M R C E T C A M P U S

(Autonomous Institution – UGC, Govt. of India)

BACHELOR OF TECHNOLOGY (B.Tech)

AI & ML

COURSE STRUCTURE & SYLLABUS (R20)

(Batches admitted from the academic year 2020 - 2021)

DEPARTMENT OF COMPUTATIONAL INTELLIGENCE

M R C E T CAMPUS

(Autonomous Institution – UGC, Govt. of India)

(Affiliated to JNTU, Hyderabad, Approved by AICTE - Accredited by NBA & NAAC – _A' Grade - ISO 9001:2015 Certified)
Maisammaguda, Dhulapally (Post Via. Kompally), Secunderabad – 500100, Telangana State, India.
Contact Number: 040-23792146/64634237, E-Mail ID: mrcet2004@gmail.com, website: www.mrcet.ac.in

Note: The regulations here under are subject to amendments as may be made by the Academic Council of the College from time to time. Any or all such amendments will be effective from such date and to such batches of candidates (including those already pursuing the program) as may be decided by the Academic Council.

PRELIMINARY DEFINITIONS AND NOMENCLATURES

➢ Autonomous Institution /College‖- means an institution/college designated as autonomous institute / college by University Grants Commission (UGC), as per the UGC Autonomous College Statutes.

➢ Academic Autonomy -‖means freedom to the College in all aspects of conducting its academic programs, granted by the University for promoting excellence.

➢ Commission - means University Grants Commission.

➢ AICTE - means All India Council for Technical Education.

➢ University - The Jawaharlal Nehru Technological University, Hyderabad.

➢ College – means M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA, Secunderabad unlessindicated
   otherwise by the context.

➢ Program - means:
   ▪ Bachelor of Technology (B.Tech) degree program
   ▪ UG Degree Program: B.Tech

➢ Branch means specialization in a program like B.Tech degree program in Computer Science and Engineering, B.Tech degree program in Electronics & Communication Engineering etc.

➢ Course or Subject means a theory or practical subject, identified by its course–number and course-
   title, which is normally studied in a semester.

➢ T–Tutorial, P–Practical, D–Drawing, L-Theory, C-Credits

FOREWORD

The autonomy is conferred on M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA (MRCET) by UGC based on its performance as well as future commitment and competency to impart quality education. It is a mark of its ability to function independently in accordance with the set norms of the monitoring bodies like UGC and AICTE. It reflects the confidence of the UGC in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of the college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.
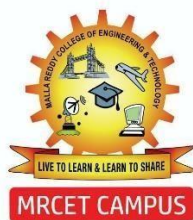
M R C E T CAMPUS | AUTONOMOUS INSTITUTION - UGC, GOVT. OF INDIA (MRCET CAMPUS) is proud to win the credence of all the above bodies monitoring the quality of education and has gladly accepted the responsibility of sustaining, and also improving upon the values and beliefs for which it has been striving for more than a decade in reaching its present standing in the arena of contemporary technical education. As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTU Hyderabad to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several experts drawn from academics, industry and research, in accordance with the vision and mission of the college which reflects the mindset of the institution in order to produce quality engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications, if needed, are to be sought at appropriate time with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stakeholders is sought for the successful implementation of the autonomous system in the larger interests of the institution and brighter prospects of engineering graduates.

"A thought beyond the horizons of success committed for educational excellence"

PRINCIPAL

M R C E T CAMPUS
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VISION

❖ To acknowledge quality education and instill high patterns of discipline making the students technologically superior and ethically strong which involves the improvement in the quality of life in human race.

MISSION

❖ To achieve and impart holistic technical education using the best of infrastructure, outstanding technical and teaching expertise to establish the students into competent and confident engineers.

   ❖ Evolving the center of excellence through creative and innovative teaching learning practices for promoting academic achievement to produce internationally accepted competitive and worldclass professionals.

QUALITY POLICY

❖ To pursue continual improvement of teaching learning process of Undergraduate and Post Graduate programs in Engineering & Management vigorously.

❖ To provide state of art infrastructure and expertise to impart the quality education.

For more information: www.mrcet.ac.in

BACHELOR OF TECHNOLOGY (B.Tech)

AI & ML

COURSE STRUCTURE & SYLLABUS (R20)

(Batches admitted from the academic year 2020 - 2021)

1.

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COURSE STRUCTURE & SYLLABUS

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1.

COURSE STRUCTURE BTECH -AI&ML

I B. Tech – I Semester (I Year I Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX.MARKS	
							INT	EXT
1	R20A0001	English	2	0	0	2	30	70
2	R20A0021	Mathematics – I	3	1	0	4	30	70
3	R20A0201	Basic Electrical Engineering	3	0	0	3	30	70
4	R20A0301	Computer Aided Engineering Graphics	2	0	2	3	30	70
5	R20A0501	Programming for Problem Solving	3	0	0	3	30	70
6	R20A0081	English Language Communication Skills Lab	-	0	4	2	30	70
7	R20A0281	Basic Electrical Engineering Lab	-	0	3	1.5	30	70
8	R20A0581	Programming for Problem Solving Lab	-	0	3	1.5	30	70
9	R20A0003*	Human Values and Professional Ethics	2	0	0	0	100	-
		TOTAL	**15**	**1**	**12**	**20**	**340**	**560**

*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree

I B. Tech– I Semester (I Year II Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0002	Professional English	2	0	0	2	30	70
2	R20A0022	Mathematics – II	3	1	0	4	30	70
3	R20A0011	Applied Physics	3	0	0	3	30	70
4	R20A0401	Analog and Digital Electronics	3	0	0	3	30	70
5	R20A0502	Python Programming	3	0	0	3	30	70
6	R20A0082	Applied Physics Lab	-	0	3	1.5	30	70
7	R20A0582	Python Programming Lab	-	0	3	1.5	30	70
8	R20A0083	Engineering and IT Workshop	-	0	4	2	30	70
9	R20A0064	Financial Institutions, Markets and Services	2	-	-	0	100	-
		TOTAL	**16**	**1**	**10**	**20**	**340**	**560**

*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree

B. Tech – III Semester (II Year I Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0503	Data Structures Using Python	3	0	0	3	30	70
2	R20A0505	Design and Analysis of Algorithms	3	0	0	3	30	70
3	R20A0506	Computer Organization	3	0	0	3	30	70
4	R20A0024	Probability & Statistics	3	0	0	3	30	70
5	R20A0513	Artificial Intelligence	3	0	0	3	30	70
6	R20A0061	Managerial Economics and Financial Analysis	3	0	0	3	30	70
7	R20A0583	Data Structures using Python Lab	0	0	3	1.5	30	70
8	R20A0588	Artificial Intelligence Lab	0	0	3	1.5	30	70
9	R20A0004*	Foreign Language: French	2	0	0	-	100	-
		TOTAL	**20**	**0**	**6**	**21**	**340**	**560**

*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree

II B. Tech – IV Semester (II Year II Semester)

S.NO	SUBJECT CODE	SUBJECT	L	T	P	C	MAX. MARKS	
							INT	EXT
1	R20A0026	Discrete Mathematics	3	0	0	3	30	70
2	R20A6601	Machine Learning	3	0	0	3	30	70
3	R20A0508	Object Oriented Programming through Java	3	0	0	3	30	70
4	R20A6902	Embedded Systems	3	0	0	3	30	70
5	R20A0504	Operating Systems	3	0	0	3	30	70
6	OE-I	Open Elective-I	3	0	0	3	30	70
7	R20A0585	Object Oriented Programming through Java Lab	-	0	3	1.5	30	70
8	R20A06681	Machine Learning Lab	-	0	3	1.5	30	70
9	R20A0008	Global Education &Professional Career/NCC	2	-	-	0	100	-
		TOTAL	**20**	**0**	**6**	**21**	**340**	**560**

*Mandatory course: Non-credit course, 50% of scoring is required for the award of the degree

OPEN ELECTIVE I		
S.NO	**SUBJECT CODE**	**SUBJECT**
1	R20A1251	WEB DESIGNING TOOLS
2	R20A0551	INTRODUCTION TO DBMS
3	R20A0351	INTELLECTUAL PROPERTY RIGHTS
4	R20A0051	ENTERPRISE RESOURCE PLANNING
5	R20A0451	BASICS OF COMPUTER ORGANIZATION

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(R20A0001) ENGLISH

INTRODUCTION

English is a global language, which is a means to correspond globally. Keeping in account of its vital role in the global market, emphasis is given to train the students to acquire language and communication skills. The syllabus is designed to develop and attain the competency in communicative skills.

The lectures focus on the communication skills and the selected excerpts support as resources for the teachers to develop the relevant skills in the students. The lessons stimulate discussions and help in comprehending the content effectively. The focus is on skill development, nurturing ideas and practicing the skills.

OBJECTIVES

1. To enable students to enhance their lexical, grammatical and communicative competence.

2. To equip the students to study the academic subjects with better perspective through theoretical and practical components of the designed syllabus.
3. To familiarize students with the principles of writing and to ensure error-free writing.
4. To analyze, interpret and evaluate a text and critically appreciate it.
5. To improve the writing and speaking skills, the productive skills.

SYLLABUS
Reading Skills:
Objectives

1. To develop an awareness in the students about the significance of silent reading and comprehension.
2. To augment the ability of students to guess the meanings of words from context and grasp theoverall message of the text, draw inferences etc.Skimming the text
   - Understanding the gist of an argument
   - Inferring lexical and contextual meaning
   Recognizing coherence/sequencing of sentences
   - Identifying the topic sentence
   - Understanding discourse features
   - Scanning the text

NOTE:
The students will be trained in reading skills using the prescribed text for detailed study. They will be examined in reading and answering questions using 'unseen' passages which may be taken from authentic texts, such as magazines/newspaper articles.

Writing Skills:
Objectives
1. To develop an awareness in the students about basic formal writing skills.
2. To equip students with the components of different forms of writing, beginning with the
   required ones:
   • Writing sentences
   • Use of appropriate vocabulary
   • Coherence and cohesiveness
   • Formal and informal letter writing

Unit –I
"The Road not taken"by Robert Frost
Grammar –Tenses and Punctuation (Sequences of Tenses) Vocabulary –Word Formation - Prefixes
and Suffixes Writing –Paragraph Writing (Focusing on Tenses and Punctuations) Reading – The art of
skimming and scanning -Reading Exercise Type 1(Match the statements to the text they refer to)
Unit – II
Act II from 'Pygmalion' by G.B. Shaw
Grammar –Direct and Indirect Speech Vocabulary– Synonyms, Antonyms
Writing–Essay Writing (Introduction, body and conclusion)
Reading –Comprehending the context– Reading Exercise Type 2(Place the missing statement)
Unit – III
Satya Nadella's Email to His Employees on his First Day as CEO of Microsoft
Grammar – Voices
Vocabulary –One-Word Substitutes, Standard Abbreviations
Writing –E-mail Writing, Letter Writing (complaints, requisitions, apologies).
Reading   –Reading Comprehension- Reading Exercise Type 3
      (Reading between the lines)
Unit – IV
J K Rowling's Convocation Speech at Harvard Grammar –Articles, Misplaced Modifiers
Vocabulary –Phrasal Verbs
Writing – Précis Writing
Reading   –Reading Exercise Type 4(Cloze test)
Unit –V
Abdul Kalam's Biography
Grammar – Subject-Verb Agreement, Noun-Pronoun Agreement Vocabulary –Commonly
Confused Words
Writing –Memo Writing
Reading   –Reading Exercise Type 5(Identifying errors)

* Exercises apart from the textbook shall also be used for classroom tasks.

REFERENCE BOOKS

1. Practical English Usage. Michael Swan. OUP. 1995.
2. Remedial English Grammar. F.T. Wood. Macmillan.2007
3. On Writing Well. William Zinsser. Harper Resource Book. 2001
4. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
5. Communication Skills. Sanjay Kumar and Pushpa Lata. Oxford University Press. 2011.
6. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

COURSE OUTCOMES

Students will be able to:

1. Gain competence and proficiency in 'productive' skills, i.e., writing and speaking with the recognition of the need for life-long learning of the same
2. Hone their language abilities in terms of comprehending complex technical texts with a potential to review literature
3. Present ideas clearly and logically to analyze data and provide valid conclusions in writtencommunication
4. Enrich their grammatical accuracy and fluency to be adept at both the active and passive skills
5. Represent old conventions with a set of the new by professional verbal communicative ability

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(R20A0021) MATHEMATICS –I

COURSE OBJECTIVES:
1.   The concept of a Rank of the matrix and applying the concept to know the consistency andsolving the system of linear equations.
2.   The concept of Eigen values, Eigen vectors and Diagonolisation.
3.   The maxima and minima of functions of several variables.
4.   The Applications of first order ordinary differential equations and methods to solve higherorder differential equations.
5.   The properties of Laplace Transform, Inverse Laplace Transform and Convolution theorem.

UNIT I: Matrices
Introduction, Rank of a matrix - Echelon form, Normal form, Consistency of system of linear equations (Homogeneous and Non-Homogeneous)-Gauss-Siedel method, Linear dependence and independence of vectors, Eigen values and Eigen vectors and their properties (without proof), Cayley-Hamilton theorem(without proof), Diagonolisation of a matrix.

UNIT II: Multi Variable Calculus (Differentiation)
Functions of two variables, Limit, Continuity, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, Jacobian-functional dependence and independence, Maxima and minima and saddle points, Method of Lagrange multipliers, Taylors theorem for two variables.

