Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: B Tech Honours (Artificial Intelligence and Data Science) **Semester: I**

Subject: Foundations of Electronics Engineering **Subject Code: A000171(028)**

Total Theory Periods: 40 **Total Tutorial Periods: 10**

No. of Class tests to: 2(Minimum) **No. of Assignments to be submitted: One per Unit**

ESE Duration: Three Hours Maximum Marks in ESE:100 Minimum Marks in ESE:35

Modeling devices: Static characteristics of ideal two terminal and three terminal devices; Small signal models of non-linear devices. Introduction to semiconductor equations and carrier statistics: poisson's and continuity equations, Fermi-Dirac statistics and Boltzmann approximation to the Fermi-Dirac statistics. Semiconductor Diodes: Barrier formation in metal-semiconductor junctions, PN homo- and hetero- junctions; CV characteristics and dopant profiling; IV characteristics; Small signal models of diodes; Some Applications of diodes. Field Effect Devices : JFET/HFET, MIS structures and MOSFET operation; JFET characteristics and small signal models; MOS capacitor CV and concept of accumulation, depletion and inversion; MOSFET characteristics and small signal models. Bipolar transistors : IV characteristics and elers-Moll model; small signal models; Charge storage and transient response. Discrete transistor amplifiers : Common emitter and common source amplifiers; Emitter and source followers.

Text/Reference Books

1. D. A. Neamen, Semiconductor Physics and Devices (IRWIN), Times Mirror High Education Group, Chicago) 1997
2. E.S. Yang, Microelectronic Devices, McGraw Hill, Singapore, 1988
3. B.G. Streetman, Solid State Electronic Devices, Prentice Hall of India, New Delhi, 1995
4. J. Millman and A. Grabel, Microelectronics, McGraw Hill, International, 1987. A.S. Sedra and K.C. Smith, Microelectronic Circuits, Saunder's College Publishing, 1991
5. R.T. Howe and C.G. Sodini, Microelectronics : An integrated Approach, Prentice Hall International, 1997

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: B Tech Honours (Artificial Intelligence and Data Science) **Semester: I**

Subject: Engineering Mathematics-I **Subject Code: A000172(014)**

Total Theory Periods: 40 **Total Tutorial Periods:10**

No. of Class tests to: 2(Minimum) **No. of Assignments to be submitted: One per Unit**

ESE Duration: Three Hours Maximum Marks in ESE:100 Minimum Marks in ESE:35

Unit I: Univariate calculus **Hours 4**

Review of differentiability, Mean value theorems and Taylor's theorem (without proofs). Integrals as limits of Riemann sums, fundamental theorem of calculus (without proof), integrals by special techniques: reduction formulae, improper integrals, Gamma and Beta functions.

Unit II: Multivariate calculus **Hours 9**

Functions of several variables, partial and directional derivatives, differentiability, chain rule, local extreme values and saddle points, constrained optimization. Double and triple integrals, change of order of integration, change of variables, application to area, volumes.

Unit III: Vector Calculus **Hours 7**

Vector differentiation, gradient, divergence and curl, line and surface integrals, path independence, Green, Stokes and Gauss theorems (statements and illustrations).

UNIT IV: Complex Variables **Hours 4**

Functions of a complex variable – Analytic function – Cauchy - Riemann equations (Statement only) – Properties of analytic function (Statement only) – Construction of Analytic functions by Milne –Thomson method

Unit IV: Fourier Series and Fourier Transform **Hours 8**

Fourier series (definition), full and half range expansions of functions of arbitrary period. Fourier Integral Theorem (without proof), Fourier sine integral, Fourier cosine integral, Fourier Transform and its properties, Fourier sine and cosine transform, Inverse Fourier Transform.

Text Books

1. Thomas' Calculus (12th edition) by Maurice D. Weir, Joel Hass, Frank R. Giordano, Pearson Education.
2. Advanced Engineering Mathematics (10th edition) by Erwin Kreyszig, Wiley eastern Ltd.

Reference Books

1. Calculus for Scientists and Engineers by K.D Joshi, CRC Press.
2. A Course in Calculus and Real Analysis (1st edition) by SudhirGhorpade and BalmohanLimaye, Springer-Verlag, New York.
3. Advanced Engineering Mathematics by C.R. Wylie, McGraw Hill Publications, New Delhi.

