O P JINDAL UNIVERITY

Scheme & Syllabus

Intel Integrated B. Tech

2nd Semester

Department of Computer Science & Engineering

OPJU

UNIVERSITY OF STEEL TECHNOLOGY AND MANAGEMENT

Computer Science and Engineering
L: Lecture, T: Tutorial, P: Practical, C: Credit

Scheme of Teaching and Examination
B. Tech (Computer Science and Engineering)

Academic Semester II

S. No.	Subject Code	Board of Study	SUBJECT	Periods per week			Scheme of Examination and Marks				Credit L+(T+P)/2 (L+T+P)
				L	T	P	PRE**		ESE*	Total Marks	
							Mid Sem	TA			
1	SOE-B-CSE201	CSE	Linear Algebra and geometry	3	1	0	30	20	50	100	4
2	SOE-B-CSE202	CSE	Programming with C	2	1	0	20	15	40	75	3
3	SOE-B-CSE203	CSE	Database Management System	2	1	0	20	15	40	75	3
4	SOE-B-CSE204	CSE	Emerging Technologies-II	2	0	0	15	10	25	50	2
5	SOE-B-CSE205	CSE	Operating System	2	1	0	20	15	40	75	3
6	SOE-B-CSE206	CSE	Programming Lab	0	0	4	0	30	20	50	2
7	SOE-B-CSE207	CSE	DBMS Lab	0	0	4	0	30	20	50	2
8	SOE-B-CSE208	CSE	Maths Lab-II	0	0	2	0	10	15	25	1
9	SOE-B-CSE209	CSE	IT workshop-II	0	0	4	0	30	20	50	2
10	SOE-B-CSE210	CSE	Emerging Technologies Lab	0	0	2	0	10	15	25	1
11	SOE-B-CSE211	Humanities	Professional Development II	0	0	2	0	10	15	25	1
12	SOE-B-CSE212	CSE	MOOCS/SWAYAM/Certification/Liberal Arts	-	-	-	-	-	-	-	-
			TOTAL	**11**	**3**	**18**	**105**	**240**	**255**	**600**	**24**

* End Semester Examination
** Progress Review Examination

Semester: II **Branch: Computer Science & Engineering**
Subject: Linear Algebra and geometry **Code: SOE-B-CSE201**
L:-03 T:-01 C:-04 **Maximum Marks:-100** **Hours:-50**

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Course Description:

The course will introduce basic concepts and techniques from linear algebra that will be required in later courses in areas such as machine learning, computer graphics, quantum computing. The theoretical results covered in this course will be proved using mathematically rigorous proofs, and illustrated using suitable examples.

Course Objectives

The objective of this course is to enable the students:

- To understand the concept of vector space over real and complex fields
- To understand inverse and rank of a matrix by using elementary transformations.
- To understand Eigen values and Eigen vectors of a matrix.
- To understand the basic ideas of linear dependence, independence and spanning.
- To understand the notion of a linear transformation and its matrix.

Syllabus:

Unit-I: Vectors

Vectors and geometry in two and three space dimensions. Algebraic properties. Dot products and the norm of a vector. Important inequalities. Vector spaces, subspaces and vector space axioms. Complex vector spaces, Eigenvalues and eigenvectors.

Unit-II: Independence and orthogonality:

Linear independence of vectors. Basis and dimension of a vector space. Orthogonal vectors and subspaces. The Gram-Schmidt orthogonalisation.

Unit-III: Matrices:

Matrix operations. Column, row and null space. Rank of a matrix. Inverse and transpose. Elementary matrices. The Gauss-Jordan method.

Unit-IV: Systems of linear equations and Transformation:

Examples of linear systems. Geometry of linear equations. Gaussian elimination. Row echelon form. Homogeneous and nonhomogeneous systems of linear equations. Application to the intersection of lines and planes, Properties and composition of linear transformations. Rotations, reflections and stretches. Translations using homogeneous coordinates. One-to-one and onto transformations.