UNIT III:First Order Ordinary Differential Equations
Exact, Equations reducible to exact form, Applications of first order differential equations - Newton's law of cooling, Law of natural growth and decay, Equations not of first degree-Equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

UNIT IV: Differential Equations of Higher Order
Linear differential equations of second and higher order with constant coefficients: Non-homogeneous term of the type $f(x) = e^{ax}$, sinax, cosax, x^n, e^{ax} V and x^n V - Method of variation of parameters, Equations reducible to linear ODE with constant coefficients-Cauchy's Euler equation and Legendre's equation.

UNIT V: Laplace Transforms
Definition of Laplace transform, domain of the function and Kernel for the Laplace transforms, Existence of Laplace transform, Laplace transform of standard functions, first shifting Theorem, Laplace transform of functions when they are multiplied and divided by "t", Laplace transforms of derivatives and integrals of functions, Unit step function, Periodic function.
Inverse Laplace transform by Partial fractions, Inverse Laplace transform of functions when they are multiplied and divided by "s", Inverse Laplace Transforms of derivatives and integrals of functions, Convolution theorem, Solving ordinary differential equations by Laplace transform.

TEXT BOOKS
1. Higher Engineering Mathematics by B V Ramana. Tata McGraw Hill.
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
3. Advanced Engineering Mathematics by Kreyszig, JohnWiley &Sons.

REFERENCE BOOKS
1. Advanced Engineering Mathematics by R.K Jain & S R K Iyengar, Narosa Publishers.
2. Ordinary and Partial Differential Equations by M.D. Raisinghania, S.Chand Publishers
3. Engineering Mathematics by N.P Bali and Manish Goyal.

COURSE OUTCOMES:
 After learning, the concepts of this paper the student will be able to
1.   Analyze the solutions of the system of linear equations and find the Eigen values and Eigen vectors of a matrix, which are used to analyze the long term behavior of any system.
2. Find the extreme values of functions of two variables with / without constraints.
3. Solve first order, first degree differential equations and their applications.
4. Form a differential equation for typical engineering problems and hence can solve those higher order differential equations.
5. Solve differential equations with initial conditions using Laplace Transformation.

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(R20A0201) BASIC ELECTRICAL ENGINEERING

COURSE OBJECTIVES:

1. To understand the basic concepts of electrical circuits & networks and their analysis which isthe foundation for all the subjects in the electrical engineering discipline.
2. To emphasize on the basic elements in electrical circuits and analyze Circuits using Network Theorems.
3. To analyze Single-Phase AC Circuits.
4. To illustrate Single-Phase Transformers and DC Machines.
5. To get overview of basic electrical installations and calculations for energy consumption.

UNIT –I:

Introduction to Electrical Circuits: Concept of Circuit and Network, Types of elements, R-L-C Parameters, Independent and Dependent sources, Source transformation and Kirchhoff's Laws

UNIT –II:

Network Analysis: Network Reduction Techniques- Series and parallel connections of resistive networks, Star–to-Delta and Delta-to-Star Transformations for Resistive Networks, Mesh Analysis, and Nodal Analysis,

Network Theorems: Thevenin's theorem, Norton's theorem, MaximumPower Transfer theorem and Superposition theorem, Illustrative Problems.

UNIT-III:

Single Phase A.C. Circuits: Average value, R.M.S. value, form factor and peak factor for sinusoidal wave form. Steady State Analysis of series R-L-C circuits.Concept of Reactance, Impedance, Susceptance, Admittance, Concept of Power Factor, Real, Reactive and Complex power and Illustrative Problems.

UNIT –IV:

Electrical Machines (elementary treatment only):

Single phase transformers: principle of operation, constructional features and emf equation. DC.Generator: principle of operation, constructional features, emf equation. DC Motor: principle of operation, Back emf, torque equation.

UNIT –V:

Electrical Installations:

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, Types of Wires and Cables, Earthing. Elementary calculations for energy consumption and battery backup.

TEXT BOOKS:

1. Engineering Circuit Analysis - William Hayt, Jack E. Kemmerly, S M Durbin, Mc Graw Hill Companies.
2. Electric Circuits - A. Chakrabarhty, Dhanipat Rai & Sons.
3. Electrical Machines – P.S.Bimbra, Khanna Publishers.

REFERENCE BOOKS:

1. Network analysis by M.E Van Valkenburg, PHI learning publications.

2. Network analysis - N.C Jagan and C. Lakhminarayana, BS publications.

3. Electrical Circuits by A. Sudhakar, Shyammohan and S Palli, Mc Graw Hill Companies.

4. Electrical Machines by I.J. Nagrath & D. P. Kothari, Tata Mc Graw-Hill Publishers.

COURSE OUTCOMES:

At the end of the course students, would be able to

1. Apply the basic RLC circuit elements and its concepts to networks and circuits.
2. Analyze the circuits by applying network theorems to solve them to find various electrical parameters.
3. Illustrate the single-phase AC circuits along with the concept of impedance parameters and power.
4. Understand the Constructional Details and Principle of Operation of DC Machines and Transformers
5. Understand the basic LT Switch gear and calculations for energy consumption.

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(R20A0301) COMPUTER AIDED ENGINEERING GRAPHICS

COURSE OBJECTIVES:
1. To learn basic engineering graphic communication skills & concept.
2. To learn the 2D principles of orthographic projections and Multiple views of the same
3. To know the solid Projection and its Sectional Views
4. To gain the capability of designing 3D objects with isometric principles by using computer aided sketches
5. To know the conversion of Orthographic Views to isometric Views and isometric to Orthographic views

UNIT-I
Introduction to Computer Aided Engineering Graphics
Introduction, Drawing Instruments and their uses, BIS conventions, lettering Dimensioning & free hand practicing. AutoCAD User Interface – Menu system – coordinate systems, axes, poly-lines, square, rectangle, polygons, splines, circles, ellipse– tool bars (draw, modify, annotations, layers etc.) – status bar (ortho, grid, snap, iso etc.),
Generation of points, lines, curves, polygons, dimensioning, layers, blocks, electrical symbols.
Geometrical constructions
Curves Used In Engineering Practice
   a) Conic Sections (General Method only- Eccentricity Method)
   b) Cycloid, Epicycloids and Hypocycloid

UNIT-II:
2D PRJECTIONS
Orthographic Projections: – Conventions – First and Third Angle projections.
Projections of Points, Projections of Lines, Projections of planes, Circuits Designs **–** Basic Circuit Symbols & Sensors

UNIT– III
Projections of Solids: Projections of regular solids prism and pyramid inclined to both planes.
Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone, True shapes of the sections.

UNIT– IV
3D Projections
Isometric Projections: Principles of Isometric Projection – Isometric Scale – Isometric Views, Commands for 3D UCS, Extrude, revolve, loft, 3D move, 3D rotate, dox, sphere, cone, wedge, cylinder, view ports.Plane
Figures, Simple and Compound Solids. 3D models of electrical components Switch, Diode, Resistor, Battery, Capacitor, Transistor, Motor

UNIT– V
Transformation of Projections: Visualize the 2D &3D View of Engineering Objects for Conversion of Isometric Views to Orthographic Views. Conversion of orthographic views to isometric views – simple objects in AutoCAD

TEXT BOOKS:

1. Engineering Drawing – N.D. Bhatt & V.M. Panchal, 48th edition, 2005 Charotar Publishing House, Gujarat.
2. "Computer Aided Engineering Drawing"by Dr. M H Annaiah, Dr C N Chandrappa and Dr B Sudheer Premkumar Fifth edition, New Age International Publishers

REFERENCE BOOKS:

1. Computer Aided Engineering Drawing – S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition-2006.
2. Engineering Graphics - K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore.

COURSE OUTCOMES:

After the completion of course the student will be capable to

1. Produce geometric construction, dimensioning & Curves and detail drawings.
2. Compile Projections of points, lines ,planes then create virtual drawing by using computer
3. Sketch the Solid Projections & Sectioning of the solids
4. Develop isometric drawings of simple objects reading the orthographic projections of those objects.
5. Understand and visualize the 3-D view of engineering objects. Elaborate the conversions of 2D -3D and Vice-Versa

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(R20A0501)PROGRAMMING FOR PROBLEM SOLVING	

Objectives

- To understand the use of computer system in problem solving
- To understand the various steps in Program development.
- To learn the basic concepts in C Programming Language.
- To learn how to write modular and readable C Programs
- To be able to write programs (using structured programming approach) in C to solve problems.

UNIT - I
Introduction to Computing – Computer Systems, Computing Environments, Computer Languages, Algorithms and Flowcharts, Steps for Creating and Running programs.
Introduction to C – History of C, Features of C, Structure of C Program, Character Set,
C Tokens - keywords, Identifiers, Constants, Data types, Variables. Operators, Expressions, Precedence and Associativity, Expression Evaluation, Type conversion, typedef, enum
Control Structures: Selection Statements(Decision Making) – if and switch statements, Repetition Statements (Loops) - while, for, do-while statements, Unconditional Statements – break, continue, goto. Command line arguments.
UNIT-II
Pointers – Pointer variable, pointer declaration, Initialization of pointer, Accessing variables through pointers, Pointer Arithmetic, pointers to pointers, void pointers
Arrays – Definition, declaration of array, Initialization, storing values in array, Two dimensional arrays, Multi-dimensional arrays. Arrays and Pointers, Array of pointers
Strings – Declaration and Initialization, String Input / Output functions, Arrays of strings, String manipulation functions, Unformatted I/O functions, strings and pointers
UNIT-III
Designing Structured Programs using Functions - Types of Functions- user defined functions, Standard Functions, Categories of functions, Parameter Passing techniques, Scope – Local Vs Global, Storage classes, Recursive functions.
Passing arrays as parameters to functions, Pointers to functions, Dynamic Memory allocation
UNIT-IV
Structures and Unions - Declaration, initialization, accessing structures, operations on structures, structures containing arrays, structures containing pointers, nested structures, self referential structures, arrays of structures, structures and functions, structures and pointers, unions..
Files – Concept of a file, Streams, Text files and Binary files, Opening and Closing files, File input / output functions. Sequential Access and Random Access Functions
UNIT-V
Basic Data Structures – Linear and Non Linear Structures – Implementation of Stacks, Queues, Linked Lists and their applications.

Case Studies Case 1: Student Record Management System

The main features of this project include basic file handling operations; you will learn how to add, list, modify and delete data to/from file. The source code is relatively short, so thoroughly go through the mini project, and try to analyze how things such as functions, pointers, files, and arrays are implemented.

Currently, listed below are the only features that make up this project, but you can add new features as you like to make this project a better one!

- ❖ Add record
- ❖ List record
- ❖ Modify record
- ❖ Delete record

Case 2: Library Management System

This project has 2 modules.

1. Section for a librarian
2. Section for a student

A librarian can add, search, edit and delete books. This section is password protected. That means you need administrative credentials to log in as a librarian.

A student can search for the book and check the status of the book if it is available. Here is list of features that you can add to the project.

1. You can create a structure for a student that uniquely identify each Student. When a student borrows a book from the library, you link his ID to Book ID so that Librarian can find how burrowed particular book.
2. You can create a feature to bulk import the books from CSV file.
3. You can add REGEX to search so that a book can be searched using ID, title, author or any of the field.
4. You can add the student login section.

TEXT BOOKS:

1. Mastering C, K.R.Venugopal, S R Prasad, Tata McGraw-Hill Education.
2. Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning
3. Data Structures and Algorithms Made Easy by Narasimha Karumanchi, Career Monk publications, 2017

REFERENCE BOOKS:

1. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
2. Computer Programming, E.Balagurusamy, First Edition, TMH.
3. C and Data structures – P. Padmanabham, Third Edition, B.S. Publications.
4. Programming in *C, Ashok Kamthane*. Pearson Education India.
5. Data Structures using C by Aaron M. Tenenbaum, Pearson Publications
6. Data Structures using C by Puntambekar

Course Outcomes:
- Understand a problem and build an algorithm/flowchart to solve it
- Interpret the structure of C program and various key features of C
- Construct C programs using various control statements, arrays and pointers
- Understand the concept of subprograms and recursion
- Develop programs using structures and unions for storing dissimilar data items
- Make use of files and file operations to store and retrieve data.

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(R20A0081) ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

The Language Lab focuses on the production and practice of sounds of the English language and familiarizes the students with its use in everyday situations and contexts.

COURSE OBJECTIVES:

1. To facilitate computer-aided multi-media instruction enabling individualized and independent language learning
2. To sensitize the students to the nuances of English speech sounds, word accent, intonation and rhythm
3. To bring about a consistent accent and intelligibility in their pronunciation, ample speaking opportunities are provided.
4. To improve the fluency in spoken English and neutralize mother tongue influence
5. To train students to use language appropriately for interviews, group discussions and public speaking

English Language Communication Skills Lab has two parts:

A. Computer Assisted Language Learning (CALL) Lab
B. Interactive Communication Skills (ICS) Lab
The following course content is prescribed for the English Language Communication Skills Lab

UNIT –I

CALL Lab: Introduction to Phonetics –Speech Sounds –Vowels and Consonants- Transcriptions

ICS Lab: Ice-Breaking activity - JAM session

UNIT –II

CALL Lab: Pronunciation: Past Tense Markers and Plural Markers

ICS Lab: Situational Dialogues/Role Plays-–Greetings - Taking Leave – Introducing Oneself and Others - Requests and Seeking Permissions

UNIT–III

CALL Lab: Syllable and Syllabification

ICS Lab: Communication at Workplace- Situational Dialogues/Role Plays – Seeking Clarifications – Asking for and Giving Directions – Thanking and Responding – Agreeing and Disagreeing – Seeking and Giving Advice

UNIT –IV

CALL Lab: Word Stress and Intonation

ICS Lab: Information transfer – from visual to verbal - maps, charts, tables and graphs

UNIT –V

CALL Lab: Errors in Pronunciation- Accent - the Influence of Mother Tongue (MTI)

ICS Lab: Making a Short Speech - Extempore

ELCS Lab:

1. **Computer Assisted Language Learning (CALL) Lab:**

The Computer aided Language Labfor 60 students with 60 systems, one master console, LAN facilityand English language software for self-study by learners.

