration.
11. To design and verify the self bias circuit operation.
12. To design and verify the voltage divider biasing circuit.
13. To verify the effect of emitter bypass capacitor.
14. To design a regulator circuit using Zener diode.

List of Equipments/Machine Required:
Circuit components, Breadboard, Hook-up wire, Power supply, CRO, Function generator

Recommended Books:
1. Laboratory Manual for Electronic Devices and Circuits, 4th Ed., David A. Bell, PHI
Experiments to be performed (Minimum 10 experiments)

1. Measurement of Resistance by kelvin’s Double Bridge
2. Measurement of resistance by wheat stone bridge
3. Measurement of unknown induction coil by Maxwell’s inductance capacitance Bridge
4. Measurement of unknown inductance of coil by Hay’s bridge
5. Measurement of unknown capacitance by modifiable Desauty’s bridge
6. Measurement of unknown inductance of coil by Anderson Bridge
7. Measurement of unknown capacitance by shearing bridge
9. Study of Moving iron & Moving coil voltmeter
10. Study of single phase wattmeter
11. Study of single phase Energy meter
12. Potentiometer calibration
13. Study of 1 - $\phi$ power factor meter
14. Study of frequency meters
15. Study of moving iron & moving coil ammeter
16. Measurement of high Resistance using loss of charge method
17. Measurement of high Resistance using Megger Method

List of Equipments/Machine Required:

1. Kelvin’s Double Bridge Kit
2. Wheat Stone Bridge Kit
3. Maxwell’s inductance capacitance bridge kit
4. Hay’s Bridge Kit
5. Desauty’s Bridge Kit
6. Anderson Bridge Kit
7. Schering Bridge Kit
8. MIMC Voltmeter Kit
9. Single Phase Voltmeter Kit
10. Single Phase Energy meter Kit
11. Single Phase Power meter Kit
12. Frequency Meter Kit
13. MIMC Ammeter Kit
14. Megger Trainer Kit
List of programmes to be executed (but should not be less than 10)
1. Write a program to take the radius of a sphere as input and print the volume and surface area of that sphere.
2. Write a program to take a 5-digit number as input and calculate the sum of its digits.
3. Write a program to take three sides of a triangle as input and verify whether the triangle is an isosceles, scalene or an equilateral triangle.
4. Write a program that will take 3 positive integers as input and verify whether or not they form a Pythagorean triplet or not.
5. Write a program to print all the Prime numbers between a given range.
6. Write a program to define a function that will take an integer as argument and return the sum of digits of that integer.
7. Write a program to define a macro that can calculate the greater of two of its arguments. Use this macro to calculate the greatest of 4 integers.
8. Write a program to define a recursive function that will print the reverse of its integer argument.
9. Write a program to print the sum of first N even numbers using recursive function.
10. Write a program to sort an array using Bubble sort technique.
11. Write a program that will take the elements of two integer arrays of 5 elements each, and insert the common elements of both the array into a third array (Set intersection).
12. Write a program to take 5 names as input and print the longest name.
13. Write a program to define a structure Student that will contain the roll number, name and total marks of a student. The program will ask the user to input the details of 5 students and print the details of all the students whose total marks is greater than a given value.
14. Write a program to define a union Contact that will contain the members Mobile no and Email id. Now define a structure Employee that will contain name, roll number, mode of contact (mobile/email) and a variable of type Contact as members. The program will ask the user to give the details of two Employees including mode of contact and the contact num/E-mail. Print the details of both the Employees.
15. Write a program that will ask the user to input a file name and copy the contents of that file into another file.
16. Write a program that will take any number of integers from the command line as argument and print the sum of all those integers.

List of Equipments/Machine Required:
PCs, C-Compiler

Recommended Books:
Programming in ANSI C – E. Balaguruswamy Tata Mc-Graw Hill
CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY
BHILAI (C.G.)

Semester: III Branch: Electronics & Instrumentation, Applied Electronics & Instrumentation

Subject: Network Analysis and Synthesis Lab Code: 328321 (28)

Total Practical Periods: 36 Total Marks in End Semester Examination: 40

Experiments to be performed: (Minimum 10 experiments)
1. To calculate & verify the Q factor of a given RL series circuit.
2. To calculate & verify the Q factor of a given RC series circuit.
3. To calculate & verify the fo factor of a given RLC series / parallel circuit.
4. To calculate & verify the fo, Q factor of a given RLC parallel circuit
5. For a given equivalent circuit by applying source transformation theory find Vo (Thevenin's equivalent circuit).
6. For a given equivalent circuit by applying source transformation theory find i o (Norton's equivalent circuit).
7. For a given equivalent circuit select a appropriate dual network (duality property).
8. To calculate & verify the value of *do for a given equivalent circuit by superposition theorem.
9. To analyze the pulse response of a series RL circuit.
10. To analyze the pulse response of a series RC circuit.
11. To analyze the impulse response of a series RC circuit (Low pass filter).
12. To analyze the impulse response of a series CR circuit (High pass filter).
13. To analyze the impulse response of a band pass filter.
14. To calculate the value of impedance by applying Millman theorem and also satisfy the condition of duality for Millman theorem.
15. For a given Two-port network calculate Z & Y parameter
16. For a given Two-port network calculate ABCD (Transmission)
17. For given Two-port network calculate h ( hybrid ) parameter & g ( inverse hybrid ) parameter.
18. For a given Two-port network by applying source transformation design
   i. T to Π network
   ii. Π to T network.

