1.1.1-Gr2104 AK-20 CSE

Course Code	Problem Solving And Programming	L	T	P	C
20AES0501		3	0	0	3
Pre-requisite	Basic Mathematics	Semester		I - I	

Course Objectives:

- Introduce the internal parts of a computer, and peripherals.
- Introduce the Concept of Algorithm and use it to solve computational problems
- Identify the computational and non-computational problems
- Teach the syntax and semantics of a C Programming language
- Demonstrate the use of Control structures of C Programming language
- Illustrate the methodology for solving Computational problems

Course Outcomes (CO):

CO1: Able to know interconnection of peripherals and connects of algorithms and flowcharts
CO2: Able to know problem solving aspects and design and analysis of algorithm
CO3: Able to know c language basics ,flow control, input output and implementation functions
CO4: Able to solve some computational problems using functions array and pointers
CO5: Able to organise real world heterogeneous data and apply searching ,sorting techniques with exception handling

UNIT – I	8 Hrs

Computer Fundamentals: What is a Computer, Evolution of Computers, Generations of Computers, Classification of Computers, Anatomy of a Computer, Memory revisited, Introduction to Operating systems, Operational overview of a CPU.
Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Fourth generation languages, Fifth generation languages, Classification of Programming languages, Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

UNIT – II	9 Hrs

Introduction to computer problem solving: Introduction, the problem-solving aspect, top-down design implementation of algorithms, the efficiency of algorithms, and the analysis of algorithms.
Fundamental algorithms: Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer.

UNIT – III	8 Hrs

Types, **Operators, and Expressions:** Variable names, data types and sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation.
Input and output: standard input and output, formatted output-Printf, formatted input-Scanf.
Control Flow: Statements and blocks, if-else, else-if, switch, Loops-while and for, Loops-Do- while, break and continue, Goto and labels.
Functions and Program Structure: Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.

UNIT – IV	9 Hrs

Factoring methods: Finding the square root of a number, the smallest divisor of a number, the greatest common divisor of two integers, generating prime numbers.
Pointers and arrays: Pointers and addresses, pointers and function arguments, pointers and arrays, address arithmetic, character pointers and functions, pointer array; pointers to pointers, Multi-dimensional arrays, initialization of arrays, pointer vs. multi-dimensional arrays, command line arguments, pointers to functions, complicated declarations.
Array Techniques: Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the k^{th} smallest element

UNIT – V	9 Hrs

Sorting and Searching: Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binary search.
Structures: Basics of structures, structures and functions, arrays of structures, pointers to structures, self-referential structures, table lookup, typedef, unions, bit-fields.
Some other Features: Variable-length argument lists, formatted input-Scanf, file access, Error handling-stderr and exit, Line Input and Output, Miscellaneous Functions.

Textbooks:

1. Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University Press.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.
3. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson.

S. Prathap – 12/8/22
C. Phanu Prakash –
T. Chandra Babu – 12/8/22
Dr. J. Jamleela –

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Annamacharya Institute of
Technology & Sciences, Tirupati-5

Reference Books:

1. RS Bichkar "Programming with C", 2012, Universities Press
2. Pelin Aksoy, and Laura DeMarchis, "Information Technology in Theory", 2017, Cengage Learning.
3. Byron Gottfried and Jitender Kumar Chhabra, "Programming with C", 4th Edition, 2019, McGraw Hill Education.

Online Learning Resources:

www.nptel.ac.in

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	2											3	
CO2	3	3												
CO3	2	3	3											
CO4	2	1	3	2										
CO5	2	1	3	3	2			2				3		

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

S. Pratap - S. Pratap 12/8/21

J. Chandra Babu - J. Chandra Babu 12/8/21

C. Bhanu Prakash - C. Bhanu Prakash 12/8/21

Dr. S. Tamilselvan - Dr. S. Tamilselvan 12/8/21

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Course Code	Data Warehousing and Mining	L	T	P	C
20APE0501		3	0	0	3
Pre-requisite	Basic Mathematics and Database	Semester		III-I	

Course Objectives:

- To know the basic concepts and principles of data warehousing and data mining
- Learn pre-processing techniques and data mining functionalities
- Learn and create multidimensional models for data warehousing
- Study and evaluate performance of Frequent Item sets and Association Rules
- Understand and Compare different types of classification and clu[illegible]

Course Outcomes :

CO1: Understand the basic concepts of Data Warehouse and data Mining
CO2: Apply OLAP technology for Data Warehouse
CO3: Analyze and evaluate performance of Association Rules and classification algorithms
CO4: Evaluate various Clustering algorithms
CO5. Analyse advanced Data Mining techniques

UNIT - I — 9 Hrs

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining. **Data Preprocessing:** Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarch, Generation

UNIT - II — 9Hrs

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, M[illegible] Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining. **Data Cube Computation and Data Generalization:** Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction

UNIT - III — 9 Hrs

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining, **Classification and Prediction:** Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods

UNIT - IV — 9 Hrs

Cluster Analysis: Introduction, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster[illegible], Outlier Analysis

UNIT - V — 9 Hrs

Mining Streams, Time Series and Sequence Data: Mining Data Streams, Mining Time-Series Data, Mining Sequence Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining, Social Network Analysis and Multi-relational Data Mining. **Mining Object, Spatial, Multimedia, Text and Web Data:** Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web

Textbooks:

1. Data Mining: Concepts and Techniques, Jiawei Han and Micheline Kamber, Morgan Kaufmann Publishers, Elsevier Second Edition, 2012.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson Education.

Reference Books:

1. Data Mining Techniques, Arun KPujari, Second Edition, Universities Press.
2. Data Warehousing in the Real World, Sam Aanhory & Dennis Murray Pearson EdnAsia
3. Insight into Data Mining, K.P.Soman, S.Diwakar, V Ajay, PHI,2008

Online Learning Resources:

https://www.youtube.com/watch?v=ykZ-_UGcYWg&list=PLLspfyoOYoQcl6Nno3gPkq0h5YSe81hsc

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3										1	1	1
CO2	2	3	2										1	
CO3	2	3	2	2	3	2								2
CO4	2	2	3	2	2	3						2	1	
CO5	2	2	3	2	2	3						2	1	1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

S. Prathap – 20/5/22

T. Chandra Babu

C. Rama Prakash

Dr. J. Jumlesha – 20/5/22

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Course Code	Formal Languages and Automata Theory	L	T	P	C
20APC0518		3	0	0	3
Pre-requisite	Discrete Mathematics and Data Structures	Semester		III-I	

Course Objectives:

- Understand formal definitions of machine models. Classify machines by their power to recognize languages. Understanding of formal grammars, analysis
- Understanding of hierarchical organization of problems depending on their complexity
- Understanding of the logical limits to computational capacity. Understanding of undecidable problems

Course Outcomes:

CO1: Design finite state machines to recognize formal languages
CO2: Identify different types of grammars in formal languages
CO3: Construct context free grammars for context free languages
CO4: Find solutions to the problems using PDA
CO5: Develop Turing machine for different computational problems

UNIT - I Introduction to Finite Automata — 9 Hrs

Introduction: Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages
Finite Automata: An Informal picture of Finite Automata, Deterministic Finite Automata (DFA), Non Deterministic Finite Automata (**NFA**), Finite Automata with Epsilon transitions (ε-NFA or NFA-ε), Finite Automata with output, Conversion of one machine to another, Minimization of Finite Automata, Myhill–Nerode Theorem

UNIT - II Regular Language — 9 Hrs

Regular Languages: Regular Expressions (RE), Finite Automata and Regular Expressions, Applications of Regular Expressions, Algebraic laws for Regular Expressions, The Arden_s Theorem, Using Arden's theorem to construct RE from FA, Pumping Lemma for RLs, Applications of Pumping Lemma, Equivalence of Two FAs, Equivalence of Two REs, Construction of Regular Grammar from RE, Constructing FA from Regular Grammar, Closure properties of RLs, Decision problems of RLS, Applications of REs and FAs

UNIT - III Context Free Grammars and Languages — 9 Hrs

Context Free Grammars and Languages: Definition of Context Free Grammars (CFG), Derivations and Parse trees, Ambiguity in CFGs, Removing ambiguity, Left recursion and Left factoring, Simplification of CFGs, Normal Forms, Linear grammars, Closure properties for CFLs, Pumping Lemma for CFLs, Decision problems for CFLs, CFG and Regular Languages

UNIT - IV Push Down Automata — 9 Hrs

Push Down Automata (PDA): Informal introduction, The Formal Definition, Graphical notation, Instantaneous description, The Languages of a PDA, Equivalence of PDAs and CFGs, Deterministic PushDown Automata, Two Stack PDA.

UNIT - V Turing Machines and Undecidability — 9 Hrs

Turing Machines and Undecidability: Basics of Turing Machine (TM), Transitional Representation of TMs, Instantaneous description, Non Deterministic TM, Conversion of Regular Expression to TM, Two stack PDA and TM, Variations of the TM, TM as an integer function, Universal TM, Linear Bounded Automata, TM Languages, Unrestricted grammar, Properties of Recursive and Recursively enumerable languages, Undecidability, Reducibility, Undecidable problems about TMs. Post's Correspondence Problem(PCP), Modified PCP

Textbooks:

1. Introduction to Automata Theory, Formal Languages and Computation, Shyamalendu Kandar, Pearson, 2013
2. John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman, Introduction to Automata Theory, Languages,and Computation, Pearson Education Asia.