System Requirement (Hardware component):

Computer network with LAN with minimum 60 multimedia systems with the following specifications:

i)   P   –IV   Processor

a)Speed –2.8 GHZ

b)   RAM –512 MB Minimum

c)   HardDisk –80 GB

ii)   Headphones of High quality

2. **Interactive Communication Skills (ICS) Lab :**

A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

COURSE OUTCOMES:

After completion of the course the students will be able to:

1. Learn with precision through computer-assisted individualized and independent language learning to work independently in an engineering set-up.
2. Improve conversational reception and articulation techniques in the course of repetitive instruction thereby gaining confidence both in institutional and professional environment.
3. Acquire accuracy in pronunciation and restoring Standard English thereby crafting better command in English language so that the students have a cutting edge over others in society.
4. Imbibe appropriate use of language in situations where one works as an individual and as a leader/team player.
5. Display professional behaviors and body language.

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(R20A0281) BASIC ELECTRICAL ENGINEERING LAB

COURSE OBJECTIVES:
1. To design electrical systems.
2. To analyze a given network by applying various network theorems.
3. To expose the students to the operation of dc generator.
4. To expose the students to the operation of dc motor and transformer.
5. To examine the self excitation in dc generators.

CYCLE – I
1. Verification of KVL and KCL.
2. Verification of Thevenin's theorem.
3. Verification of Norton's theorem.
4. Verification of Super position theorem.
5. Verification of Maximum power transfer theorem.
6. Verification of Reciprocity theorem.

CYCLE -II
6. Magnetization characteristics of DC shunt generator.
7. Swinburne's test on DC shunt machine.
8. Brake test on DC shunt motor.
9. OC &SC tests on single phase transformer.
10. Load test on single phase transformer.

NOTE: Any 10 of above experiments are to be Conducted

COURSE OUTCOMES:
At the end of the course, students would be able to

1. Calculate the branch currents and mesh voltages by conducting KCL and KVL test on given

   circuit.

2. Prove the various circuit theorems like Superposition, Thevenin's, Norton's, Maximum power

   transfer and Reciprocity theorems.

3. Plot the Magnetization characteristics of DC shunt generator.

4. Plot the characteristics of DC shunt motor by conducting Brake Test.

5. Determine the Efficiency of single-phase transformer by conducting OC, SC and Load tests

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(R20A581) PROGRAMMING FOR PROBLEM SOLVING LAB

Program Objectives:

1. To understand the various steps in Program development.
2. To understand the basic concepts in C Programming Language.
3. To learn how to write modular and readable C Programs.
4. To learn to write programs (using structured programming approach) in C to solve problems.
5. To introduce the students to basic data structures such as lists, stacks and queues.

Week 1:

a) Write a program to find sum and average of three numbers

b) Write a program to calculate simple interest(SI) for a given principal (P), time (T), andrate of interest (R)   (SI = P*T*R/100)

Week 2:

a) Write a program to swap two variables values with and without using third variable

b) Write a program to find the roots of a quadratic equation.

Week 3:

a) Write a program to find the sum of individual digits of a given positive integer.

b) Write a program, which takes two integer operands and one operator from the user,performs the operation and then prints the result.

(Consider the operators +,-,*, /, % and use Switch Statement)

Week 4:

a) Write a program to find both the largest and smallest number in a list of integers.

b) Write a program to find the sum of integer array elements using pointers

Week 5:

a) Write a program to perform addition of two matrices.

b) Write a program to perform multiplication of two matrices.

Week 6:

a) Write a program to find the length of the string using Pointer.

b) Write a program to count the number of lines, words and   characters in a given text.
Week 7:

a) Write a program to find factorial of a given integer using non-recursive function and recursive function.

b) Write program to find GCD of two integers using non-recursive function andrecursive function.

Week 8:

a) Write a program using user defined functions to determine whether the given string is palindrome or not.

b) Write a Program to swap the values of two variables using

i) Call by Value ii) Call by Reference

Week 9:

a) Write a program to find the sum of integer array elements using pointers ,use dynamicmemory allocation to allocate memory.

b) Write a program to perform subtraction of two matrices, Design functions to performread ,display and subtract

Week 10:

a) Write a program to create a structure named book and display the contents of a book.

b) Write a Program to Calculate Total and Percentage marks of a student using structure.

Week 11:

a) Write a program that uses functions to perform the following operations:

   i) Reading a complex number   ii) Writing a complex number

   iii) Addition of two complex numbers   iv) Multiplication of two complex numbers

b)Write a program to reverse the first n characters in a file.

 (Note: The file name and n are specified on the command line.)

Week 12:

a) Write a program to copy the contents of one file to another.

b) Write a program to merge two files into a third file (i.e., the contents of the first filefollowed by those of the second are put in the third.

Week 13:

a) Write a program for static implementation of stack

b) Write a program for static implementation of Queue

Week 14:

 Write a program to perform various operations on single list

Week 15:

a) Write a program for dynamic implementation of stack

b) Write a program for Dynamic implementation of Queue

Case Studies

Case 1: Student Record Management System

The main features of this project include basic file handling operations; you will learn how to add, list, modify and delete data to/from file. The source code is relatively short, so

thoroughly go through the mini project, and try to analyze how things such as functions, pointers, files, and arrays are implemented.

Currently, listed below are the only features that make up this project, but you can add new features as you like to make this project a better one!

- ❖ Add record
- ❖ List record
- ❖ Modify record
- ❖ Delete record

Case 2: Library Management System

This project has 2 modules.

1.   Section for a librarian
2.   Section for a student

A librarian can add, search, edit and delete books. This section is password protected. That means you need administrative credentials to log in as a librarian.

A student can search for the book and check the status of the book if it is available.Here is list of features that you can add to the project.

1. You can create a structure for a student that uniquely identify each student. When astudent borrows a book from

the library, you link his ID to Book ID so that librarian can find how a particular book is borrowed.

2.You can create a feature to bulk import the books from CSV file.

3.You can add REGEX to search so that a book can be searched using ID, title, author orany of the field.

4.You can add the student login section.

TEXT BOOKS

1. C Programming and Data Structures, P.Padmanabham, Third Edition, BS Publications
2. Computer programming in C.V.RAjaraman, PHI Publishers.
3. C Programming, E.Balagurusamy, 3rd edition, TMHPublishers.
4. C Programming, M.V.S.S.N Venkateswarlu and E.V.Prasad,S.Chand Publishers
5. Mastering C,K.R.Venugopal and S.R.Prasad, TMH Publishers.

Program Outcomes:

1. Ability to apply solving and logical skills to programming in C language.
2. Able to apply various conditional expressions and looping statements to solve problems associated with conditions.

3. Acquire knowledge about role of Functions involving the idea of modularity.

4. Understand and apply the Concept of Array, Strings and pointers dealing with memory management.

5. Acquire knowledge about basic data structures and their implementation.

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(R20A003) HUMAN VALUES AND PROFESSIONAL ETHICS

COURSE OBJECTIVES:

This introductory course input is intended:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.

2. To facilitate the development of a holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of value based living in a natural way.

3. To highlight plausible implications of such a holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

UNIT - I:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration - what is it? - its content and process; 'Natural Acceptance' and Experiential Validation - as the mechanism for self-exploration. Continuous Happiness and Prosperity A look at basic Human Aspirations- Right understanding, Relationship and Physical Facilities - the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT - II:

Understanding Harmony in the Human Being - Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT - III:

Understanding Harmony in the Family and Society - Harmony in Human - Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human - human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society - Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!

UNIT - IV:

Understanding Harmony in the nature and Existence - Whole existence as Coexistence: Understanding the harmony in the Nature. Inter connectedness and mutual fulfillment among the four orders of nature - recyclability and self-regulation in nature. Understanding Existence as Co-

existence (Sah-astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT - V:

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order.
b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems.
c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values andProfessional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart StudentPublications, 3rd Edition.

REFERENCE BOOKS:

1. Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth - Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. AI Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology - the Untold Story

COURSE OUTCOMES:

1. The students will be able to obtain happiness and prosperity in their life.
2. They will develop harmony at all levels.
3. They can have satisfying human behavior throughout their life.

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(R20A0002) PROFESSIONAL ENGLISH

INTRODUCTION:

English is a tool for global communication and is the dominant language, which is sweeping almost all the fields in the world. It has become a necessity for people to speak in English comfortably, if they want to enter the global workforce. Hence, the course is designed to help the students to meet the global standards. Each unit focuses on English skill-set to improve: Interview skills, giving presentations and professional etiquette.

COURSE OBJECTIVES:

1. To enrich students to express themselves appropriately and fluently in professional contexts.
2. To enhance their employability through regular participation in group discussions and interview skills.
3. To lay foundation with writing strategies for the future workplace needs.
4. To acquaint students with different components of professional presentation skills.
5. To equip students with necessary training in listening to comprehend dialects of English language.

UNIT-I
Listening   - Listening for General Details.
Speaking   - Description of Pictures, Places, Objects and Persons
NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract   - The summary of Asimov's *Nightfall*
Grammar   - If clauses Vocabulary   - Technical VocabularyWriting   - Paragraph Writing
Unit –II
Listening   -Listening for Specific Details
Speaking   - Oral presentations
NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract   - A literary analysis of Asimov's *Nightfall*Grammar   - Transformation of Sentences
Vocabulary   - Idioms
Writing   -Abstract Writing
Unit –III
Listening   - Listening for GistSpeaking   - Mock Interviews
NOTE: Listening and speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract   - Character sketches of Asimov's *Nightfall's* - protagonists and antagonists - Dr. Susan Calvin, Mike Donovan, Stephen Byerley, Francis Quinn
Grammar   - Transitive and Intransitive Verbs Vocabulary - Standard Abbreviations (Mini Project)
Writing   - Job Application – Cover letter
Unit – IV
Listening   - Listening for Vocabulary

Speaking   - Telephonic Expressions
NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract   - Theme of Asimov's *Nightfall*
Grammar   - Auxiliary verbs, Degrees of Comparison
Vocabulary   - Word Analogy
Writing   - Job Application - Resume
Unit – V
Listening   - Critical Listening (for attitude and Opinion)
Speaking   - Group discussion
NOTE: Listening and Speaking tasks are solely for lab purpose and not for testing in the examinations.
Extract   -Asimov's *Nightfall*: A Science Fiction
Grammar   - Common Errors, Prepositions
Vocabulary   - Homonyms, homophones and homographs
Writing   - Report Writing

* Isaac Asimov's *Nightfall* for intensive and extensive reading
* Exercises apart from the text book shall also be referred for classroom tasks.

REFERENCE BOOKS:
1. Nightfall, Isaac Asimov; Robert Silverberg, 1990
2. Practical English Usage. Michael Swan. OUP. 1995.
3. Remedial English Grammar. F.T. Wood. Macmillan.2007
4. On Writing Well. William Zinsser. Harper Resource Book. 2001
5. Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
6. Communication Skills. Sanjay Kumar and Pushpa Lata. Oxford University Press. 2011.
7. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press

COURSE OUTCOMES:

Students will be able to:

1.   Analyze and interpret a diverse range of engineering concepts through the synthesis ofinformation
2.   Understand the impact of professional engineering solutions is societal contexts anddemonstrate its knowledge
3. Achieve communicative ability in their personal and professional relations with clarity of speech and creativity in content
4. Function effectively as an individual and a team; and would be able to prepare themselves to be market ready
5. Comprehend and write effective reports and design documentation, manage projects and make effective presentations.

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(R20A0022) MATHEMATICS-II

COURSE OBJECTIVES:

1. The aim of numerical methods is to provide systematic methods for solving problems in a numerical form using the given initial data,also used to find the roots of an equation and to solve differential equations.
2. The objective of interpolation is to find an unknown function which approximates the given data points and the objective of curve fitting is to find the relation between the variables x and y from given data and such relationships which exactly pass through the data (or) approximately satisfy the data under the condition of sum of least squares of errors.
3. PDE aims at forming a function with many variables and also their solution methods, Method of separation of variables technique is learnt to solve typical second order PDE.
4. Evaluation of multiple integrals.
5. In many engineering fields the physical quantities involved are vector valued functions. Hence the vector calculus aims at basic properties of vector-valued functions and their applications to line, surface and volume integrals.

UNIT – I: Solutions of algebraic, transcendental equations and Interpolation
Solution of algebraic and transcendental equations: Introduction, Bisection Method, Method of false position, Newton-Raphson method and their graphical interpretations.
Interpolation: Introduction, errors in polynomial interpolation, Finite differences - Forward differences, Backward differences, Central differences. Newton's formulae for interpolation, Gauss's central difference formulae, Interpolation with unevenly spaced points - Lagrange's Interpolation.

UNIT – II: Numerical Methods
Numerical integration : Generalized quadrature - Trapezoidal rule, Simpson's $1/3^{rd}$ and Simpson's $3/8^{th}$ rules.
Numerical solution of ordinary differential equations: Solution by Taylor's series method, Euler's method, Euler's modified method, Runge-Kutta fourth order method.
Curve fitting : Fitting a straight line, second degree curve, exponential curve, power curve by method of least squares.