List of Equipments/Machine Required:
Breadboard, Circuit components like resistor, capacitors, inductors etc., Power supply, Function Generator, Ammeter, Voltmeter, CRO.

Recommended Books:
Unit – I

• STUDY OF BASIC HUMAN OBJECTIVES: Everlasting solution \(\text{\textfrac{1}{4}}\text{lekk}\kku\text{\textfrac{1}{2}}\) prosperity \(\text{\textfrac{1}{4}}\text{le}\text{\textfrac{1}{2}}\), trust in self and others \(\text{\textfrac{1}{4}}\text{vHk}\text{\textfrac{1}{2}}\) and coexistence \(\text{\textfrac{1}{4}}\text{gvlRrRo}\text{\textfrac{1}{2}}\) for balance in nature. Need and importance of aforesaid basic human objectives and how to achieve these.

Unit – II

• CONCEPT AND UNDERSTANDING OF HUMAN HAPPINESS
Meaning and concept of "happiness", incessant happiness, its relationship with guarantee of physical needs, comforts, physical and sensory pleasures with its transient nature, misery; The only method to minimize incessant happiness: gaining right understanding about oneself, one's body, one's relationship with other human beings, Nature and total existence.

Unit – III

• PROPER UNDERSTANDING about the order in Nature \(\text{\textfrac{1}{4}}\text{OLFkk}\text{\textfrac{1}{2}}\) and co-existence \(\text{\textfrac{1}{4}}\text{gvlRrRo}\text{\textfrac{1}{2}}\) at various levels, such as, I and my body, family, society, Nature and existence.

• UNDERSTANDING THE SELF: Understanding human reality – I and my body, present understanding of the self, physical needs, relation with others and with Nature, gaining proper understanding of the self, discrimination between 'I' and my 'body', characteristics and the needs of 'I', of my 'body' and 'body' & 'I'.

Unit – IV

• SYNERGATIC ORDER \(\text{\textfrac{1}{4}}\text{OLFkk}\text{\textfrac{1}{2}}\) and COEXISTENCE \(\text{\textfrac{1}{4}}\text{gvlRrRo}\text{\textfrac{1}{2}}\) among HUMANS, IN NATURE & IN EXISTENCE:
  - Conceptual understanding of natural relations and consequent values, of family and relation therein, of society and role of engineers therein, overall excellence: concept, its universal parameters and total human behaviour
  - Inanimate \(\text{\textfrac{1}{4}}\text{M}+\text{\textfrac{1}{2}}\) and consciousness \(\text{\textfrac{1}{4}}\text{Sr}\text{\textfrac{1}{2}}\) aspects of Nature, Four distinct synergetic orders in Nature - Padaarth Awastha \(\text{\textfrac{1}{4}}\text{nkFkZ voLFkk}\text{\textfrac{1}{2}}\) Pran Awastha \(\text{\textfrac{1}{4}}\text{izk.k voLFkk}\text{\textfrac{1}{2}}\) Jiv Awastha \(\text{\textfrac{1}{4}}\text{tho voLFkk}\text{\textfrac{1}{2}}\) and Gyan Awastha \(\text{\textfrac{1}{4}}\text{Kku voLFkk}\text{\textfrac{1}{2}}\) complementary supplementary evolutionary connection amongst above orders, identifying and implementing "Appropriate Technology".
  - Synergetic order among interacting entities of Nature operating in all pervading changeless Shunya or Satta, Indivisible interconnectedness of Satta and Prakriti and its implications.

Unit – V

• IMPLICATIONS OF PROPER UNDERSTANDING
  - Awakening \(\text{\textfrac{1}{4}}\text{tkxfr}\text{\textfrac{1}{2}}\) the common goal of all human beings,
  - promotion and perseverance of synergetic order and co-existence at all levels leading to incessant happiness.
  - Natural manifestation of universal human values and thereby incessant happiness
  - Undivided Society \(\text{\textfrac{1}{4}}\text{voHkkT; lekt}\text{\textfrac{1}{2}}\) and Universal Organised System \(\text{\textfrac{1}{4}}\text{kouZHkkSe O;oLFkk}\text{\textfrac{1}{2}}\)
  - Transition from synergetic disorder \(\text{\textfrac{1}{4}}\text{vO;oLFkk}\text{\textfrac{1}{2}}\) to synergetic order \(\text{\textfrac{1}{4}}\text{O;oLFkk}\text{\textfrac{1}{2}}\)
  - Evaluation of Understanding, work and behaviour.

REFERENCES
1. Jeevan Vidya Camp \(\text{\textfrac{1}{4}}\text{fkfoj}\text{\textfrac{1}{2}}\) notes
2. An Introduction to Jeevan Vidya by Shri A. Nagaraj

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