Reference Books:

1. J.P. Trembley and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science,McGraw Hill Book Co.
2. Michael Sipser, Introduction to The Theory of Computation, Thomson Course Technology.
3. Harry R. Lewis and Christos H. Papadimitriou, Elements of the Theory of Computation, Pearson Education Asia.John E. Hopcroft and J.D.Ullman, Introduction to Automata Theory, Languages and Computation, Narosa Pub. 2021
4. Dexter C. Kozen, Automata and Computability, Undergraduate Texts in Computer Science, Springer.
5. Michael Sipser, Introduction to the Theory of Computation, PWS Publishing.
6. John Martin, Introduction to Languages and The Theory of Computation, Tata McGraw Hill.

Online Learning Resources:

https://www.youtube.com/channel/UCb8HLf1c_-m0MovWMWdg_bA

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	3	2									2	
CO2	3	3												
CO3	3	3												
CO4	2	3	3										2	
CO5	3	3	3	3									2	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Dr.S.Jamleela

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1.1.1 - AIRDS F604

ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES::TIRUPATI(AUTONOMOUS)

Year: III	Semester: II	Branch of Study: AI & DS			
COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**CREDITS**
20APC3020	Big Data Analytics	3	0	0	3

Course Outcomes

Upon completion of the course, the students should be able to:

CO1: Understand the concepts and challenges of big data

CO2: Outline the operations viz. Collect, manage, store, query, and analyze various forms of big data.

CO3: Apply large-scale analytic tools to solve some of the open big data problems.

CO4: Analyze the impact of big data for business decisions and strategies.

CO5: Design different big data applications.

UNIT - 1:

Introduction to Big Data: What is Big Data? Why Big Data is Important? Meet Hadoop, Data, Data Storage and Analysis, Comparison with other systems, History of Apache Hadoop, Hadoop Ecosystem, VMWare Installation of Hadoop. Analyzing the Data with Hadoop, Scaling Out.

UNIT - 2:

HDFS: The Design of HDFS, HDFS Concepts, The Command-Line Interface, Hadoop File systems, The Java Interface, Data flow.

MapReduce: Developing a MapReduce application, The Configuration API, Setting up the Development Environment, Running Locally on Test Data, Running on a Cluster

UNIT - 3:

How MapReduce Works: Anatomy of a MapReduce, Job Run, Failures, Shuffle and Sort, Task Execution. MapReduce Types and Formats:MapReduce Types, Input formats, output formats.

UNIT - 4:

Hadoop Environment: Setting up a Hadoop Cluster, Cluster specification, Cluster Setup and Installation, Hadoop Configuration, Security.

Pig: Installing and Running Pig, an Example, Comparison with Databases, Pig Latin, User- Defined Functions, Data Processing Operators.

UNIT - 5:

Hive: Installing Hive, Running Hive, Comparison with traditional Databases, HiveQL, Tables, Querying Data.

Spark: Installing Spark, Resilient Distributed Datasets, Shared Variables, Anatomy of a Spark Job Run.

HBase: HBasics, Installation, clients, Building an Online Query Application.

Text Books:

1. Tom White, "Hadoop: The Definitive Guide"Fourth Edition, O'reilly Media, 2015.
2. Big Data, Big Analytics: Emerging business intelligence and analytic trends for today's businesses, Michael Minnelli, Michelle Chambers, and Ambiga Dhiraj, Wiley Cio Series

Reference Books:

1. Glenn J. Myatt, Making Sense of Data , John Wiley & Sons, 2007 Pete Warden,Big Data Glossary, O'Reilly, 2011.
2. Michael Berthold, David J.Hand, Intelligent Data Analysis, Spingers, 2007.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos,Uderstanding Big Data : Analytics for Enterprise Class Hadoop and Streaming Data, McGraw Hill Publishing, 2012.
4. Anand Rajaraman and Jeffrey David Ullman, Mining of Massive Datasets Cambridge University Press, 2012.

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2							1		3	2	2
CO2	2	3	2		3					1		3		2
CO3	2	3	2		3					1		3		2
CO4	2	3	3		3					1		3	2	2
CO5	2	3	2		3					1		3		2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

G.S.K — S.P — S.S.P

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY AND SCIENCES::TIRUPATI(AUTONOMOUS)

Year: III	Semester: II	Branch of Study: AI & DS			
COURSE CODE	**COURSE TITLE**	**L**	**T**	**P**	**CREDITS**
20APE3004	**Software Engineering for AI**	**3**	**0**	**0**	**3**

Course Outcomes

CO1: Understand the methods and issues in software engineering
CO2: Apply the principles of Artificial Intelligence for Software engineering
CO3: Design AI based software
CO4: Apply the algorithms of Machine learning in solving problems
CO5: Design Expert systems

UNIT – 1: Introduction to Computer Software for AI, AI Problems and Conventional SE Problems, Software Engineering Methodology

Computers and software systems, An introduction to Software engineering, Bridges and buildings versus software systems, the software crisis, A demand for more software power, Responsiveness to human users, Software systems in new types of domains, Responsiveness to dynamic usage environments, Software systems with self-maintenance capabilities, A need for AI systems

What is an AI problem, Ill-defined specifications, correct versus 'good enough' solutions, It s the HOW not the WHAT, the problem of dynamics, the quality of modular approximations, Context-free problems?