UNIT III: Partial Differential Equations
Introduction, formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order Lagrange's linear equation and non-linear equations, Charpit's method, Method of separation of variables for second order equations and applications of PDE to one dimensional equation (Heat equation).

Unit IV: Double and Triple Integrals
Double and triple integrals (Cartesian and polar), Change of order of integration in double integrals, Change of variables (Cartesian to polar).

Unit V: Vector Calculus

Introduction, Scalar point function and vector point function, Directional derivative, Gradient, Divergence, Curl and their related properties, Laplacian operator, Line integral - work done, Surface integrals, Volume integral. Green's theorem, Stoke's theorem and Gauss's Divergence theorems (Statement & their Verification).

TEXT BOOKS:

1. Higher Engineering Mathematics by B V Ramana ., Tata McGraw Hill.
2. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers.
3. Mathematical Methods by S.R.K Iyenger, R.K.Jain, Narosa Publishers.

REFERENCE BOOKS:

1. Elementary Numerical Analysis by Atkinson-Han, Wiley Student Edition.
2. Advanced Engineering Mathematics by Michael Greenberg –Pearson publishers.
3. Introductory Methods of Numerical Analysis by S.S. Sastry, PHI

COURSE OUTCOMES:

 After learning the concepts of this paper the student will be able to independently

1. Find the roots of algebraic, non algebraic equations and predict the value at an intermediate point from a given discrete data.
2. Find the most appropriate relation of the data variables using curve fitting and this method of data analysis helps engineers to understand the system for better interpretation and decision making.
3. Solve first order linear and non-linear partial differential equations which are very important in engineering field.
4. Evaluate multiple integrals; hence this concept can be used to evaluate Volumes and Areas of an object.
5. Evaluate the line, surface, volume integrals and converting them from one to another using vector integral theorems.

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(R20A0011) APPLIED PHYSICS

COURSE OBJECTIVES:

1. To analyze the ordinary light with a laser light and realize the transfer of light through optical fibers.
2. To identify dual nature of the matter and behavior of a particle quantum mechanically.
3. To explore band structure of the solids and classification of materials.
4. To acquire the basic knowledge of various types of semiconductor devices and find the applications in science and technology.
5. To Compare dielectric and magnetic properties of the materials and enable them to design and apply in different fields.

UNIT – I

LASERS & FIBER OPTICS

Lasers: Characteristics of lasers, Absorption, Spontaneous and Stimulated emissions, population inversion, meta stable state, types of pumping, lasing action, construction and working of Ruby Laser, Helium-Neon Laser, Semiconductor diode Laser, Applications of lasers.

Fiber Optics: Introduction to optical fiber, Construction and working principle of an Optical Fiber, Acceptance angle and Numerical aperture, Types of Optical fibers - Mode and Propagation through step and graded index fibers ,Losses in optical fiber, Optical Fiber in Communication System, Applications of optical fibers.

UNIT – II

QUANTUM MECHANICS

Wave nature of particles, de Broglie's hypothesis, matter waves, Heisenberg's uncertainty principle, Davisson and Germer's experiment, G.P Thomson experiment, Schrodinger time-independent wave equation-significance of wave function, particle in one dimensional square well potential.

UNIT – III

ELECTRONIC MATERIALS

Free electron theory(Classical & Quantum)- Assumptions, Merits and drawbacks, Fermi level, Density of states, Periodic potential, Bloch's theorem, Kronig – Penny model (qualitative) , E – K diagram, Effective mass, Origin of energy bands in solids, Classification of materials : Metals, semiconductors and insulators.

UNIT-IV

SEMICONDUCTOR PHYSICS

Intrinsic and extrinsic semiconductors, Direct and indirect band gap semiconductors, Carrier concentration in intrinsic and extrinsic semiconductors. Dependence of Fermi level on carrier concentration and temperature, carrier transport: mechanism of diffusion and drift, Formation of PN junction, V-I characteristics of PN diode, energy diagram of PN diode, Hall experiment, semiconductor materials for optoelectronic devices - LED, Solar cell.

UNIT – V:
DIELECTRICS AND MAGNETIC PROPERTIES OF MATERIALS
Dielectrics: Introduction, Types of polarizations (Electronic and Ionic) and calculation of their polarizabilities, internal fields in a solid, Clausius-Mossotti relation.
Magnetism: Introduction, origin of magnetism, Bohr magneton, classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Properties of anti-ferro and ferri magnetic materials, Hysteresis curve based on domain theory, Soft and hard magnetic materials.

TEXT BOOKS:
1. Engineering Physics by Kshirsagar & Avadhanulu, S Chand publications.
2. Engineering Physics- B.K.Pandey, S.Chaturvedi, Cengage Learning.

REFERENCES:
1. Engineering Physics – R.K. Gaur and S.L. Gupta, DhanpatRai Publishers.
2. Engineering Physics, S Mani Naidu- Pearson Publishers.
3. Engineering physics 2nd edition –H.K. Malik and A.K. Singh.
4. Engineering Physics – P.K. Palaniswamy, Scitech publications.
5. Physics by Resnick and Haliday.

COURSE OUTCOMES:
After completion of studying Applied Physics the student is able to

1 Observe the properties of light and its engineering applications of laser in fiber opticcommunication systems.
2 Apply the basic principles of quantum mechanics and the importance of behavior of a particle.
3 Find the importance of band structure of solids and their applications in various electronicdevices.
4 Evaluate concentration & estimation of charge carriers in semiconductors and workingprinciples of PN diode.
5 Examine dielectric, magnetic properties of the materials and apply them in material technology.

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(R20A0401) ANALOG & DIGITAL ELECTRONICS

COURSE OBJECTIVES:

The main objectives of the course are:

1. To familiarize with the principal of operation, analysis and design of pn junction diode.
2. To study the construction of BJT and its characteristics in different configurations.
3. To study the construction and characteristics of JFET and MOSFET.
4. To study basic number systems codes and logical gates.
5. To introduce the methods for simplifying Boolean expressions and design of combinational circuits.

UNIT-I

P-N Junction diode: Qualitative Theory of P-N Junction, P-N Junction as a diode, diode equation, volt-ampere characteristics temperature dependence of V-I characteristic, ideal versus practical, diode equivalent circuits, Zener diode characteristics.

UNIT-II

Bipolar Junction Transistor: The Junction transistor, Transistor construction, Transistor current components, Transistor as an amplifier, Input and Output characteristics of transistor in Common Base, Common Emitter, and Common collector configurations. α and β Parameters and the relation between them, BJT Specifications.

UNIT-III

FIELD EFFECT TRANSISTOR: JFET-Construction, principle of Operation, Volt–Ampere characteristics, Pinch- off voltage. Small signalmodelofJFET. FET as Voltage Variable Resistor, Comparison of BJT andFET. MOSFET- Construction, Principle of Operation and symbol, MOSFET characteristics in Enhancement and Depletionmodes.

UNIT IV:

Number System and Boolean Algebra: Number Systems, Base Conversion Methods, Complements of Numbers, Codes- Binary Codes, Binary Coded Decimal, Unit Distance Code, Digital Logic Gates (AND, NAND, OR, NOR, EX-OR, EX-NOR), Properties of XOR Gates, Universal Gates, Basic Theorems and Properties, Switching Functions, Canonical and Standard Form.

UNIT-V

Minimization Techniques: The Karnaugh Map Method, Three, Four and Five Variable Maps, Prime and Essential Implications, Don't Care Map Entries, Using the Maps for Simplifying, Multilevel NAND/NOR realizations.

Combinational Circuits: Design procedure – Half adder, Full Adder, Half subtractor, Full subtractor, Multiplexer/Demultiplexer, decoder, encoder, Code converters, Magnitude Comparator.

TEXT BOOKS

1. "Electronic Devices & Circuits", Special Edition – MRCET, McGraw Hill Publications,2017.
2. Integrated Electronics Analog Digital Circuits, Jacob Millman and D. Halkias, McGrawHill.
3. Electronic Devices and Circuits, S.Salivahanan,N.Sureshkumar, McGrawHill.
4. M. Morris Mano, Digital Design, 3rd Edition, Prentice Hall of India Pvt. Ltd., 2003
5. Switching and Finite Automata Theory- ZviKohavi& Niraj K. Jha, 3rdEdition,Cambridge.

REFERENCE BOOKS

1. Electronic Devices and Circuits,K.Lal Kishore B.SPublications
2. Electronic Devices and Circuits, G.S.N. Raju, I.K. International Publications, New Delhi, 2006.
3. John F.Wakerly, Digital Design, Fourth Edition, Pearson/PHI,2006
4. John.M Yarbrough, Digital Logic Applications and Design, Thomson Learning,2002.
5. Charles H.Roth. Fundamentals of Logic Design, Thomson Learning,2003.

COURSE OUTCOMES

After completion of the course, the student will be able to:

1. Understand the principal of operation, analysis and design of pn junction diode.
2. Understand the construction of BJT and its characteristics in different configurations.
3. Understand the construction and characteristics of JFET and MOSFET.
4. Understand basic number systems codes and logical gates.
5. Understand the methods for simplifying Boolean expressions and design of combinational circuits.

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(R20A0502) PYTHON PROGRAMMING

COURSE OBJECTIVES:
1. To read and write simple Python programs.
2. To develop Python programs with conditionals and loops.
3. To define Python functions and call them.
4. To use Python data structures –- lists, tuples, dictionaries.
5. To do input/output with files in Python.

UNIT I
Introduction to Python Programming Language: Introduction to Python Language and installation, overview on python interpreters, working with python, Numeric Data Types: int, float, Boolean, complex and string and its operations, Standard Data Types: List, tuples, set and Dictionaries, Data Type conversions, commenting in python.

UNIT II
Variables and Operators: Understanding Python variables, Multiple variable declarations, Python basic statements, Python basic operators: Arithmetic operators, Assignment operators, Comparison operators, Logical operators, Identity operators, Membership operators, Bitwise operators, Precedence of operators, Expressions.

UNIT III
CONTROL FLOW AND LOOPS
Conditional (if), alternative (if-else), chained conditional (if- elif -else), Loops: For loop using ranges,string, Use of while loops in python, Loop manipulation using pass, continue and break

UNIT IV
Functions
Defining Your Own Functions, Calling Functions, passing parameters and arguments, Python Function arguments: Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables. Powerful Lambda functions in python.

UNIT V
I/O and Error Handling in Python
Introduction, Access Modes, Writing Data to a File, Reading Data from a File, Additional File Methods introduction to Errors and Exceptions, Handling IO Exceptions, Run Time Errors, Handling Multiple Exceptions.
Introduction to Data Structures: What are Data structures, Types of Data structures, Introduction to Stacks and Queues.

TEXT BOOKS

1. R. Nageswara Rao, "Core Python Programming", dreamtech
2. Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist'', 2nd edition,Updated for Python 3, Shroff/O'Reilly Publishers, 2016.
3. Python Programming: A Modern Approach, Vamsi Kurama, Pearson
4. Data Structures and Algorithmic Thinking with Python by Narasimha Karumanchi

REFERENCE BOOKS:

1. Core Python Programming, W.Chun, Pearson.
2. Introduction to Python, Kenneth A. Lambert, Cengage
3. Learning Python, Mark Lutz, Orielly

COURSE OUTCOMES:

Upon completion of the course, students will be able to

1. Read, write, execute by hand simple Python programs.
2. Structure simple Python programs for solving problems.
3. Decompose a Python program into functions.
4. Represent compound data using Python lists, tuples, and dictionaries.
5. Read and write data from/to files in Python Programs

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(R20A0082) APPLIED PHYSICS LAB

COURSE OBJECTIVES:
  Students can be able to
 1   Identify the specific types of elastic and electrical nature of materials in physics lab.
 2   Observe concepts of magnetism in physics lab.
 3   Analyze propagation of light in various optical devices practically.
 4   Examine various opto electronic devices practically
 5   Well-equipped with the properties of semiconductor devices in physics lab.

LIST OF EXPERIMENTS:
1. Torsional pendulum-Rigidity modulus of given wire.
2. Melde's experiment –Transverse and Longitudinal modes.
3. Stewart and Gee's method- Magnetic field along the axis of current carrying coil.
4. Spectrometer-Dispersive power of the material of a prism
5. Diffraction grating-using laser -Wavelength of light.
6. Newton's Rings –Radius of curvature of Plano convex lens.
7. LED -Characteristics of LED.
8. Solar cell -Characteristics of a Solar cell.
9. Optical fiber- Evaluation of numerical aperture of optical fiber.
10. Hall Effect –To study Hall effect in semiconducting samples.

REFERENCE BOOKS:
1. Practical physics by Dr. Aparna, Dr K.V Rao, V.G.S.Publications.
2. Engineering physics practical lab manual – MRCET.

COURSE OUTCOMES:
1   Students are able to measure the elastic constants of the given material of the wire and
    determine the ac frequency f vibrating bar.
2   Students are able to determine the magnetic induction of a circular coil carrying current by
     applying the principles of terrestrial magnetism.
3   Students are able to frame relativistic ideas of light phenomenon
4   Students are able to achieve the analysis of V-I characteristics of opto electronic devices
5   Students are able to determine the carrier concentration and identify the given semiconductor
    material with the help of Hall Effect.