Unit-V: Elementary matrix factorisations and determinants:

LU factorisation, related algorithms and operation count. PLU factorisation. Calculating the determinant of a matrix. Properties of the determinant of a matrix. Application examples: area, volume and cross product.

Course Outcomes:

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

- To apply the concept of vector space over real and complex fields
- To apply inverse and rank of a matrix by using elementary transformations.
- To Test consistency of a system of linear equations.
- To Find Eigen values and Eigen vectors of a matrix.
- To apply the basic ideas of linear dependence, independence and spanning.

Text Book

- 1. Introduction to Linear Algebra, Gilbert Strang, Wellesley-Cambridge press.
- 2. J. Defranza and D. Gagliardi, Introduction to Linear Algebra with Applications, McGraw-Hill

Reference Book

- 2. Introduction to Linear Algebra (2nd edition) by Serge Lang Springer
- 3. Schaum's outlines of Linear Algebra by Seymour Lipschutz, Marc Lipson,McGraw-Hill Education (India) Private Limited, New Delhi
- 5. K. Hoffman and R. Kunze, Linear Algebra, Prentice Hall

References:

- IIIT Raipur.
- Oxford University.
- WBTU.
- NPTEL.
- MIT.
- NIT Raurkela.

Semester: II **Branch: Computer Science & Engineering**
Subject: Programming with C **Code: SOE-B-CSE202**
L:-02 T:-01 C:-03 **Maximum Marks:-75** **Hours:-40**

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Course Description:

This course offers lecture, laboratory, and case studies to impart teaching and learning to develop problem solving approaches to systematic represent identified problem into design using flowcharts, algorithms and pseudocode leading towards programming through systemic refinements. This course focus on writing various c programs in Linux environment. This course covers fundamental concepts of elementary c programming including Arrays, Strings, Pointers, Functions, Structures, Unions, Enum, Storage classes, Dynamic memory allocation, File Handling.

Course Objectives:

The objective of this course is to enable the students:

- To understand the semantics and syntax of C programming language.
- To analyze problem domain, formulate solution and implement it using C programming language.
- To learn the syntax, semantics and language constructs to write efficient code using C.
- To appreciate the importance and use of pointers and dynamic memory allocation.

Syllabus:

Unit-I: Introduction to Problem Solving Techniques and Linux commands

Problem solving techniques using flowcharts and pseudocode, Introduction to Linux and basic commands

Unit-2: Introduction C Programming

Introduction to C programming, Structure of c program. Elements of C: C character set, identifiers and keywords, data types, Constants and variables, C Compilers, Linkers and development environment.

Unit-3: C Programming Constructs

Operator and expressions, decision making constructs, iterative construct, Arrays and Strings.

Unit-4: Functions and Pointers

Introduction to Functions, User defined functions, build-in/library functions, Recursion, pointers, header files.

Unit-5: Dynamic Memory Allocation and File Handing

Structures, unions, enum, Storage classes, dynamic memory allocation, file management using c programming.

Course Outcome:

At the end of this course, the student will be able to:

- Write, debug, resolve syntax & logical errors and execute the programs.
- Make the comparisons and limitations of the various programming constructs and choose the right one for the task in hand.
- Use the concepts of functions and dynamic memory allocations for better and cleaner programs
- Develop programs using various features like control statements, Functions, Arrays Strings, File, Pointer, Structure etc.
- Implement solutions of various practical problems using C Programming.

Text Books:

- A. B. Chaudhuri, Flowchart and Algorithm Basics: The Art of Programming, Mercury Learning & Information, 2020.
- William Shotts, The Linux Command Line, 2nd Edition: A Complete Introduction, No Starch Pres, 2019.
- Herbert Schildt, C: The Complete Reference, Fourth Edition, McGraw Hill Education, 2017.
- E Balagurusamy, Programming in ANSI C, 8/e, McGraw-Hill India, 2019.