Specify and verify—the SAV methodology, the myth of complete specification, what is verifiable, Specify and test—the SAT methodology, testing for reliability, the strengths, the weaknesses, what are the requirements for testing, what's in a specification, Prototyping as a link.

UNIT – 2: An Incremental and Exploratory Methodology, New Paradigms for System Engineering

Classical methodology and AI problems, The RUDE cycle, how do we start, Malleable software, AI muscles on a conventional skeleton How do we proceed, how do we finish, The question of hacking, Conventional paradigms

Automatic programming, Transformational implementation, The "new paradigm" of Blazer, Cheatham and Green, Operational requirements of Kowalski, The POLITE methodology

UNIT –3: Towards a Discipline of Exploratory Programming, Machine Learning: Much Promise, Many Problems

Reverse engineering, Reusable software Design knowledge, Stepwise abstraction, The problem of decompiling, Controlled modification, Structured growth

Self-adaptive software, The promise of increased software power, The threat of increased software problems

UNIT – 4: Machine Learning and Expert Systems

Practical machine learning examples, Multisession inductive programming, Expert Systems: The Success Story, Expert systems as AI software, Engineering expert systems, The lessons of expert
systems for engineering AI software

UNIT – 5: AI into Practical Software

Support environments, Reduction of effective complexity, Moderately stupid assistance, An engineering toolbox, Self-reflecuve software, Over engineering software, Summary and What the Future Holds

TEXT BOOKS:

1. Derek Partridge, "Artificial Intelligence and Software Engineering", Glenlake Publishing Company, 1998.

REFERENCES:

1. " The role of Artificial Intelligence in Software Engineering", K. Nitalksheswara Rao,2020
2. "Farid Meziane &Sunil Vadera, "Artificial Intelligence Applications for Improved Software Engineering Development", Information Science Reference, 2009

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3													
CO2	3	3	2	2	2					2			2	
CO3	3	2	2						1				1	1
CO4	3	3	2	2	2								2	
CO5	3	2	2							2			1	1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Technology & Sciences, Tirupati-5

1.1.1_CIC-1164

Course Code	Cryptography and Network Security		L	T	P	C
20APC3613			3	0	0	3
Pre-requisite	Computer Networks	Semester	III - I			

Course Outcomes (CO):

CO1: Understand basic Cryptographic algorithm, Security issues
CO2: Identify various type of vulnerabilities of a computer network
CO3: Outline various Security algorithms.
CO4: Design secure system
CO5: Investigate the threads and identify the solution for the threats

UNIT – I	Introduction	9 Hrs

Security Concepts: Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security Cryptography Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, steganography, key range and key size, possible types of attacks.

UNIT – II	Ciphers	9 Hrs

Symmetric key Ciphers: Block Cipher principles &Algorithms (DES, AES, Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4,Location and placement of encryption function, Key distribution Asymmetric key Ciphers: Principles of public key cryptosystems, Algorithms(RSA, Diffie-Hellman,ECC), Key Distribution.

UNIT – III	Authentication	9 Hrs

Message Authentication Algorithms and Hash Functions: Authentication requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, Whirlpool, HMAC, CMAC, Digital signatures, knapsack algorithm.

UNIT – IV	Security	9 Hrs

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, combining security associations, key management.

UNIT – V	Virus and Firewall	9 Hrs

Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction Intruders, Virus and Firewalls: Intruders, Intrusion detection, password management, Virus and related threats, Countermeasures, Firewall design principles, Types of firewalls. Case Studies on Cryptography and security: Secure Inter-branch Payment Transactions, Cross site Scripting Vulnerability, Virtual Elections.

Textbooks:

1. William Stallings, "Cryptography and Network Security", 5th Edition, Pearson Education, 2011.
2. Atul Kahate, "Cryptography and Network Security", 2nd Edition, Mc Graw Hill, 2010.
3. Bernard Menezes "Network Security and Cryptography", 1stEdition, CENGAGE Learning, 2010.

Reference Books:

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley, 1st Edition.
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 3rd Edition
3. Information Security, Principles, and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM. Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.