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(R20A0582) PYTHON PROGRAMMING LAB

COURSE OBJECTIVES:
1. Syntax and Semantics and create Functions in Python.
2. Different data types Lists, Dictionaries in Python.
3. how to execute the programs using loops and control statements
4. Decision Making and Functions in Python
5. Files and exception Handling in Python

Week 1:
A)   Write python program to print Hello World
B)   Write a python program to get string, int, float input from user
C)   Write a python program to add 2 numbers

Week 2:
A) Create a list and perform the following methods
1) insert()   2) remove()   3) append()   4) len()   5) pop()   6) clear()
B) Write a python program to find the length of list?
C) Write a python program to find the smallest and largest number in the list?

Week 3:
A) Create a tuple and perform the following methods
1) Add items   2) len()   3) check for item in tuple   4)Access iems
B) Write a python program using the following methods: 1) count 2) index
C) Write a python program using "+" and "*" operations which resulting a new tuple?

Week 4:
A) Create a dictionary and apply the following methods
1) Print the dictionary items   2) access items 3) use get() 4)change values 5) use len()
B) Write a python code to convert list of tuples into dictionaries?
C) Write python program to store data in list, tuple, set, dictionary and then try to print them.

Week 5:
A) Write a python program to perform arithmetic, assignment, logical and comparison operators?

B) Write a Python program to add two positive integers without using the '+' operator. (use bitwise operator)

C) Write a Python program to perform the basic four operators (+, -, *, /)

Week 6:
A) Write a simple python program to declare a variable in different possible ways?

B) Write a python program to show precedence of operators using the expression: z = (v+w) * x / y

C) Write a python program to check whether the values of a list exist or not (use membership operator) and also perform identity operation?

Week 7:

A) Write a python program to print a number is positive/negative using if-else.

B) Write a python program to find largest number among three numbers.

C) Write a python Program to read a number and display corresponding day using if_elif_else?

D)   Write a python program to print list of numbers using range and for loop

Week 8:

A)   Write a python code to print the sum of natural numbers using while loop?

B)   Write a python program to print the factorial of given number?

C)   Write a python program to find the sum of all numbers stored in a list using for loop?

Week 9:

A)   Write a Python function that takes two lists and returns True if they are equal otherwise false

B)   Write python program in which an function is defined and calling that function prints Hello World

C)   Write python program in which an function(with single string parameter) is defined and calling thatfunction prints the string parameters given to function.

D)   Write a python program using with any one of python function argument?

Week 10:

A) Write a program to double a given number and add two numbers using lambda()?

B) Write a program for filter() to filter only even numbers from a given list.

C) Write a program for map() function to double all the items in the list?

D)Write a program to find sum of the numbers for the elements of the list by using reduce()?

Week 11:

A) Write a python program to open and write "hello world" into a file?

   B) Write a python program to write the content "hi python programming" for the existing file.

C) Write a python program to read the content of a file?

Week 12:

A) write a program to implement stack using array.

B) write a program to implement Queue using array.

TEXT BOOKS:

1. R. Nageswara Rao, "Core Python Programming", dream tech

2. Allen B. Downey , " Think Python: How to Think Like a Computer Scientist", Second Edition, Updated for Python 3, Shroff/O'Reilly Publishers, 2016.

COURSE OUTCOMES:

After completion of the course, Students will be able to**:**

1. Evaluate Problem solving and programming capability

2. Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python

3. Implement conditional and loop for python programs

4. Express different Decision Making statements and Functions

5. Understand and summarize different File handling operations and exceptions

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(R20A0083) ENGINEERING AND IT WORKSHOP LAB

It is consisting of 3 parts:

Part I: IT Workshop;

Part-II: Enectrical & Electronics Workshop;

Part III: Auto CAD Workshop

Part I: IT Workshop:

Objectives:

- Understand the internal structure and layout of the computer system.
- Learn to diagnose minor problems with the computer functioning.
- Know the proper usage and threats of the world wide web.
- Study in detail about the various features of Ms-Word, Excel, PowerPoint.
- Gain an awareness about the tools of LibreOffice.

Task- 1: PC HARDWARE

Identification of the peripherals of a computer, components in a CPU and its functions. Block diagram of the CPU along with the configuration of each peripherals. Functions of Motherboard. Assembling and Disassembling of PC. Installing of OS.

Task- 2: TROUBLESHOOTING

Hardware Troubleshooting: Students are to be given a PC which does not boot due to proper assembly or defective peripherals and the students should be taught to identify and correct the problem.

Software Troubleshooting: Students have to be given a malfunctioning CPU due to system software problems. They should identify the problem and fix it to get the computer back to working condition.

Task 3: INTERNET

Web Browsers, Access of websites, Surfing the Web, Search Engines, Customization of web browsers, proxy settings, bookmarks, search toolbars, pop-up blockers. Antivirus downloads, Protection from various threats.

MS OFFICE

Task 4: MICROSOFT WORD

Introduction to Word Processor, Editing and Formatting features, overview of toolbars,saving files, Using help and resources, rulers, fonts, styles, format painter, Drop Cap in word, Applying Text

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effects, Using Character Spacing, Borders and colors, Inserting Header and Footer, Using Date and Time option in Word &Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes. Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and MailMerge in word.Using Word to create Project Certificate, Project Abstract, News Letter, Resume.

Task 5: MICROSOFT EXCEL

Excel Orientation: The importance of Excel as a Spreadsheet tool, Accessing, overview of toolbars, saving excel files, Using help and resources. Excel formulae &Functions : formulae, logical functions, text functions, statistical functions, mathematical functions, lookup functions, conditional formatting, Charts, Hyper linking, Renaming and Inserting worksheets, Data Analysis functions.
Creating a Scheduler (Features:- Gridlines, Format Cells, Summation, auto fill, Formatting)
Calculating GPA (Features:- Cell Referencing, Formulae and functions in excel)

Task 6: MICROSOFT POWER POINT

Basic power point utilities and tools, PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Drawing toolbar-Lines and Arrows, Text boxes, Clipart, Insertion of images, slide transition, Custom animation, Hyperlinks.

Task 7: LIBRE OFFICE

Overview of LibreOffice and its features of Writer, Calc, Impress, Draw, Base, Math, Charts.
Libre office Math: Introduction , Creating & Editing Formulas, formulas as separated documents or files, formulas in office document, Creating formulas, Formula layout
Libre Office Draw : Introduction, Basic shapes, working with objects, flowcharts, organization charts,

Text Books:

1.Introduction to Information Technology,ITL Education Solutions limited, Pearson Education
2.PC Hardware and A+ Handbook-Kate J.Chase PHI(Microsoft)
3. Excel Functions and Formulas, Bernd held, Theodor Richardson, Third Edition
4. Libre Office Documentation : https://documentation.libreoffice.org/en/english-documentation

Outcomes:

- Ability to identify the major components of a computer and its peripherals. They are capable of assembling a personal computer, and can perform installation of system software like MS Windows and required device drivers.
- Students can detect and perform minor hardware and software level troubleshooting.
- Capacity to work on Internet & World Wide Web and make effective usage of the internet foracademics.

PART II:ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP

Course Objectives:

1. To get acquaintance with Residential house wiring procedure.

2. To obtain the knowledge about fluorescent lamp wiring procedure.

3. To get familiarized with staircase wiring.

4. To perform soldering and desoldering practice.

List of Experiments:

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.

2. Fluorescent lampwiring

3. Stair casewiring

4. Soldering and Desoldering practice – components, devices and circuits using general purpose PCB.

Course Outcomes:

1. Students will able to understand domestic wiring procedurespractically.

2. Students will able to doFluorescent lamp wiring.

3. Students will able to do staircasewiring.

4. Student will able to soldering and disordering practice.

PART III: AUTOCAD WORKSHOP

1. **Introduction to AutoCAD**

   Design Process, AutoCAD Installation Process, AutoCAD user Interface,Function Keys

2. **Commands:** Drawing Commands,Editing Commands, Drawings aids

3. **D Wireframe Modeling**

4. **CAD Practice Exercises**

5. **CAD -2D, CAD - Isometric**

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(R20A0014) ENVIRONMENTAL SCIENCE

COURSE OBJECTIVES:

On successful completion of this course, students will be able to:

1. Distinguish the inter relationship between living organism and environment.
2. Categorize various types of natural resources available on the earth surface.
3. Detectthe causes, and control measures of various types of environmental pollution.
4. Articulate the issues related to solid waste and its management.
5. Explain and understand the importance of sustainable development.

UNIT-I: ECOSYSTEMS:
Definition, Scope, and Importance of ecosystem. Classification, natural and artificial ecosystems, structure - abDSic and bDSic component, functions of an ecosystem, food chains, food webs and ecological pyramids.
Activities: Case studies, poster making.

UNIT-II: NATURAL RESOURCES:
Classification of Resources: Definition of natural resource, renewable and non -renewable resources. Renewable resources: Energy resources: growing energy needs solar energy, hydro energy, biogas, biofuel. Non-Renewable Resources: Fossil fuels, refining of Coal, Petroleum, and natural gas. Use of alternate energy source.
Activities: Case studies, seminars.

UNIT-III: ENVIRONMENTAL POLLUTION AND TECHNIQUES:
Definition, Types of pollution:Air pollution causes, effects,control measures of air pollution and prevention techniques.Water pollution causes, effects, control measures and techniques.
Activities: Debate, seminars

UNIT-IV: SOLID WASTE MANAGEMENT:
Definition of Solid waste, characteristics of solid waste, solid waste management: collection, transportation, processing treatment, disposal methods and e-waste management,3R techniques: reduce, reuse, and recycle.
Activities: Seminars, Case studies.

UNIT-V: SUSTAINABLE DEVELOPMENT:
Definition of sustainable development, concept,sustainable development goals, threats to sustainability, strategies to achieve sustainable development.Introduction to green chemistry, green building concept.
Activities: Worksheets, seminars.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission
2. Environmental Studies by R. Rajagopalan, Oxford University Press.
3. Textbook of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications
4. Dr. P. D Sharma, "Ecology and Environment", Rastogi Publications, New Delhi, 12 Edition, 2015

REFERENCE BOOKS

1. Environmental Studies by Anubha Kaushik, 4 Edition, New age international publishers
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Pvt. Ltd, New Delhi
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHL Learning Pvt. Ltd, New Delhi
4. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition

COURSE OUTCOMES:

The basic concepts included in this course will help the student to:

1. Differentiate between various bDSic and abDSic components of ecosystem.
2. Describe the various types of natural resources.
3. Examine the problems associated with waste management.
4. Evaluate the causes, and apply control measures of various types of environmental pollutions.
5. Develop technologies on the basis of ecological principles on environment which in turn helps in sustainable development.

(R20A0503) DATA STRUCTURES USING PYTHON

COURSE OBJECTIVES:

This course will enable students to
1. Implement Object Oriented Programming concepts in Python.
2. Understand Lists, Dictionaries and Regular expressions in Python.
3. Understanding how searching and sorting in Python.
4. Understanding how liner and non-liner data structures works.
5. To learn the fundamentals of writing Python scripts.

UNIT –I
Oops Concepts-Class, object, types of variables, types of methods, inheritance, Encapsulation, Polymorphism, Abstraction, special functions, constructors.

UNIT -II
Data Structures, Types-User define, predefine, List, List comprehension, Arrays vs. List, Tuples, Set, Dictionaries, Expressions, Slicing, strings, String processing, Python memory model: names, mutable and immutable values.

UNIT -III
Searching-Linear Search and Binary search. **Sorting-** Bubble Sort, Selection Sort, Insertion Sort, Merge sort, Quick sort.

UNIT -IV
Stacks and Queues implementation, Linked List, Double Linked List, Circular Linked list, Heap

UNIT -V
Graphs-Breadth First Search, Depth First Search. **Trees** - Binary search trees: find, insert, delete | Height-balanced binary search trees.

TEXTBOOKS:

1. Data structures and algorithms in python by Michael t. Goodrich
2. Data Structures and Algorithmic Thinking with Python by Narasimha Karumanchi

REFERENCE BOOKS:
1.   Hands-On Data Structures and Algorithms with Python: Write complex and powerful codeusing the latest features of Python 3.7, 2nd Edition by Dr. Basant Agarwal, Benjamin Baka.
2. Data Structures and Algorithms with Python by Kent D. Lee and Steve Hubbard.
3.   Problem Solving with Algorithms and Data Structures Using Python by Bradley N Miller andDavid L. Ranum.
4. Core Python Programming -Second Edition,R. Nageswara Rao, Dreamtech Press

COURSE OUTCOMES:

The students should be able to:

1.   Examine Python syntax and semantics and be fluent in the use of Python flow control andfunctions.
2.   Create, run and manipulate Python Programs using core data structures like Lists,
3.   Dictionaries and use Regular Expressions.
4.   Interpret the concepts of Object-Oriented Programming as used in Python.
5.   Master object-oriented programming to create an   entire python project using objects and classes.

(R20A0505) DESIGN AND ANALYSIS OF ALGORITHMS

COURSE OBJECTIVES:
1. To analyze performance of algorithms.
2. To choose the appropriate data structure and algorithm design method for a specified application.
3. To understand how the choice of data structures and algorithm design methods impacts the performance of programs.
4. To solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking and branch and bound.
5. To understand the differences between tractable and intractable problems and to introduce P and NP classes.

UNIT I
Introduction: Algorithms, Pseudo code for expressing algorithms, performance analysis- Space complexity, Time Complexity, Asymptotic notation- Big oh notation, omega notation, theta notation and little oh notation.
Divide and Conquer: General method. Applications- Binary search, Quick sort, merge sort, Strassen's matrix multiplication.

UNIT II
Disjoint set operations, Union and Find algorithms, Spanning trees, AND/OR graphs, connected components, Bi-connected components.