References Books:

- Brajendra Singh, Jignesh Rawal, Pathik Rawal, Algorithm, Pseudocode and Flowchart: Learn Algorithm in Simple Steps,BeITReady, 2015
- Laxmi Publications,The Art of Programming Through Flowcharts & Algorithms (First edition), Anil Bikas Chaudhuri, 2018.
- Richard Blum & Christine Bresnahan,Linux Command Line and Shell Scripting Bible(3rd ed.), Wiley, 2015.
- Kamthane, Ashok N., “Programming in C,” 2/e. Pearson Education India, 2011.
- Sumitabha Das, “Computer Fundamental and C Programming,” McGraw Hill Education, 1st edition.

References:

- Principles of Programming Languages - Video course, NPTL, Prof. S. Arun Kumar, IIT Delhi.
- Introduction to Problem Solving and Programming - Video course, NPTL, Prof. D. Gupta, IIT Kanpur.

Semester: II **Branch: Computer Science & Engineering**
Subject: Database Management System **Code: SOE-B-CSE203**
L:-02 T:-01 C:-03 **Maximum Marks:-75** **Hours:-40**

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Course Description:

This course offers lecture, laboratory, and online interaction to provide a foundation in data management concepts and database systems. It includes representing information with the relational database model, manipulating data with an interactive query language (SQL). It also includes database applications, security, and integrity and privacy issues.

Course Objectives:

The objective of this course is to enable the students to:

- Learn and practice data modeling using the entity-relationship and developing database designs.
- Understand and use of Structured Query Language (SQL).
- Apply normalization techniques to normalize the database.
- Develop an understanding of essential DBMS concepts such as: database security, integrity, concurrency.

Syllabus:

Unit-1: DBMS concepts and architecture

Database approach v/s Traditional file system, Data models, Schemas and instances, Data independence, Data models, ER data model: Entitles and attributes, Entity types, Concept of Generalization, Aggregation and Specialization. transforming ER diagram into the tables.

Unit-2: Relational Data Models

Introduction to the Relational Model, Integrity Constraints, Querying on relational database, Relational Algebra and Relational calculus. SQL Queries, Nested subqueries, Aggregate functions, Set operations, Joins, SQL Triggers and Active Data bases**.**

Unit-3: Database Design

Normal forms, Functional dependency, Decomposition, Dependency preservation and lossless join, multivalued dependencies, Query Optimization.

Unit-4: Transaction management and Concurrency control

Transaction management: ACID properties, Serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management.

Unit-5: File indexing techniques and current trends in Database

File Organization and Indexing, Clusters, Indexes, Hashing and Tree Base Indexing. Database Security, current trends in Databases, case study on MongoDB.

Course Outcomes:

At the end of this course, the student will be able to:

- Design the relational database for various applications.
- Perform CRUD operations on database. (Create, Retrieve, Update, Delete)
- Understand & Implement the principles of transaction management, database recovery, security etc.
- Understand the concurrency control mechanism for database.
- Analyze multidimensional data with data cube.

Text Books:

- Data base System Concepts, By Silberschatz, Korth, McGraw Hill, 6th edition.
- Fundamentals of Database Systems, Elmasri Navathe, Pearson Education.
- An Introduction to Database Systems, By C J Date, 8th Edition

Reference Books:

- Advanced Database Management System, by Rini Chakrabarti, Shilbhadra Dasgupta, Wiley India Pvt. Limited
- Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
- Data base Management Systems, By Raghurama Krishnan & Johannes Gehrke, TATA McGraw Hill, 3rd Edition.