Online Learning Resources:

https://onlinecourses.nptel.ac.in/noc21_cs16/preview

Mapping of course outcomes with program outcomes

	PO	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1	PO1	PO12	PSO1	PSO2
CO1	3													
CO2	3	2												
CO3	2	3												2
CO4	3		2											
CO5	3			3									3	

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Course Code	Embedded Systems and Internet of Things		L	T	P	C
[illegible]			3	0	0	3
Pre requisite	Digital Electronics and Microcontroller	Semester	III - I			

Course Outcomes (CO):

- **CO1:** Understand the Fundamental Concept of Embedded System
- **CO2:** Analyze TM4C Architecture, Instruction Set, addressing modes to develop programs for various applications using Assembly and Embedded C
- **CO3:** Develop an embedded system by interfacing the microcontrollers and IDE tools
- **CO4:** Understand the basic concept of Internet of Things.
- **CO5:** Implement the IoT basic application by Arduino Microcontroller.

UNIT – I	Introduction To Embedded Systems	9

Embedded system introduction, host and target concept, embedded applications, features and architecture considerations for embedded systems- ROM, RAM, timers; data and address bus concept, Embedded Processor and their types, Memory types, overview of design process of embedded systems, programming languages and tools for embedded design

UNIT – II	Embedded Processor Architecture	9

CISC Vs RISC design philosophy, Von-Neumann Vs Harvard architecture. Introduction to ARM architecture and Cortex – M series, Introduction to the TM4C family viz. TM4C123x & TM4C129x and its targeted applications TM4C block diagram, address space, on-chip peripherals (analog and digital) Register sets, addressing modes and instruction set basics.

UNIT – III	Overview Of Microcontroller And Embedded Systems	9

Embedded hardware and various building blocks, Processor Selection for an Embedded System, Interfacing Processor, Memories and I/O Devices, I/O Devices and I/O interfacing concepts, Timer and Counting Devices, Serial Communication and Advanced I/O, Buses between the Networked Multiple Devices. Embedded System Design and Co-design Issues in System Development Process, Design Cycle in the Development Phase for an Embedded System.

UNIT – IV	Introduction to IoT	9

Introduction to Internet of Things: Characteristics of IoT, Design principles of IoT, IoT Architecture and Protocols, Enabling Technologies for IoT, IoT levels and IoT vs M2M. IoT Design Methodology: Design methodology, Challenges in IoT Design, IoT System Management, IoT Servers – Sensors.

UNIT – V	Arduino in IoT	9

Basics of Arduino: Introduction to Arduino – Types of Arduino – Arduino Toolchain – Arduino Programming Structure – Sketches – Pins -Input/Output From Pins Using Sketches – Introduction to Arduino Shields – Integration of Sensors and Actuators with Arduino- Connecting LEDs with Arduino, Connecting LCD with Arduino – Tinkercad arduino simulation.

Textbooks:

1. Embedded System Design: Embedded Systems Foundations of Cyber-Physical Systems, and the Internet of Things 4th ed. 2021 Edition by Peter Marwedel.
2. Embedded System A Complete Guide - 2020 Edition by Gerardus Blokdyk
3. Ti Tiva Arm Programming for Embedded Systems: Programming Arm Cortex-M4 Tm4c123g with C (Mazidi & Naimi Arm) Paperback, 2017.
4. Building Arduino Projects for the Internet of Things: Experiments with Real-World Applications, 2016 by Adeel Javed.

Reference Books:

1. Michael J. Pont, "Embedded C", Pearson Education, 2007.
2. Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", CISCO Press, 2017.
3. Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Elsevier, 2006.
4. IOT (Internet of Things) Programming: A Simple and Fast Way of Learning, IOT Kindle Edition.
5. Andrew N Sloss, D. Symes, C. Wright, "Arm System Developers Guide", Morgan Kauffman/ Elsevier, 2006.
6. Arshdeep Bahga, Vijay Madisetti, "Internet of Things: A Hands-on Approach", VPT, 2014.

Online Learning Resources:

https://nptel.ac.in/courses/128108016

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(AUTONOMOUS)

Year: II	Semester: I	Branch of Study: AI & ML			
COURSECODE	**COURSETITLE**	**L**	**T**	**P**	**CREDITS**
20APC3302	**Database Management Systems (Common to: CSE, CIC, AI & ML, AI & DS, ECE)**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

This course is designed to

- Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL and system implementation techniques.
- Enable students to model ER diagrams for any customized application
- Inducting appropriate strategies for optimization of queries.
- Provide knowledge on transaction and concurrency techniques

COUSEOUTCOMES:

After completion of the course, students will be able to

CO1: know the fundamentals of Databases
CO2: Understand SQL and PL/SQL Concepts
CO3: Design a database for a real-world information system
CO4: Process and Optimize the query
CO5: Working of transaction and concurrency techniques in real time applications

UNIT-1:

Introduction: Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database users and Administrators. **Introduction to Relational Model:** Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations.