UNIT III
Greedy method: General method, applications- Job sequencing with deadlines, Knapsack problem, Minimum cost spanning trees, Single source shortest path problem.
Dynamic Programming: General method, applications- Matrix chained multiplication, Optimal binary search trees, 0/1 Knapsack problem, All pairs shortest path problem, Traveling sales person problem, Reliability design.

UNIT IV
Backtracking: General method, Applications- n-queue problem, Sum of subsets problem, Graph coloring, Hamiltonian cycles.

UNIT V
Branch and Bound: General method, applications- Travelling sales person problem, 0/1 Knapsack problem- LC branch and Bound solution, FIFO branch and Bound solution.
NP-Hard and NP-Complete Problems: Basic concepts, Non deterministic algorithms, NP-Hard and NP-Complete classes, NP-Hard problems, Cook's theorem.

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, SatrajSahni and Rajasekharan,

Universities press

2. Design and Analysis of Algorithms, P. h. Dave,2ndedition,Pearson Education.

REFERENCES:

1. Introduction to the Design and Analysis of Algorithms A Levitin Pearson Education

2. Algorithm Design foundations Analysis and Internet examples, M.T.Goodrich and RTomassia John

Wiley and sons

3. Design and Analysis of Algorithms, S. Sridhar, Oxford Univ.Press

4. .Design and Analysis of Algorithms,Aho, Ulman and Hopcraft, Pearson Education.

5. Foundations of Algorithms, R. NeapolitanandK.Naimipour, 4th edition

COURSE OUTCOMES:

1.   Ability to analyze the performance of algorithms.

2.   Ability to choose appropriate algorithm design techniques for solving problems.

3.   Ability to understand how the choice of data structures and the algorithm design methods to impact the performance of programs.

4.   Describe the dynamic programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic programming algorithms and analyze them.

5.   Describes the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms and analyze them.

(R20A0506) COMPUTER ORGANIZATION

COURSE OBJECTIVES:
To expose the students to the following:
1. How Computer Systems work & the basic principles
2. Instruction Level Architecture and Instruction Execution
3. The current state of art in memory system design
4. How I/O devices are accessed and its principles.
5. To provide the knowledge on Instruction Level Parallelism

UNIT I
Basic Functional units of Computers: Functional units, basic Operational concepts, Bus structures. Software, Performance, Multiprocessors, Multicomputer. Data Representation: Signed number representation, fixed and floating point Representations.
Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms. Error detection and correction codes.

UNIT II
Register Transfer Language and Micro Operations: RTL- Registers, Register transfers, Bus and memory transfers. Micro operations: Arithmetic, Logic, and Shift micro operations, Arithmetic logic shift unit.
Basic Computer Organization and Design: Computer Registers, Computer instructions, Instruction cycle. Instruction codes, Timing and Control, Types of Instructions: Memory Reference Instructions, Input – Output and Interrupt.

UNIT III
Central Processing Unit organization: General Register Organization, Stack organization, Instruction formats, Addressing modes, Data Transfer and Manipulation, Program Control, CISC and RISC processors
Control unit design: Design approaches, Control memory, Address sequencing, micro program example, design of CU. Micro Programmed Control.

UNIT IV
Memory Organization: Semiconductor Memory Technologies, Memory hierarchy, Interleaving, Main Memory-RAM and ROM chips, Address map, Associative memory-Hardware Organization. Match logic. Cache memory-size vs. block size, Mapping functions-Associate, Direct, Set Associative mapping. Replacement algorithms, write policies. Auxiliary memory Magnetic tapes etc

UNIT V
Input –Output Organization: Peripheral devices, Input-output subsystems, I/O device interface, I/O Processor, I/O transfers–Program controlled, Interrupt driven, and DMA, interrupts and exceptions. I/O device interfaces – SCII, USB
Pipelining and Vector Processing: Basic concepts, Instruction level Parallelism Throughput and Speedup, Pipeline hazards.

TEXT BOOKS:
1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, Vth Edition, McGraw Hill.
 2. Computer Systems Architecture – M.Moris Mano, IIIrd Edition, Pearson/PHI

REFERENCE BOOKS:
1. "Computer Architecture and Organization", 3rd Edition by John P. Hayes,WCB/McGraw-Hill
2. "Computer Organization and Architecture: Designing for Performance", 10th Edition by
   William Stallings, Pearson Education.
3. "Computer System Design and Architecture", 2nd Edition by Vincent P. Heuring and Harry
   F. Jordan, Pearson Education.

 COURSE OUTCOMES:
Upon completion of this course, students should be able to:

1. Student will learn the concepts of computer organization for several engineeringapplications.
2. Student will develop the ability and confidence to use the fundamentals of computer
   organization as a tool in the engineering of digital systems.
3. An ability to identify, formulate, and solve hardware and software computer engineering
   problems using sound computer engineering principle
4. To impart the knowledge on micro programming
5. Comprehend the concepts of advanced pipelining techniques

(R20A0024) PROBABILITY AND STATISTICS

COURSE OBJECTIVES:

1. To identify a random variable that describes randomness or an uncertainty in certain realistic situation. It can be either discrete or continuous type.
2. To learn important probability distributions like: in the discrete case, study of the Binomial and the Poisson Distributions and in the continuous case the Normal Distributions.
3. To build the linear relationship between two variables and also to predict how a dependent variable changes based on adjustments to an independent variable.
4. To interpret the types of sampling, sampling distribution of means and variance, Estimations of statistical parameters.
5. To give comprehensive knowledge of probability theory to make inferences about a population from large and small samples.

UNIT – I: Random Variables

Single Random Variables -Discrete and Continuous, Probability distribution function, Probability mass and density functions, mathematical expectation and variance.
Multiple Random variables:Discrete and Continuous, Joint probability distribution, Marginal probability density functions, conditional probability distribution function and density functions.

UNIT-II: Probability Distributions

Binomial distribution – properties, mean, variance and recurrence formula for Binomial distribution, Poisson distribution – Poisson distribution as Limiting case of Binomial distribution, properties, mean variance and recurrence formula for Poisson distribution,Normal distribution – mean, variance, median,mode and characteristics of Normal distribution.

UNIT -III:Correlation and Regression

Correlation -Coefficient of correlation, Rank correlation, Regression- Regression coefficients, Lines of regression.
Multiple correlation and regression: Coefficient of multiple Correlations and multiple regression,multiple linear regression equations.

UNIT –IV: Sampling and Testing of Hypothesis for Large Samples

Sampling: Definitions - Types of sampling - Expected values of sample mean and variance, Standard error - Sampling distribution of means and variance. Estimation - Point estimation and Interval estimation.
Testing of hypothesis , Null and Alternative hypothesis, Type I and Type II errors, Critical region, confidence interval, Level of significance, one tailed and two tailed test.
Large sample Tests: Test of significance - Large sample test for single mean, difference of means, single proportion, and difference of proportions.

Unit-V: Testing of Hypothesis for Small Samples

Small samples: Test for single mean, difference of means, paired t-test, test for ratio of variances (F-test), Chi- square test for goodness of fit and independence of attributes.

TEXT BOOKS:

1. Fundamental of Statistics by S.C. Gupta, 7thEdition, 2016.

2. Fundamentals of Mathematical Statistics by SC Gupta and V.K.Kapoor

3. Higher Engineering Mathematics by B.S. Grewal, Khanna Publishers, 35thEdition, 2000.

REFERENCES BOOKS:

1. Introduction to Probability and Statistics for Engineers and Scientists by Sheldon M.Ross.

2. Probability and Statistics for Engineers by Dr. J. Ravichandran

COURSE OUTCOMES:

After completion of the course, the student will be able to

1. Evaluate randomness in certain realistic situation which can be either discrete or continuous type and compute statistical constants of these random variables.

2. Provide very good insight which is essential for industrial applications by learning probability distributions.

3. Higher up thinking skills to make objective, data-driven decisions by using correlation and regression.

4. Assess the importance of sampling distribution of a given statistic of a random sample.

5. Analyze and interpret statistical inference using samples of a given size which is taken from a population.

(R20A0513) ARTIFICIAL INTELLIGENCE

COURSE OBJECTIVES:

1. To train the students to understand different types of AI agents.
2. To understand various AI search algorithms.
3. Fundamentals of knowledge representation, building of simple knowledge-based systems and to apply knowledge representation.
4. Fundamentals of reasoning
5. Study of Markov Models enable the student ready to step into applied AI.

UNIT- I:
Introduction:AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth-First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing, Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search)

UNIT- II:
Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem

UNIT- III:
Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Nonmonotonic Reasoning, Other Knowledge Representation Schemes

Reasoning Under Uncertainty: Basic probability, actingunder Uncertainty, Bayes' Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks

UNIT - IV:
Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees.

UNIT - V:
Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition.

TEXT BOOKS:
1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, PrenticeHall, 2010.

REFERENCES:

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009. 2. George F. Luger,
2. Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.

COURSE OUTCOMES:

1. Understand the informed and uninformed problem types and apply search strategies to solve them.
2. Apply difficult real life problems in a state space representation so as to solve those using AI techniques like searching and game playing.
3. Design and evaluate intelligent expert models for perception and prediction from intelligent environment.
4. Formulate valid solutions for problems involving uncertain inputs or outcomes by using decision making techniques.
5. Demonstrate and enrich knowledge to select and apply AI tools to synthesize information and develop models within constraints of application area

(R20A0061)MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

COURSE OBJECTIVES:
The main objectives of the course are:
1. To enable the student to understand and appreciate, with a practical insight, the importance of certain basic issues governing the business operations that are needed for sound economic decision making.
2. To provide inputs on an overall analysis of an individual firm, its production function, cost analysis and break-even-point
3. To make students understand different market structures, pricing of the product or services and different forms of business organizations.
4. To understand capital requirements of the business and basic rule of accounting of the business.
5. To learn analytical techniques and arriving at conclusions from financial information for the purpose of business decision making.

Unit-I
Introduction to Managerial Economics: Definition, Nature and Scope of Managerial Economics, Micro and Macroeconomic Concepts.
Demand Analysis: Demand Determinants, Law of Demand and exceptions.
Elasticity ofDemand: Definition, Types, Measurement and Significance of elasticity of Demand.
Demand Forecasting: Factors governing Demand Forecasting, Methods of Demand Forecasting (Survey Methods, Expert Opinion, Test Marketing, Controlled Experience, Judgmental Approach, and Time Series Analysis).

Unit-II
Production & Cost Analysis: Production Function- Isocost and Isoquants, MRTS, Least Cost Combination of Inputs, Cobb-Douglas Production Function, Laws of Returns, Internal and External Economies of Scale.
Cost Analysis: Cost Concepts. Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)

Unit-III
Markets: Types of Competition and Markets, Features of Perfect Competition, Monopoly and Monopolistic Competition;
Pricing: Objectives, Methods of Pricing;
Business: Features of different forms of Business Organization (Sole Trader, Partnership, Joint Stock Company, Cooperative Society, and Public Enterprises).

Unit-IV
Introduction to Capital and Financial Accounting: Need for Capital, Types of Capital, Working Capital Analysis, Methods and Sources of raising Finance.

Accounting: Definition, Concepts and Conventions (GAAP); Accounting Cycle; Formats for preparation of Trial Balance and Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet).

Unit-V
Investment Decision: Capital Budgeting - Features, Objectives, and Methods (Payback Method, Accounting Rate of Return and Net Present Value) - advantages & disadvantages. (Simple Problems)
Financial Analysis: Analysis and Interpretation of Liquidity Ratios, Activity Ratios, Capital Structure Ratios and Profitability Ratios. (Simple Problems)

References:

1. Managerial Economics & Financial Analysis, Special Edition-MRCET. McGraw Hill Publications, 2017

2. D.N. Dwivedi, Managerial Economics, Vikas Publications.

3. Justin Paul, Leena, Sebastian, Managerial Economics, Cengage

4. P. L. Mehta, Managerial Economics: Analysis, Problems and Cases, Sultan Chand & Sons.

5. S. N. Maheswari & S. K. Maheswari, Financial Accounting, Vikas Publications.

6. M. Y. Khan and P. K. Jain, Financial Management, McGraw Hill

COURSE OUTCOMES:

Following are the course outcomes:

1. Makes students understand the concepts and applications of managerial economics in taking business decisions.

2. Empowers students to comprehend with the production process and technical relationship among factors of production, different cost concepts and optimization of cost.

3. Enables students to know the classification of markets and how firms determine their price output decisions in different kinds of markets with different forms of business.

4. Allows students to know different sources of capital for the business and how financial accounting is done for smooth business functioning.

5. Equips students with different financial analysis tools and techniques to evaluate financial performance of the business.

(R20A0583) DATA STRUCTURES USING PYTHON LAB

COURSE OBJECTIVES:
1. To understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.
2. To understand the how linear and non-linear data structures works

WEEK 1: Write a Python program for class, Flower, that has three instance variables of type str, int, and float, that respectively represent the name of the flower, its number of petals, and its price. Your class must include a constructor method that initializes each variable to an appropriate value, and your class should include methods for setting the value of each type, and retrieving the value of each type.

WEEK 2: Write a Python program for class that extends the Progression class so that each value in the progression is the absolute value of the difference between the previous two values. You should include a constructor that accepts a pair of numbers as the first two values, using 2 and 200 as the defaults.

WEEK 3: Develop an inheritance hierarchy based upon a Polygon class that has abstract methods area ( ) and perimeter ( ). Implement classes Triangle, Quadrilateral, Pentagon, that extend this base class, with the obvious meanings for the area ( ) and perimeter ( ) methods. Write a simple program that allows users to create polygons of the various types and input their geometric dimensions, and the program then outputs their area and perimeter.