4. Advanced Engineering Mathematics (7th edition) by Peter V. O' Neil, Thomson.Brooks /Cole, Singapore.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: B Tech Honours (Artificial Intelligence and Data Science) **Semester: I**

Subject: Learning Programming Concept with C **Subject Code: A000173(022)**

Total Theory Periods: 40 **Total Tutorial Periods:10**

No. of Class tests to: 2(Minimum) **No. of Assignments to be submitted: One per Unit**

ESE Duration: Three Hours Maximum Marks in ESE:100 Minimum Marks in ESE:35

Unit I: Introduction to Programming **08 Hours**

Basics: Basic program structure; Variables, Constants, I/O Operators; Decision control and blocks; Loop control; Problems using basic concepts.

Unit II: Introduction to Problem Solving **04 Hours**

Understanding a problem; Framing a problem in simple terms – mathematical, graphical, other abstractions; Problem solving heuristics; Conveying the solution in a formal language – using pseudo-code, unplugged exercises Decisions and loops in pseudo-code and flowcharts; Sub-program concept and its representation in pseudocode and flow-charts.

Unit III: Array and Strings **08 Hours**

Concept and requirement of arrays; Defining arrays –one, two and multi-dimensional; Problems using arrays; Strings as arrays of characters; Implementing important string functions; Problems using strings; String library functions.

Unit IV: Function and Recursion **08 Hours**

Concept of subprogram: Declaration, Definition, Calling, Arguments, Local variables; Global and Static variables; Pre and Post conditions; Important problems using functions; Parameter passing mechanisms, Concept of recursion; Essential components of a recursive program; Recursion v/s iteration; Factorial, fibonnaci, towers of hanoi, permutations, combinations using recursion.

Unit V: Pointers **06 Hours**

Pointers and addresses; Types of pointers; Pointer arithmetic; Dangling pointers; Use of pointers for passing variables; Pointers and arrays; Dynamic allocation and its application; Garbage memory.

Unit IV: Structures and File Handling **06 Hours**

Structures; Pointers and structures; Structures and Functions; Self-referential structures; Introduction to linked lists and data structures; Concept of a file. Basics of file handling (Text files); Command line Arguments.

Text Book

1. B. Kernighan, D. Ritchie, "The C Programming Language", Prentice Hall of India, Second Edition, ISBN 81-203-0596-5

Reference Books

1. How to solve it by Computer by R.G. Dromey, Pearson Education
2. Programming in ANSI C by E. Balguruswamy, Tata Mc-Graw Hill

3. Problem Solving Techniques , Stephen G. Krantz, Universities Press.
4. Computer Programming in 'C' by V. Rajaraman , Prentice Hall

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: B Tech Honours (Artificial Intelligence and Data Science) **Semester: I**

Subject: Fundamentals of Computational Biology **Subject Code: A000174(028)**

Total Theory Periods: 40 **Total Tutorial Periods:10**

No. of Class tests to: 2(Minimum) **No. of Assignments to be submitted: One per Unit**

ESE Duration: Three Hours Maximum Marks in ESE:100 Minimum Marks in ESE:35

Unit I: Introduction mathematical modelling: dependent variable, independent variable, vectors, functions, matrix, ordinary differential equations, Bacterial growth model, estimation of product production and substrate decay.

Unit II : Basic biological models: Lotka-Volterra model, population dynamics models, modelling infectious diseases and vaccination efficiency, cancerous cell spread.

Unit III : Visualization: Graph theory, basic graphical representation for biological data- bar plots, scatter plot, line plot, area plot, surface plot, heat map, 3-D plots, distribution plot using excel and MATLAB programming.

Unit IV : Modelling and simulations:Use of python or MATLAB for writing modelling scripts, Modelling of biochemical reactions, reaction mechanisms, respiration, blood/fluid modelling, Fick's law.

Unit V : Biological processes: Molecular switch, flux balance analysis, mutational studies in population.

Text books

1) Advance Engineering Mathematics, BS Grewal.
2) Modelling in Computational Biology and Biomedicine by Oliver Faugeras and Joel Janin
3) Computational cell biology by Christopher fall
4) An introduction to systems biology by Uri Alon

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: B Tech Honours (Artificial Intelligence and Data Science) **Semester: I**

Subject: Environmental Science **Subject Code: A000175(020)**

Total Theory Periods: 40 **Total Tutorial Periods:10**

No. of Class tests to: 2(Minimum) **No. of Assignments to be submitted: One per Unit**

ESE Duration: Three Hours Maximum Marks in ESE:100 Minimum Marks in ESE:35

Unit 1: The Global environmental issues **02 Hours**

Human population and environment : Population growth, Environment and human health, Women andchild welfare, Social issues and environment : People and environment, Social consequences ofdevelopment and Environmental changes

Unit : 2 Natural resources **02 Hours**

Concept, spheres, Direct & Indirect utilization of natural resources, Types - Renewable and nonrenewable,Overexploitation & pollution, Conservation - 3R principle

Unit :3 Ecosystem **04 Hours**

Concept, Types – Terrestrial & aquatic with subtypes, Function, Food chain & web, Energy pyramid,Niche, Ecotone

Unit :4 Biodiversity **04 Hours**

Introduction, levels, Types, Distribution & Magnitude, Threats, Conservation.