UNIT-2:

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub-queries, Modification of the Database. Intermediate SQL: Joint Expressions, Views, Transactions, Integrity Constraints, SQL Data types and schemas, Authorization.

Advanced SQL: Accessing SQL from a Programming Language, Functions and Procedures, Triggers, Recursive Queries, OLAP, Formal relational query languages

UNIT-3:

Database Design and the E-R Model: Overview of the Design Process, The Entity Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues.

Relational Database Design:

Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms.

UNIT-4:

Query Processing: Overview, Measures of Query cost, Selection operation, sorting, Join Operation, other operations, Evaluation of Expressions.

Query optimization: Overview, Transformation of Relational Expressions, Estimating statistics of Expression results, Choice of Evaluation Plans, Materialized views, Advanced Topics in Query Optimization.

UNIT-5:

Transaction Management: Transactions: Concept, A Simple Transactional Model, Storage Structures,

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Transaction Isolation Levels, Implementation of Isolation Levels, Transactions as SQL Statements.
Concurrency Control: Lock-based Protocols, Deadlock Handling, Multiple granularity, Timestamp-based Protocols, and Validation-based Protocols

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, Early Lock Release and Logical Undo Operations

TEXT BOOKS:

1. A. Silberschatz, H.F Korth, S.Sudarshan, -Database System Concepts,6/e, TMH 2019
2. Database Management System, 6/e Ramez Elmasri, Shamkant B. Navathe, PEA

REFERENCES:

1. Database Management System, 6/e Ramez Elmasri, Shamkant B. Navathe, PEA
2. Database Principles Fundamentals of Design Implementation and Management, Carlos Coronel, Steven Morris, Peter Robb, Cengage Learning.
3. Database Management Systems, 3/e, Raghurama Krishnan, Johannes Gehrke,TMH

Online Learning Resources:

https://onlinecourses.nptel.ac.in/noc21_cs04/preview

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2													
CO2	2				2									
CO3	2	1	2											
CO4	3	2	3										2	
CO5	2	2												

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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(AUTONOMOUS)

Year: II	Semester: I	Branch of Study: AI & ML			
COURSECODE	**COURSETITLE**	**L**	**T**	**P**	**CREDITS**
20APC3304	**Object Oriented Programming through Java (Common to : CSE, CIC, AI & ML, AI & DS)**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

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

- To understand object oriented programming concepts and apply them in solving Problems.
- To introduce the principles of inheritance and polymorphism and implementation of packages and interfaces.
- To learn java s exception handling mechanism, String Handling Methods.
- To introduce the concepts of multithreading and Collection Framework and internet programming using applets.
- To introduce the design of Graphical User Interface swing controls.

COUSE OUTCOMES:

CO1: Understanding the Syntax, Semantics and features of Java Programming Language.
CO2: To gain knowledge on Object Oriented Programming concepts.
CO3: Raise Exceptions and handle exceptions.
CO4: Analyze the method of creating Multi-threading programs
CO5: Ability to create GUI applications & perform event handling.

Unit–1:

Object Oriented Thinking: History of Java, Java Buzzwords, Overview of OOP CLASSES AND **Objects:** Classes, Objects, Simple Java Program, Methods, Constructors, this Keyword, Garbage Collection, Data Types, Variables, Arrays, Operators, Control Statements Overloading of Methods and Constructors, Parameter Passing, Recursion, String Class and String handling methods.

Unit– 2:

Inheritance: Inheritance Basics, Using Super, Multilevel Hierarchy, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Using final with Inheritance, Object Class.
Packages: Packages, Access Protection, Importing Packages.
Interfaces: Defining an Interface, Implementing Interface, Applying Interface, Variables in Interfaces, Interfaces can be extended.

Unit–3:

Exception Handling: Exception Handling Fundamentals, Exception Types, Uncaught Exceptions, Usingtry and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built in Exceptions, Creating Own Exception Sub Classes.
Input and Output Operations: I/O basics, reading console input, writing console output, the PrintWriter class, reading and writing files, automatically closing a file.
Generic Programming — Generic classes — generic methods — **Bounded** Types — Restrictions and Limitations

Unit–4:

Multithreading: Java Thread Model, The Main Thread, Thread Life Cycle, Creating Thread and Multiple Threads, isAlive() and join(), Thread Priorities, Synchronization, Inter thread Communication, Suspending, Resuming and Stopping Threads.
Collection Framework: Collection Overview, Collection Interfaces: **The Collection** Interface, the List Interface, the Queue Interface, **Collection Classes**: Array List Class, Linked List Class, String Tokenizer, Scanner

Unit–5:

Applets: Applet Basics, Life Cycle of an Applet, Simple Applet Display Methods, The HTML APPLETtag.