WEEK 4: Write a Python program that inputs a list of words, separated by whitespace,and outputs how many times each word appears in the list.

WEEK 5: Write a Python program to generate the combinations of n distinct objects taken from the elements of a given list.**Example:** Original list: [1, 2, 3, 4, 5, 6, 7, 8, 9] Combinations of 2 distinct objects: [1, 2] [1, 3] [1, 4] [1, 5]   [7, 8] [7, 9] [8, 9].

WEEK 6: Write a Python program for Linear Search and Binary search

WEEK 7: Write a program to implement Bubble Sort and Selection Sort

WEEK 8: Write a program to implement Merge sort and Quicksort.

WEEK 9: Write a program to implement stacks and Queues

WEEK 10: Write a program to implement linked list

WEEK 11: Write a program to implement Double Linked list

WEEK 12: Write a program to implement Binary search Tree

Reference Books:

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1. Hands-On Data Structures and Algorithms with Python: Write complex and powerful code using the latest features of Python 3.7, 2nd Edition by Dr. Basant Agarwal, Benjamin Baka.

2. Data Structures and Algorithms with Python by Kent D. Lee and Steve Hubbard.

3. Problem Solving with Algorithms and Data Structures Using Python by Bradley N Miller and David L. Ranum.

4. Core Python Programming -Second Edition,R. Nageswara Rao, Dreamtech Press

COURSE OUTCOMES:

1. Student should be able to understand concepts of data structures
2. Ability to explore python especially the object-oriented concepts, and the built-in objects of Python.

(R20A0588) ARTIFICIAL INTELLIGENCE LAB

Course Objectives:

Familiarity with the PROLOG programming environment.

Systematic introduction to PROLOG programming constructs

Learning basic concepts of PROLOG through illustrative examples and small exercises

Understanding list data structure in Python/ PROLOG.

Implementing expert systems with PROLOG.

1.   Study of PROLOG Programming language and its Functions. Write simple facts for the statements using PROLOG.

2. Write a program in PROLOG to implement simple arithmetic.

3. Write a program to implement Factorial, Fibonacci of a given number.

4. Write predicates One converts centigrade temperatures to Fahrenheit, the other checks if a temperature is below freezing.

5. Write a program to Implement Depth First Search using PROLOG.

6. Implementation of Breadth First Search for Tic-Tac-Toe problem.

7. Write a program to solve N-Queen problem

8. Write a program to solve water jug problem using PROLOG.

9. Write a program to solve the Monkey Banana problem.

10. Write a program to solve traveling salesman problem.

11. Solve 8-puzzle problem using Best First Search.

Course Outcomes:

Upon completion of the course, students will be able to

· Apply various AI search algorithms.

· Understand the fundamentals of knowledge representation, inference.

· Understand the fundamentals of theorem proving using AI tools.

· Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information

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(R20A0004) FOREIGN LANGUAGE-FRENCH

INTRODUCTION

In view of the growing importance of foreign languages as a communication tool in some countries of the world, French has been identified as one of the most popular languages after English. As a result, Frenchprogram is introduced to develop the linguistic and communicative skills of engineering students andto familiarize them to the French communication skills. This course focuses on basic oral skills.

OBJECTIVES

1. To inculcate the basic knowledge of the French language
2. To hone the basic sentence constructions in day to day expressions for communication in their vocation
3. To form simple sentences that aids in day-to-day communication
4. To prepare the students towards DELF A1
5. To develop in the student an interest towards learning languages.

UNIT - I:

Speaking:Introduction to the French language and culture –Salutations - French alphabet - Introducing people

Writing:Understand and fill out a form

Grammar:The verbs "to be ' and "to have '' in the present tense of the indicative

Vocabulary: The numbers from 1 to 20 - Professions- Nationalities

UNIT - II:

Speaking:Talk about one's family – description of a person - express his tastes and preferences - express possession - express negation

Writing:Write and understand a short message

Grammar:Nouns (gender and number) - Articles - The–erverbs in the present-Possessive adjectives - Qualifying adjectives

Vocabulary:The family – Clothes-Colors- The numbers from 1 to 100-The classroom

UNIT - III

Speaking:Talk about your daily activities - be in time - ask and indicate the date and time - talk about sports and recreation - express the frequency

Writing:A letter to a friend

Grammar:The expression of time– The –ir verbs in the present- The verbs do, go, take, come,- Adverbs-Reflexive verbs

Vocabulary: The days and months of the year-   The sports-Hobbies

UNIT - IV

Speaking: Express the quantity - ask and give the price - express the need, the will and the capacity - compare (adjective) - speak at the restaurant / in the shops

Writing: A dialogue between a vendor and a customer at the market

Grammar: Verbs "to want", "to can"- Express capacity / possibility- Express will / desire – the

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future tense

Vocabulary: The food – Meals-Fruits and vegetables– The parts of the body

UNIT - V

Speaking: Express the prohibition and the obligation - describe an apartment - talk about the weather / ask the weather - ask the opinion - give your opinion - express your agreement or disagreement

Writing: Descriptions

Grammar: Demonstrative adjectives- Prepositions- The verb 'must' to indicate obligation and necessity in the present

Vocabulary: Seasons – Holidays-The city– Furniture

NOTE: The students are exposed to simple listening and reading activities.

REFERENCE BOOKS

1. Apprenons le François 1& 2, New Sarasvati House, 2015
2. A propos, A1, Langers International, 2010
3. Easy French Step-by-step by Myrna Bell Rochester
4. Ultimate French Beginner-Intermediate (Course book) By Livid Language
5. Ã L'Aventure: An Introduction to French Language and Francophone Cultures by Eveline Charvier-Berman, Anne C. Cummings.

COURSE OUTCOMES

1. The students will be able to communicate in French at A1 level.
2. The student will have an advantage in the competitive job market.
3. This course benefits the graduates when pursuing study *opportunities* in the countries where French is the official language.

(R20A0026)DISCRETE MATHEMATICS

COURSE OBJECTIVES:

1. Describe mathematical concepts as applied in computer science for solving logicalproblems.
2. Understanding the concepts of sets, functions, relations,recurrence relations and Lattices.
3. Understand the concepts on elementary combinations and permutations.
4. To develop the mathematical skills needed for advanced quantitative courses.
5. Analyze the properties of graphs and trees.

UNIT – I:

Mathematical Logic: Statements and notations, connectives, well-formed formulas, truth tables, tautology, equivalence implication; Normal forms: Disjunctive normal forms, conjunctive normal forms, principle disjunctive normal forms, principle conjunctive normal forms.
Predicates: Predicative logic, statement functions, variables and quantifiers, free and bound variables, rules of inference, consistency, proof of contradiction, automatic theorem proving.

UNIT – II:

Posets and Lattices: Relations and their properties,Properties of binary relations, equivalence, compatibility and partial ordering relations, lattices, Hasse diagram; Functions-Inverse function, composition of functions, recursive functions.
Lattices as partially ordered sets; Definition and examples, properties of lattices, sub lattices, some special lattices.

UNIT - III:

Groups: Algebraic structure, Groupoid, Monoid, Semi groups, Group, Sub groups, Homomorphism and Isomorphism of groups.
Elementary Combinatorics : Basics of counting, The permutations, disarrangements, combinations, permutations and combinations with repetitions, constrained repetitions, the principal of Inclusion-Exclusion, Pigeon hole principle.

UNIT-IV:

Advanced Counting Techniques : Generating Function of Sequences, Recurrence relations, Solving Recurrence Relations by substitution and Generating function ,The method of Characteristic roots, Solutions of Inhomogeneous Recurrence Relations.

UNIT-V:

Graphs Theory: Introduction to Graphs, Isomorphic graphs, Euler graphs, Hamiltonian graphs, planar graphs, Graph coloring, Directed graphs, weighted digraphs, chromatic numbers.Trees and their properties, Spanning trees, Directed trees, Binary trees Minimal Spanning Trees.

TEXT BOOKS:

1. C. L. Liu, D. P. Mohapatra, —Elements of Discrete Mathematics, Tata Mcgraw-Hill, India, 3rdEdition,2008.
2. J. P. Tremblay, R. Manohar, Discrete Mathematical Structures with Applications to Computer Science , Tata McGraw Hill, India, 1stEdition,1997.
3. JoeL.Mott, Abraham Kandel, Theodore P.Baker,—Discrete Mathematics for Computer Scientists and Mathematicians, Prentice Hall of India Learning Private Limited, New Delhi, India, 2nd Edition,2010.

REFERENCE BOOKS:

1. Kenneth H. Rosen, —Discrete Mathematics and Its Applications, Tata Mcgraw-Hill, New Delhi, India,6thEdition,2012.
2. Ralph P. Grimaldi, B. V. Ramana, —Discrete and Combinatorial Mathematics - An Applied Introduction, Pearson Education, India, 5thEdition, 2011.
3. D. S. Malik, M. K. Sen, —Discrete Mathematical Structures: Theory and Applications, Thomson Course Technology, India, 1stEdition, 2004.

COURSE OUTCOMES:

After learning the concepts of this paper the student will be able to

Apply Propositional and Predicate logic for a variety of problems in various domains.

1. Understand Set Theory, Venn Diagrams, relations, functions and apply them to Real-world Scenarios.

2. Understand General properties of Algebraic systems and study lattices as partially ordered sets and their applications.

3. Solve the recurrence relations and can be used to optimize algorithms.

4. To identify the basic properties of graphs and trees and use these concepts to model simple applications.

(R20A0508) OBJECT ORIENTED PROGRAMMING THROUGH JAVA

COURSE OBJECTIVES:

1. To understand object oriented principles like abstraction, encapsulation, inheritance, and polymorphism and apply them in solving problems.
2. To understand the implementation of packages and interfaces.
3. To understand the concepts of exception handling, multithreading and collection classes.
4. To understand how to connect to the database using JDBC.
5. To understand the design of Graphical User Interface using applets and swing controls.

UNIT-I

Java Programming- History of Java, comments, Java Buzz words, Data types, Variables, Constants, Scope and Lifetime of variables, Operators, Type conversion and casting, Enumerated types, Control flow- block scope, conditional statements, loops, break and continue statements, arrays, simple java stand alone programs, class, object, and its methods constructors, methods, static fields and methods, access control, this reference, overloading constructors, recursion, exploring string class, garbage collection.

UNIT – II

Inheritance – Inheritance types, super keyword, preventing inheritance: final classes and methods.

Polymorphism – method overloading and method overriding, abstract classes and methods**.**

Interfaces- Interfaces Vs Abstract classes, defining an interface, implement interfaces, accessing implementations through interface references, extending interface, inner class.

Packages- Defining, creating and accessing a package, importing packages.

UNIT-III

Exception handling-Benefits of exception handling, the classification of exceptions - exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, creating own exception subclasses.

Multithreading – Differences between multiple processes and multiple threads, thread life cycle, creating threads, interrupting threads, thread priorities, synchronizing threads, inter-thread communication, producer consumer problem.

UNIT-IV

Collection Framework in Java – Introduction to java collections, Overview of java collection framework, commonly used collection classes- Array List, Vector, Hash table, Stack, Lambda Expressions.

Files- Streams- Byte streams, Character streams, Text input/output, Binary input/output, File management using File class.

Connecting to Database – JDBC Type 1 to 4 drivers, connecting to a database, querying a database and processing the results, updating data with JDBC,Data Access Object (DAO).

UNIT-V

GUI Programming with Swing - The AWT class hierarchy, Introduction to Swing, Swing Vs AWT, Hierarchy for Swing components, Overview of some Swing components – Jbutton, JLabel, JTextField, JTextArea, simple Swing applications, Layout management – Layout manager types – border, grid and flow

Event Handling- Events, Event sources, Event classes, Event Listeners, Delegation event model, Examples: HandlingMouse and Key events, Adapter classes.

TEXT BOOK:

1. JavaFundamentals–AComprehensiveIntroduction,HerbertSchildtandDaleSkrien,TMH.
2. Core Java: An Integrated Approach – Dr R Nageswara Rao

REFERENCE BOOKS:

1. Java for Programmers, P.J.Deitel and H.M.Deitel, PEA (or) Java: How to Program ,P.J.Deitel and H.M.Deitel,PHI
2. Object Oriented Programming through Java, P.RadhaKrishna, and Universities Press.
3. Thinking in Java, Bruce Eckel,PE
4. Programming in Java, S. Malhotra and S. Choudhary, Oxford UniversitiesPress.
5. Design Patterns Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides.

COURSE OUTCOMES:

1. A competence to design, write, compile, test and execute straightforward programsusing a high level language;
2. An appreciation of the principles of object oriented programming;
3. Be able to make use of members of classes found in the Java API
4. Demonstrate the ability to employ various types of selection constructs in a Javaprogram. Be able to employ a hierarchy of Java classes to provide a solution to a given set of requirements.
5. Able to develop applications using Applet, AWT, JDBC and Swing

(R20A6601) MACHINE LEARNING

COURSE OBJECTIVES:
The students will be able:

1. To introduce the basic concepts and techniques of machine learning and the need for Machine learning techniques for real world problem
2. To provide understanding of various Machine learning algorithms and the way to evaluate the performance of ML algorithms
3. To learn, predict and classify the real world problems
4. To understand, learn and design simple artificial neural networks for the selected problem
5. To understand mathematical models or techniques

UNIT-1 INTRODUCTION
Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning Concept learning and the general to specific ordering, find-S: finding a maximally specific hypothesis, version spaces -- candidate elimination algorithm, inductive bias.
Decision Tree Learning – Introduction, decision tree representation, appropriate problems for decision tree learning, the basic decision tree learning algorithm, hypothesis space search in decision tree learning, inductive bias in decision tree learning, issues in decision tree learning.