Unit :5 Pollution **04 Hours**

Concept, Types & Sources, Direct & indirect Impacts, Prevention, control and mitigation measures,Disaster management

Unit :6 Environmental rules and regulations **04 Hours**

Concepts, Local, national and Global level framework, tools like Environmental Impact Assessment,Environmental Management System, Certifications, Role of an engineer in environmentalmanagement

Reference books:

1) Bharucha E. (2013) Textbook of Environmental Studies for Undergraduate Courses.

2) Carson, Rachel (1962) The Silent Spring

3) Leelakrishnan, P. (2006) Environmental Law Case Book (IInd Edition) LexisNexis Butterworths (Student Series) 466 p.

4) McKibben, Bill (1989) The end of Nature

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: B Tech Honours (Artificial Intelligence and Data Science) **Semester: I**

Subject: Professional Ethics and Life Skills **Subject Code: A000176(046)**

Total Theory Periods: 40 **Total Tutorial Periods:10**

No. of Class tests to: 2(Minimum) **No. of Assignments to be submitted: One per Unit**

ESE Duration: Three Hours Maximum Marks in ESE:50 Minimum Marks in ESE:18

UNIT 1: HUMAN VALUES -

Definition of ethics-Morals values and ethics – integrity-Work ethics- Service Learning-Civic Virtue- Respect for others- Caring-Sharing-Honesty-Courage - Valuing time-Cooperation-Commitment- Empathy-Self-confidence-Character-Spirituality-Introduction to Yoga and meditation for professional excellence and stress management.

Self-Study: Case study of Discovery failure

UNIT 2: ENGINEERING ETHICS

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

Self-study: Study the Bhopal gas tragedy

UNIT 3: SAFETY, RESPOSIBILITIES AND RIGHTS

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

Self-study: Chernobyl explosion, Nuclear and thermal power plant issues

UNIT 4: LIFE SKILLS

Definition, Relevance, Types of values, changing concepts of values-aims and values of value

education- basic etiquette-morals and values in life-dealing with people. Personal values – Self –

Strengths (self-confidence, self-assessment, self-reliance, self-discipline, determination, self-restraint, contentment, humility, sympathy and compassion, gratitude, forgiveness) Weaknesses.

Self-study: Influences - Peer pressure, familial and societal expectations, media.

UNIT 5: SOCIETIES IN PROGRESS

Definition of society; Units of society; Communities – ancient and modern – Agents of change – Sense of survival, security, desire for comfort and ease sense of belonging, social consciousness and responsibility.

Self-study: Personal value and professional value of Engineers on society's perception

Text Books

1. Subramanian R., Professional ethics, Oxford University press, 2010.

2.Manoharan P.K., Education and Personality Development, APH Publishing Corporation, New Delhi, 2008

Reference Books

1. Megan J. Murphy (Editor), Lorna Hecker (Editor), Ethics and Professional Issues in Couple and Family Therapy.

2. Andrew Belsey (Editor), Ruth Chadwick (Editor), Ethical Issues in Journalism and the Media (Professional Ethics).

3. Warwick Fox (Editor), Ethics and the Built Environment (Professional Ethics).

4. RuchikaNath, Value Education, APH Publishing Corporation, New Delhi, 2008.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: B Tech Honours (Artificial Intelligence and Data Science) **Semester: I**

Subject: Language & Writing Skills **Subject Code: A000177(046)**

Total Theory Periods: 40 **Total Tutorial Periods:10**

No. of Class tests to: 2(Minimum) **No. of Assignments to be submitted: One per Unit**

ESE Duration: Three Hours **Maximum Marks in ESE:50** **Minimum Marks in ESE:18**

Unit 1: **02 Hours**

Communication as a skill: types of communication, barriers to communication, need for effective communication in English for Engineers.

Unit 2: **06 Hours**

Foundation of language: Communicative Grammar and its appropriateness, Revision of Tenses, use of conjunctions, use of prepositions, speech, word order, sentence structure.