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Passing Parameters to Applets.
Swing: Introduction to Swing Model-View-Controller design pattern button, layout management, Swing Components

Text Books:

1. Herbert Schildt, Java, The complete reference, TMH 12thEdition, McGraw Hill, 2021
2. Cay. S. Horstmann and Gary Cornell Core Java 2, Vol 2, Advanced Features, Pearson Education, 7thEdition, 2004

Reference Books:

1. J.Nino and F.A. Hosch, An Introduction to programming and OO design using Java, John Wiley & sons.
2. Y. Daniel Liang, Introduction to Java programming, Pearson Education6th Edition
3. R.A. Johnson- Thomson, An introduction to Java programming and object oriented application development.
4. P. Radha Krishna, Object Oriented Programming through Java, University Press.

Online Learning Resources:

www.javatpoint.com

1. **.pping of course outcomes with program outcomes**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			3								1	1
CO2	1	1	3										1	1
CO3	1		3	1									1	1
CO4	1	2	3										1	1
CO5	2	1	2		3								1	1

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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Course Code	Information Technology And Numerical Methods		L	T	P	C
20AES0505			3	0	0	3
Pre-requisite	Basic Computer Knowledge	Semester	I - I			

Course Outcomes (CO):

CO1: Usage of Digital World and Exploring Cyber space
CO2: Explain the needs of hardware and software required for a computation task.
CO3: Peripheral devices, networking and internet concepts

UNIT – I — 8 Hrs

INTRODUCTION TO INFORMATION TECHNOLOGY Your Digital World: The Practical User: How Becoming Computer Savvy Benefits You, Information Technology & Your Life: The Future Now, Infotech Is All Pervasive: Cell phones, Email, the Internet, & the E-World, The "All-Purpose Machine": The Varieties of Computers, Understanding Your Computer: How Can You Customize (or Build) Your Own PC?, Where Is Information Technology Headed?

THE INTERNET & THE WORLD WIDE WEB Exploring Cyberspace: Connecting to the Internet: Narrowband, Broadband, & Access Providers, How Does the Internet Work? The World Wide Web, Email & Other Ways of Communicating over the Net, The Online Gold Mine: Telephony, Multimedia, Webcasting, Blogs, E-Commerce, & the Social Web, The Intrusive Internet: Snooping, Spamming, Spoofing, Phishing, Pharming, Cookies, & Spyware.

UNIT – II — 9 Hrs

SOFTWARE Tools for Productivity & Creativity: SOFTWARE: TOOLS FOR PRODUCTIVITY & CREATIVITY, **System Software:** The Power Behind the Power, The Operating System: What It Does? Other System Software: Device Drivers & Utility Programs, Common Features of the User Interface, Common Operating Systems, Application Software: Getting Started, Word Processing, Spreadsheets, Database Software, Specialty Software

HARDWARE: THE CPU & STORAGE How to Choose a Multimedia Computer System: HARDWARE: THE CPU & STORAGE: HOW TO CHOOSE A MULTIMEDIA COMPUTER SYSTEM, Microchips, Miniaturization, & Mobility, the System Unit: The Basics, More on the System Unit, Secondary Storage, Future Developments in Processing & Storage

UNIT – III — 8 Hrs

HARDWARE: INPUT & OUTPUT Taking Charge of Computing & Communications: Input & Output, Input Hardware, Output Hardware, Input & Output Technology & Quality of Life: Health & Ergonomics, The Future of Input & Output

COMMUNICATIONS, NETWORKS, & SAFEGUARDS The Wired & Wireless World: From the Analog to the Digital Age, Networks, Wired Communications Media, Wireless Communications Media, Cyber Threats, Hackers, & Safeguards

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2			2							2	2	
CO2	3	3	2						2			2	2	
CO3	3	2			2							2		

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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20AES0505	Numerical Methods	
Pre-requisite	Basic Statistics	I-I

Course Outcomes:

CO4: Analyze the concepts of Errors, Algebraic & Transcendental Equations to solve different Engineering problems

CO5: Analyze Interpolation using the concepts of the numerical methods and apply the Integration in numerical methods

CO6: Apply the concepts of O.D.E on numerical method

UNIT – I — 8 Hrs

Errors in Numerical computations: Errors and their Accuracy, Mathematical Preliminaries, Errors and their Analysis, Absolute, Relative and Percentage Errors, A general error formula, Error in a series approximation.
Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method, Solution of linear simultaneous equation: Crout's triangularisation method, Gauss - Seidal iteration method.