UNIT-2
Supervised Learning: – Regression: Linear Regression, multi linear regression, Polynomial Regression, logistic regression, Non-linear Regression, Model evaluation methods, SVM, Random Forest
Instance-Based Learning- Introduction, k-nearest neighbour algorithm, locally weighted regression, radial basis functions, case-based reasoning, remarks on lazy and eager learning.

UNIT-3
Bayesian learning : Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum Likelihood and least squared error hypotheses, maximum likelihood hypotheses for predicting probabilities, minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, an example: learning to classify text, Bayesian belief networks, the EM

UNIT-4
Artificial Neural Networks - **Artificial Neural Networks-1**– Introduction, neural network representation, appropriate problems for neural network learning, perceptions, multilayer networks and the back-propagation algorithm.
Artificial Neural Networks-2- Remarks on the Back-Propagation algorithm, An illustrative example: face recognition, advanced topics in artificial neural networks.

UNIT-5
Hidden Markov Models Introduction, discrete Markov processes, hidden Markov models, three basic problems of HMMs evaluation problem, finding the state sequence, learning model parameters, continuous observations, the HMM with input, model selection in HMM

Text Books

1. Tom M. Mitchell, Machine Learning, McGraw Hill , 2017.
2. Ethem Alpaydin, Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press, 2015

References

1. Aurelien Geron, Hands-On Machine Learning WithScikit-Learn and Tensorflow, O'Really publication 2019
2. Shai Shalev-Shwartz and Shai Ben-David, Understanding Machine Learning, Cambridge University Press. 2017
3. T. Hastie, R. Tibshirani, J. H. Friedman, Introduction to Statistical Machine Learning 1/e, Springer, 2017.
4. M NarasimhaMurty, Introduction to Pattern Recognition and Machine Learning, World Scientific Publishing Company, 2015

Course Outcomes:

1. Be able to recognize the basic concepts techniques and the need for Machinelearning techniques for solving real world problems
2. To illustrate the use of supervised learning algorithms
3. apply classification techniques to make good predictions
4. To understand, learn and design simple artificial neural networks for the selected problem
5. illustrate the relation between a sequence of observations and a sequence of hidden classes or hidden states that explain the observations

(R20A0463) EMBEDDED SYSTEMS

COURSE OBJECTIVES:

For embedded systems, the course will enable the students to:
1) To understand the basics of microprocessors and microcontrollers architecture and itsfunctionalities 2) Understand the core of an embeddedsystem
3)To learn the design process of embedded systemapplications.
4) To understands the RTOS and inter-processcommunication.
5)   To understand the programming for Embedded systems

UNIT-I:
INTRODUCTION TO MICROPROCESSORS AND MICROCONTROLLERS:8086 Microprocessor: Architecture of 8086, Register Organization, Programming Model, Memory Segmentation, Signal descriptions of 8086, Addressing modes, Instruction Set.
8051 Microcontroller: 8051 Architecture, I/O Ports, Memory Organization, Instruction set of 8051.

UNIT-II:
INTRODUCTION TO EMBEDDED SYSTEMS: History of embedded systems, Classification of embedded systems based on generation and complexity, Purpose of embedded systems, Applications of embedded systems, and characteristics of embedded systems, Operational and Non-operational attributes of embedded systems.

UNIT-III:
TYPICAL EMBEDDED SYSTEM: Core of the embedded system, Sensors and actuators, Onboard communication interfacesI2C, SPI, parallel interface; External communication interfaces-RS232, USB, infrared, Bluetooth, Wi-Fi, ZigBee, GPRS.

UNIT-IV:
EMBEDDED FIRMWARE DESIGN AND DEVELOPMENT: Embedded firmware design approaches-super loop based approach, operating system based approach; embedded firmware development languages-assembly language based development, high level language based development.

UNIT-V:
EMBEDDED PROGRAMMING CONCEPTS Data types, Structures, Modifiers, Loops and Pointers, Macros and Functions, object-oriented Programming, Embedded Programming in C++ &JAVA

TEXT BOOKS:

1. Embedded Systems, Raj Kamal, Second EditionTMH.
2. Kenneth. J. Ayala, The 8051 Microcontroller , 3rd Ed., CengageLearning
3. Introduction to Embedded Systems - shibu k v, Mc Graw HillEducation.

REFERENCE BOOKS:

1. Advanced Microprocessors and Peripherals – A. K. Ray and K.M. Bhurchandi, TMH, 2nd Edition2006 2. Embedded Systems- An integrated approach - Lyla B Das, Pearson education2012.

COURSE OUTCOMES:

After going through this course, the student will be able to
 1) The student will learn the internal architecture of popular 8086/8051
microprocessors/microcontrollers.
 2) Understand Introduction to Embeddedsystems
3) Understand Typical Embedded& its components
4) Understand Embedded Firmware design approaches and development languages
5.Understand Embedded programming concepts

(R20A0504) OPERATING SYSTEMS

COURSE OBJECTIVES:

1. To understand the fundamental concepts and techniques of Operating Systems.
2. To study the concepts of LINUX OS and process scheduling.
3. To understand the concepts in deadlocks and process management.
4. To understand the techniques in memory managements and IPC mechanism.
5. To study file system concepts and sockets.

UNIT - I

Operating System-Introduction, Structures-Simple Batch, Multi-programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services.

Introduction to Linux operating system, Linux file system, Linux Utilities

UNIT - II

Linux: Introduction to shell, Types of Shell's, example shell programs.

Process and CPU Scheduling - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads, Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling.

UNIT - III

Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors

UNIT - IV

Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory implementation in Linux. Corresponding system calls.

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT - V

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, kernel support for files, system calls for file I/O operations open, create, read, write, close, l seek, stat, ioctl

Disk Management: Disk Scheduling Algorithms-FCFS, SSTF, SCAN, C-SCAN

TEXT BOOKS:

1. Beginning Linux Programming –Neil Mathew, Richard Stones 4th Edition, Wiley
2. Operating System Principles- Abraham Silberschatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
3. Unix System Programming using C++, T. Chan, PHI.
4. Unix Concepts and Applications, 4th Edition, SumitabhaDas,TMH,2006.
5. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOKS:

1. Operating Systems – Internals and Design Principles Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.

3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

COURSE OUTCOMES:
At the end of the course students should have:

1. Ability to apply concepts of operating system.
2. Ability to write shell programs and simulate process scheduling algorithms.
3. Skills to analyze memory management and deadlocks situations.
4. An ability to develop programs using system calls and utilities.
5. Capability to compare various file systems.

II Year B.Tech. AI&ML- II Sem   **L/T/P/C**
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(R20A0585) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

COURSE OBJECTIVES:

1. To prepare students to become familiar with the Standard Java technologies ofJ2SE
2. To prepare students to excel in Object Oriented programming and to succeed as a Java Developer through global rigorous education.
3. To provide Students with a solid foundation in OOP fundamentals required to solve programming problems and also to learn Advanced Java topics like J2ME, J2EE, JSP, JavaScript
4. To inculcate in students professional and ethical attitude, multidisciplinary approach and an ability to relate Java programming issues to broader application context.
5. To provide student with an academic environment aware of excellence, written ethical codes and guidelines and lifelong learning needed for a successful professional career.

Week 1:
a) Write a java program to find the Fibonacci series using recursive and non-recursive functions
b) Write a   program to multiply two given matrices.
c) Write a   program for Method overloading and Constructor overloading

Week 2:
a) Write a program to demonstrate execution of static blocks ,static variables & static
   methods.
b) Write a   program to display the employee details using Scanner class
c) Write a program for sorting a given list of names in ascending order

Week 3:
a) Write a program to implement single and Multi level inheritance
b) Write a program to implement Hierarchical Inheritance.
c) Write a program to implement method overriding.

Week 4:
a) Write a   program to create an abstract class named Shape that contains two integers and an empty method named printArea (). Provide three classes named Rectangle, Triangle and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method printArea () that prints the area of the given shape.
b) Write a   program to implement Interface .
c) Write a program to implement multiple and Hybrid Inheritance

Week 5:
a) Write a   program to create inner classes
b) Write a   program to create user defined package and demonstrate various access modifiers.
c) Write a   program to demonstrate the use of super and final keywords.

Week 6 :
a) Write a   program if number is less than 10 and greater than 50 it generate the exception

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out of range. else it displays the square of number.

b) Write a   program with multiple catch Statements.

c) write a   program to implement nested try

Week 7:

a) Write a   Program to implement simple Thread by extending Thread class and implementing runnable interface.

b) Write a   program that implements a multi-thread application that has three threads

c) Write a program to set and print thread priorities

Week 8:

Write a   program to implement following collections

a) Array List   b) Vector

c) Hash table d)Stack

Week 9:

a) Write a program to demonstrate lambda expressions.

b)Write a   program for producer and consumer problem using Threads

Week 10:

a) Write a   program to list all the files in a directory including the files present in all its subdirectories.

b) Write a   Program to Read the Content of a File Line by Line

Week 11:

a) Write a   program that connects to a database using JDBC display all records in a table.

b) Write a   program to connect to a database using JDBC and insert values into it.

c) Write a   program to connect to a database using JDBC and delete values from it

Week 12:

Write a   program that works as a simple calculator. Use a Grid Layout to arrange Buttons for digits and for the + - * % operations. Add a text field to display the result.

COURSE OUTCOMES:

Upon successful completion of this course, the students will be able to:

1.   Analyze the necessity for Object Oriented Programming paradigm and over structured programming and become familiar with the fundamental concepts in OOP.

2. Demonstrate an ability to design and develop Java programs, analyze, and interpret object oriented data and report results.

3. Analyze the distinguish between various types of inheritance.

4. Demonstrate an ability to design an object oriented system, AWT components or multithreaded process as per needs and specifications.

5. Demonstrate an ability to visualize and work on laboratory and multidisciplinary tasks like console and windows applications for standalone programs.

II Year B.Tech. AI&ML- II Sem   **L/T/P/C**
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(R20A6682) MACHINE LEARNING LAB

COURSE OBJECTIVES:

1. To introduce students to the basic concepts and techniques of Machine Learning.

2. To become familiar with regression methods.

3. To implement classification methods.

4. To implement clustering methods.

5. To become familiar with Dimensionality reduction Techniques.

SNo LIST OF EXPERIMENTS

WEEK 1 a)Implementation of Python Basic Libraries such as Statistics, Math, Numpy and Scipy b)Implementation of Python Libraries for ML application such as Pandas and Matplotlib.

WEEK 2 a)Creation and Loading different datasets in Python b) Write a python program to compute Mean, Median, Mode, Variance, Standard Deviation using Datasets

WEEK 3 Write a python program to compute reshaping the data, Filtering the data , merging the data and handling the missing values in datasets

WEEK 4 a)Write a Python program to implement Simple Linear Regression and plot the graph. b)Implementation of Multiple Linear Regression for House Price Prediction using sklearn

WEEK 5 Implementation of Logistic Regression for iris using sklearn

WEEK 6 Implementation of random forest algorithm

WEEK 7 implementation of navie bayes classifier algorithm and plot the graph.

WEEK 8 implementation of SVM classification and plot the graph.

WEEK 9 a) implementation of PCA b) implementation of LDA.

WEEK 10 a) implementation of k-means clustering. b) implementation of hierarchical clustering.

WEEK 11 implementation Q-learning

Week 12 Performance analysis on a specific dataset (Mini Project)

COURSE OUTCOMES:

1. To introduce students to the basic concepts and techniques of Machine Learning.

2. To become familiar with regression methods.

3. To implement classification methods.

4. To implement clustering methods.

5. To become familiar with Dimensionality reduction Techniques.

(R20A0008) GLOBAL EDUCATION AND PROFESSIONAL CAREER

Introduction

In every era of human life, studying abroad has allowed one to experience another part of oneself in a different setting. Additionally, if all that hurry is geared towards success in one's career, international education will most definitely be worth one's time. It is not only an expedition of self- discovery but also an investment in one's resume.

The world, today, is redefining knowledge and great leadership to encompass critical values that are key to meeting modern career challenges. To meet the current requirements, a study delineating Global Education is of utmost importance towards prospective growth.

Course Objectives:

1. To assist students to understand the broad scope of engineering.
2. To equip the students to study the academic subjects with better
   perspective of theexpectations of the international standards
3. To familiarize students with the financial requirements and ways to receive monetary aid
4. To enable students' understanding of the various admission tests
5. To acquaint them with their own skill set and train the students towards skills development

Unit 1

Importance and relevance of Engineering in today's and futuristic contexts.

The jobs that will thrive in the market in the coming decades. For eg., Robot Manufacturer

&serviceManagement, Big Data & AI Scientists, Artificial Bodies Manufacturer, Gene

Designers, etc

Unit 2

Countries and their entry requirements

Non-immigrant student visas, Work Permit visas

Unit 3

Admission tests to colleges and universities world-

overPSAT, SAT, TOEFL, AP, IELTS…

Unit 4

Financial capacity requirements

Scholarships, Full scholarships, merit scholarships, on-campus jobs

Unit 5

Skills Mapping

Match one's skills with jobs, Skills development

COURSE OUTCOMES

After completion of the course, the students will be able to:

1. Comprehend the usage of engineering in various fields and disciplines.

2. Identify the right college and country to pursue higher education.

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3. Prepare themselves for the skill-oriented academics and prospective growth.

4. Plan for their future education with the precise financial management.

5. Discover and discuss their skill set and the jobs that map their skills.