Unit 3: **04 Hours**

Listening: nature of listening, stages of listening (pre, while and post), types of listening, barriers to listening, ways to overcome barriers, ways to practice effective listening, practice listening comprehension.

Unit 4: **02 Hours**

Vocabulary Building and Enhancement of word power, idiomatic expressions, Business English vocabulary, activities on synonyms/antonyms/homonyms/newly coined words.

Unit 5: **04 Hours**

Speaking: Aspects of Speech like pronunciation, stress, intonation and pauses and their need, formal and informal speeches, various expressions used in speech, situational speech, general discussions, group discussions, basics of presentation skill, practice one minute speech, impromptu speeches, prepared speeches.

Unit 6: **06 Hours**

Reading: Types of reading, reading between and beyond the lines, importance of reading for effective communication, practice loud reading and reading comprehension

Writing: nature of writing, stages of writing (pre, while and post), qualities of effective writing, developing drafting and summarizing, format for formal letters, practice writing formal letters, formal report writing.

Text Books:

1. Enhancing employability at soft skills by ShaliniVerma, Pearson publications.

Reference Books:

1. Essential English Grammar (Intermediate) Raymond Murphy (CUP)
2. Communication for Business: A Practical Approach by Shirley Tailor (Longman)
3. Written Communication in English by Saran Freeman (Orient Longman)
4. Business Correspondence and Report Writing, R. C. Sharma & Krishna Mohan (Tata McGraw Hill)

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: B Tech Honours (Artificial Intelligence and Data Science) **Semester: I**

Subject: Foundations of Electronics Engineering Lab **Subject Code: A000191(028)**

Total Marks in End Semester Exam: 40

List of Experiments:

1. P-N Junction Diode Characteristics Part A: Germanium Diode (Forward bias & Reverse bias) Part B: Silicon Diode (Forward bias only)
2. Zener Diode Characteristics Part A: V-I Characteristics Part B: Zener Diode act as a Voltage Regulator
3. Rectifiers (without and with c-filter) Part A: Half-wave Rectifier Part B: Full-wave Rectifier
4. BJT Characteristics (CE Configuration) Part A: Input Characteristics Part B: Output Characteristics
5. FET Characteristics (CS Configuration) Part A: Drain (Output) Characteristics Part B: Transfer Characteristics
6. SCR Characteristics
7. UJT Characteristics
8. CRO Operation and its Measurements
9. BJT-CE Amplifier
10. Emitter Follower-CC Amplifier
11. FET-CS Amplifier

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Branch: B Tech Honours (Artificial Intelligence and Data Science) **Semester: I**

Subject: Learning Programming Concept with C Lab **Subject Code: A000192(022)**

Total Marks in End Semester Exam: 40

List of Experiments:

1. Basic problem solving – (Various ``unplugged" exercises)

2. Basic C program -- (Using variables, constants and simple I/O statements)

3.Arithmetic operators and simple arithmetic expressions – (Unit Conversion, Simple Interest, Basic Physics and Mathematics Formulae)

4. Swapping two values, rotating three values.

5. Simple character handling – (Recognition, Case change, Counting)

6. Decision control and blocks – (Tests of Divisibility, Triangularity, Nature of Quadratic Roots, Leap year, Calculator)

7. Loop control – (Arithmetic and geometric progressions, Trigonometric ratios using power series, Power, Factorial, Fibonacci series, Pattern generation)

8. Arrays – (Declaration, Initialisation and Access, Generating value tables, Simple Data processing – Summation of array elements, Average of elements, Maximum and Minimum.)

9. Sorting -- (Bubble, Insertion and Selection sorting algorithms)

10. Searching -- (Linear and Binary search)

11. 2-D Arrays – (Basic matrix operations, Matrix multiplication)

12. Strings – (Initialization and usage, Important string functions, String matching, String reversal)

13. Basics of functions -- (Declaration, Definition and Usage – previously solved problems like unit conversion, trigonometric ratios, etc. can be re-done using functions)

14. Arrays and functions – (Sorting and Searching with functions)

15. Recursive Functions -- (Summation, Power, Fibonacci series)

16. Use of Pointers for Indirect Access

17. Use of Pointers for passing variables

18. Use of Pointers for passing arrays and strings.

19. Dynamic memory allocation

20. Structures – (Basics of Structures -- definition, declaration and usage)

21. Arrays of Structures -- (Student Database, Telephone Directory)

22. Passing Structures to Functions

23. Pointer to Structure and Passing Structure using Pointers

24. Self-Referential Structure (Basics – definition, declaration and usage)

25 .File Handling – (Reading and Writing into Text Files with standard functions)