UNIT – II — 8 Hrs

Interpolation: Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.
Curve fitting: Fitting of a straight line – Second degree curve – Exponential curve-Power curve by method of least squares. Numerical Differentiation for Newton's interpolation formula. Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – III — 8 Hrs

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method- Runge - Kutta Methods. Numerical solutions of Laplace equation using finite difference approximation. Initial Value Problem, Eigen Value Problem and Boundary-value Problem

Textbooks:

1. Using Information Technology 9th Edition By Brian Williams and Stacey Sawyer, Mcgraw Hill Publications
2. "Computer Oriented Numerical Methods" by V Rajaraman

Reference Books:

1. Uttam K Roy, –Web Technologiesl, Oxford University Press, 1st Edition, 2010.
2. HTML and CSS: Design and Build Websites 1st Edition by Jon Duckett (Author) india price
3. Steven Holzner, –The Complete Reference PHPl, Tata McGraw-Hill, 1st Edition, 2007.
4. HTML & CSS: The Complete Reference, Fifth Edition (Complete Reference Series)
5. Deitel and Deitel and Nieto, –Internet and World Wide Web - How to Programl, Prentice Hall, 5 th Edition, 2011.
6. Numerical Methods by E Balaguruswamy

Online Learning Resources:

1. http://www.scoopworld.in
2. http://www.sxecw.edu.in
3. http://www.technofest2u.blogspot.com
4. http://www.ptutorial.com/php-cxample/php-upload-image
5. http://www.ptutorial.com/php-example/php-change-case
6. https://www.math.ust.hk/~machas/numerical-methods.pdf

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO4	3													
CO5	3													
CO6	3													

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(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

Course Code	Problem Solving And Programming	L	T	P	C
20AES0501		3	0	0	3
Pre-requisite	Basic Mathematics	Semester	I - I		

Course Objectives:

- Introduce the internal parts of a computer, and peripherals.
- Introduce the Concept of Algorithm and use it to solve computational problems
- Identify the computational and non-computational problems
- Teach the syntax and semantics of a C Programming language
- Demonstrate the use of Control structures of C Programming language
- Illustrate the methodology for solving Computational problems

Course Outcomes (CO):

CO1: Able to know interconnection of peripherals and connects of algorithms and flowcharts
CO2: Able to know problem solving aspects, design and analysis of algorithm
CO3: Able to know flow control, input output and implementation functions
CO4: Able to solve computational problems using functions, array and pointers
CO5: Able to organise real world heterogeneous data and apply searching ,sorting techniques with exception handling

UNIT – I — 8 Hrs

Computer Fundamentals: What is a Computer, Evolution of Computers, Generations of Computers, Classification of Computers, Anatomy of a Computer, Memory revisited, Introduction to Operating systems, Operational overview of a CPU.
Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Fourth generation languages, Fifth generation languages, Classification of Programming languages, Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

UNIT – II — 9 Hrs

Introduction to computer problem solving: Introduction, the problem-solving aspect, top-down design, implementation of algorithms, the efficiency of algorithms, and the analysis of algorithms.
Fundamental algorithms: Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer.

UNIT – III — 8 Hrs

Types, Operators, and Expressions: Variable names, data types and sizes, constants, declarations, arithmetic operators, relational and logical operators, type conversions, increment and decrement operators, bitwise operators, assignment operators and expressions, conditional expressions precedence and order of evaluation.
Input and output: standard input and output, formatted output-Printf, formatted input-Scanf.
Control Flow: Statements and blocks, if-else, else-if, switch, Loops-while and for, Loops-Do- while, break and continue, Goto and labels.
Functions and Program Structure: Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.

UNIT – IV — 9 Hrs

Factoring methods: Finding the square root of a number, the smallest divisor of a number, the greatest common divisor of two integers, generating prime numbers.
Pointers and arrays: Pointers and addresses, pointers and function arguments, pointers and arrays, address arithmetic, character pointers and functions, pointer array; pointers to pointers, Multi-dimensional arrays, initialization of arrays, pointer vs. multi-dimensional arrays, command line arguments, pointers to functions, complicated declarations.
Array Techniques: Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the k^{th} smallest element

UNIT – V — 9 Hrs

Sorting and Searching: Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binary search.
Structures: Basics of structures, structures and functions, arrays of structures, pointers to structures, self-referential structures, table lookup, typedef, unions, bit-fields.
Some other Features: Variable-length argument lists, formatted input-Scanf, file access, Error handling-stderr and exit, Line Input and Output, Miscellaneous Functions.

Textbooks:

1. Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University Press.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.
3. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson.

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Reference Books:

1. RS Bichkar "Programming with C", 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, "Information Technology in Theory", 2017, Cengage Learning.
3. Byron Gottfried and Jitender Kumar Chhabra, "Programming with C", 4th Edition, 2019, McGraw Hill Education.

Online Learning Resources:

www.nptel.ac.in

Mapping of course outcomes with program outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2											3	
CO2	3	3	2										2	
CO3	2	3	3										2	
CO4	2	1	3	2									2	
CO5	2	1	3	3	2			2				3	2	2

(Levels of Correlation, viz., 1-Low, 2-Moderate, 3 High)

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