References:

- IIITNayaRaipur
- IIT Mumbai
- IIIT Delhi
- IIIT Raipur

Semester: II **Branch: Computer Science & Engineering**
Subject: Emerging Technologies-II **Code: SOE-B-CSE204**
L:-02 T:-00 C:-02 **Maximum Marks:-50** **Hours:-26**

Course Description:

This course offers lecture, laboratory, workshop, case studies and expert talk to impart teaching and learning to develop sound understanding of technology disruption in changing business environment through invention of new technologies or advancement of existing technologies. This course covers introduction of solving critical technical problems using emerging technologies like Mobile Technologies, Automation using Robotics, IoT, Blockchain Technologies and Cybersecurity.

Course Objectives:

The objective of this course is to enable the students:

- To know the selection of equipment and development of a product for Industry 4.0 environment.
- To get familiar with the various software tools, process and techniques for digital enterprises and manufacturing.
- To develop strategic understanding on the technological disruption and its impact on technology ecosystem.
- To impart knowledge on emerging technologies and its advantages and limitations
- To guide on the future scope and career opportunities in emerging technology domains

Syllabus:

Unit - I: Mobile Tech

Introduction to Mobile Innovations, Mobile Devices, Mobile Operating Systems and Mobile Apps, Apps for multiple devices and platforms, Wearable Technology, Mobile Technologies in Space and Defense, Current state and Future scope

Unit - I: Automation and IoT

Internet of Things (IoT), IoT Devices and Components, Needs of Automation, Introduction to Robotic, Robotic Process Automation (RPA), RPA and 5G, Current state and Future scope

Unit - III: Blockchain

Blockchain: Introduction, Types and Use Cases, Blockchain Platforms and Its Architecture, Decentralized finance (DeFi), Central Bank Digital Currency (CBDC), Current state and Future scope

Unit - IV: Cybersecurity

Introduction Cyber Threats, Cybersecurity principles and approaches, Cybersecurity tools and solutions, Advance Cyber warfare

Course Outcome:

At the end of this course, the student will be able to:

- Understand the role of business needs and distributive nature of emerging technologies.
- Get familiar with emerging technologies like Mobile Technologies, Automation using Robotics, IoT, Blockchain, Quantum Computing and Cybersecurity.
- Understand the path of innovative technological inventions and enhancement
- Formulate solutions for various enterprise and industry problems using emerging technologies.
- To apply strategies and techniques used in emerging technologies to solve real life/case studies problems.

Text Books:

- Chellammal Surianarayanan, Kavita Saini, Pethuru Raj, Blockchain Technology and Applications, CRC Press, 2020
- Abhishek Kumar, Ashutosh Kumar Dubey, N. Gayathri, Prasenjit Das and S. Rakesh Kumar, AI and IoT-Based Intelligent Automation in Robotics, Wiley, 2021
- Lauren Collins, Scott R. Ellis, Mobile Devices Tools and Technologies, CRC Press, 2015
- Mohammad Razani, Information, Communication, and Space Technology, CRC Press, 2012
- Joseph Steinberg, Cybersecurity for Dummies, Wiley, 2019

References Books:

- Tiana Laurence, Introduction to Blockchain Technology The Many Faces of Blockchain Technology in the 21st Century, Van Haren Publishing
- Dharm Singh Jat, Dinesh Goyal, S. Balamurugan, Sheng-Lung Peng, The IoT and the Next Revolutions Automating the World, Engineering Science Reference, 2019
- Bharat Rao, Adam Jay Harrison, Balashankar Mulloth, Defense Technological Innovation: Issues and Challenges in an Era of Converging Technologies, Edward Elgar Publishing, 2020
- Malcolm Macdonald, Viorel Badescu,The International Handbook of Space Technology, Springer Berlin Heidelberg, 2014
- Mayank Bhushan, Rajkumar Singh Rathore, Aatif Jamshed, Fundamentals of Cyber Security, BPB Publications, 2017

References:

- Prof. Sudip Misra, NOC: Introduction to internet of things, IIT Kharagpur

- Prof. Sudip Misra, NOC: Introduction to Industry 4.0 and Industrial Internet of Things, IIT Kharagpur
- Prof. Suvra Sekhar Das, NOC: Evolution of Air Interface towards 5G, IIT Kharagpur
- Prof. Sandeep Shukla, NOC: Introduction to Blockchain Technology and Applications, IIT Kanpur
- Praveen Jayachandran & Prof. Sandip Chakraborty, NOC: Blockchain Architecture Design and Use Cases, IIT Kharagpur
- Dr. Amit Kumar and Dr. Nandan Kumar Sinha, Space Technology, IIT Madras
- Prof. Chester Rebeiro, NOC:Information Security - 5 - Secure Systems Engineering, IIT Madras
- Dr. Debdeep Mukhopadhyay, NOC: Hardware Security, IIT Kharagpur
- Prof. M J Shankar Raman, Prof. V. Kamakoti and Prof.Vasan, NOC: Information security - IV, IIT Madras

Semester: II **Branch: Computer Science & Engineering**

Subject: Operating System **Code: SOE-B-CSE205**

L:-02 T:-01 C:-03 **Maximum Marks:-75** **Hours:-40**

Course Descriptions:

The purpose of this course is to provide an overview of computer operating systems. Topics to be discussed include a brief history of OS's and their design and development. The course will cover major components the and the algorithms and implementation techniques used to create them. The class will have presented using a both a mix of theory and hands-on exercises. Some/most of the programming assignments will be done on Linux machines using C.

Course Objectives:

- To learn the fundamentals of Operating Systems functions, features and services.
- To understand the concepts of process and resource management.
- To understand the memory hierarchy, memory technologies and memory management.
- To gain insight of Linux/Unix system.
- To know how operating system manages complexity through appropriate abstraction of CPU, memory, files, processes etc.

Syllabus:

Unit – I Operating System Introduction:

Operating systems objectives, functions, architecture, structures, operations, Evolution, services, Design and Implementation issues, System calls, System programs, Virtual machine. History of UNIX.

Unit - II Process Scheduling and Threads

Processes: Process Concept, Process States, Process State Transition Diagram, Process Control Block (PCB), Process Scheduling Concepts. Scheduling: Performance criteria, Scheduling algorithms, Multiprocessor scheduling. Process management in Linux: Boot process, Scheduling of processes at command

Unit - III Process Coordination:

Process Synchronization: Critical section problem, semaphores, monitors, atomic transactions, classical synchronization problems. Deadlock: characterization, Prevention, Avoidance and Detection, Recovery, combined approach to handle deadlocks.

Unit - IV Memory and File Systems:

Memory Management: Virtual Memory Concepts, Partitioning, Cache memory. File System: File organization and access mechanism, File directories, File allocation methods, Free space management.

Unit - V Security, Protection and Networking Tools

Introduction, Threats and attacks, Security violation through parameters, Computer virus and worms Security design principle, Authentication, Protection mechanisms, Data encryptions, Digital signature.

Course Outcomes:

At the end of the course students will:

- Gain an insight into how programming languages, operating systems, and architectures interact and provide an environment to the user.
- Get an idea regarding tradeoffs that can be made between performance and functionality during the design and implementation of an operating system.
- Get knowledge about different functions of operating system i.e. Process Management, resource management.
- Be able to conceptualize the components involved in designing a contemporary Operating system.
- Be able to understand the theoretical approaches and practical implementations of OS functionalities.

Text Books:

- Operating System Concepts, By Silberschatz and Galvin, Wiley India, 8th edition.
- Operating System, By William Stalling, Pearson Education, 6th edition.
- Unix Concepts and Applications by Sumitabha Das, TMH,4th Edition.

Reference Books:

- Modern Operating Systems, By Andrew S. Tanenbaum, Pearson Education, 4th Edition.
- Operating System, By Achyut S Godbole and Atul Kahate, TMH, 3rd edition.
- UNIX: The Complete Reference by Rosen and Kenneth, McGraw Hill,2nd Edition.