NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)

Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY UTTAR PRADESH, LUCKNOW

Evaluation Scheme & Syllabus

For

Bachelor of Technology

Computer Science And Business System

Second Year

(Effective from the Session: 2023-24)

(AN AUTONOMOUS INSTITUTE)

Bachelor of Technology
Computer Science And Business System
EVALUATION SCHEME
SEMESTER -III

Sl. No.	Subject Codes	Subject Name	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	TOTAL	PS	TE	PE		
WEEKS COMPULSORY INDUCTION PROGRAM													
1	ACSBS0306	Formal Language & Automata Theory	3	0	0	30	20	50		100		150	3
2	ACSBS0303	Computer Organization & Architecture	3	0	0	30	20	50		100		150	3
3	ACSBS0302	Object Oriented Programming	3	0	0	30	20	50		100		150	3
4	ACSBS0301	Computational Statistics	3	0	0	30	20	50		100		150	3
5	ACSBS0304	Software Engineering	3	0	0	30	20	50		100		150	3
6	ACSBS0305	Financial Management	2	0	0	30	20	50		100		150	2
7	ACSBS0353	Computer Organization & Architecture Lab	0	0	2				25		25	50	1
8	ACSBS0352	Object Oriented Programming Lab	0	0	2				25		25	50	1
9	ACSBS0351	Computational Statistics Lab	0	0	2				25		25	50	1
10	ACSBS0354	Software Engineering Lab	0	0	2				25		25	50	1
11	ANC0303	Indian Constitution	2	0	0	30	20	50		50		100	
12		MOOCs (For B.Tech. Hons. Degree)											
		GRAND TOTAL										**1100**	**21**

List of MOOCs (Coursera) Based Recommended Courses for Second Year (Semester-III) B. Tech Students

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	AMC0022	Data Analysis with Python	IBM	15	1
2	AMC0028Z	Agile Project Management	Google	26	2

PLEASE NOTE:-

- **Internship (3-4 weeks) shall be conducted during summer break after semester-IIand will be assessed during semester-III**
- **Compulsory Audit Courses (Non Credit - ANC0303)**
  - All Compulsory Audit Courses (a qualifying exam) has no credit.
  - Total and obtained marks are not added in the Grand Total.

Abbreviation Used:-
L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam.

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Bachelor of Technology
Computer Science And Business System
EVALUATION SCHEME
SEMESTER - IV

Sl. No.	Subject Codes	Subject Name	Periods			Evaluation Scheme				End Semester		Total	Credit
			L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	ACSBS0403	Operating Systems	3	0	0	30	20	50		100		150	3
2	ACSBS0404	Database Management Systems	3	0	0	30	20	50		100		150	3
3	ACSBS0402N	Software Design with UML	2	0	0	30	20	50		100		150	2
4	ACSBS0405	Introduction to Innovation, IP Management & Entrepreneurship	2	0	0	30	20	50		50		100	2
5	ACSBS0407	Business Communication & Value Science-III	2	0	0	30	20	50		100		150	2
6	ACSBS0401	Operations Research	2	0	0	30	20	50		50		100	2
7	ACSBS0406	Marketing Research & Marketing Management	2	0	0	30	20	50		50		100	2
8	ACSBS0453	Operating Systems Lab (Unix)	0	0	2				25		25	50	1
9	ACSBS0454	Database Management Systems Lab	0	0	2				25		25	50	1
10	ACSBS0452	Software Design with UML Lab	0	0	2				25		25	50	1
11	ACSBS0451	Operations Research Lab	0	0	2				25		25	50	1
12	ANC0404	Essence of Indian Traditional Knowledge	2	0	0	30	20	50		50		100	
		MOOCs (For B.Tech. Hons. Degree)											
		GRAND TOTAL										**1100**	**20**

List of MOOCs (Coursera) Based Recommended Courses for Second Year (Semester-IV) B. Tech Students

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	AMC0031	Data Structures	University of California San Diego	25	2
2	AMC0041	Introduction to NoSQL databases	IBM	18	1

PLEASE NOTE:-

- **Compulsory Audit Courses (Non Credit - ANC0404)**
  - All Compulsory Audit Courses (a qualifying exam) has no credit.
  - Total and obtained marks are not added in the Grand Total.

Abbreviation Used: -

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam., PE: Practical End Semester Exam.

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AICTE Guidelines in Model Curriculum:

A student will be eligible to get Under Graduate degree with Honours only, if he/she completes the additional MOOCs courses such as Coursera certifications, or any other online courses recommended by the Institute (Equivalent to 20 credits). During Complete B.Tech. Program Guidelines for credit calculations are as follows.

1. For 6 to 12 Hours =0.5 Credit
2. For 13 to18 =1 Credit
3. For 19 to 24 =1.5 Credit
4. For 25 to 30 =2 Credit
5. For 31 to 35 =2.5 Credit
6. For 36 to 41 =3 Credit
7. For 42 to 47 =3.5 Credit
8. For 48 and above =4 Credit

For registration to MOOCs Courses, the students shall follow Coursera registration details as per the assigned login and password by the Institute these courses may be cleared during the B. Tech degree program (as per the list provided). After successful completion of these MOOCs courses, the students shall provide their successful completion status/certificates to the Controller of Examination (COE) of the Institute through their coordinators/Mentors only.

The students shall be awarded Honours Degree as per following criterion.

i. If he / she secures 7.50 as above CGPA.
ii. Passed each subject of that degree program in the single attempt without any grace.
iii. Successful completion of MOOCs based 20 credits.

B.TECH. SECOND YEAR			
Course Code	**ACSBS0306**	**L T P**	**Credits**
Course Title	**Formal Language & Automata Theory**	**3 0 0**	**3**

Course objective:

To introduce mathematical foundations of computation including automata theory, provide the design concepts of abstract computation model of finite automata, push down automata and turing Machine and familiarize the notions of algorithm, decidability, complexity, and computability.

Pre-requisites:

- Discrete Mathematics
- Fundamental of Computer System

Course Contents / Syllabus

UNIT-I	Introduction of Regular Languages and Finite Automata	8 Hours

Alphabet, languages and grammars, productions and derivation, Chomsky hierarchy of languages.

Regular expressions and languages, deterministic finite automata (DFA) and equivalence with regular expressions, nondeterministic finite automata (NFA) and equivalence with DFA, regular grammars and equivalence with finite automata, properties of regular languages, Kleene's theorem, pumping lemma for regular languages, Myhill-Nerode theorem and its uses, minimization of finite automata.

UNIT-II	Context-free Languages and Pushdown Automata	8 Hours

Context-free grammars (CFG) and languages (CFL), Chomsky and Greibach Normal Forms, Equivalence with CFG, Parse trees, Ambiguity in CFG, Pumping lemma for Context-free languages, Deterministic Pushdown Automata, Nondeterministic Pushdown Automata (PDA), Closure Properties of CFLs.

Context-sensitive languages: Context-sensitive grammars (CSG) and languages, Linear Bounded Automata and Equivalence with CSG.

UNIT-III	Turing Machine	8 Hours

The basic model for Turing machines (TM), Turing recognizable (Recursively Enumerable) and Turing-decidable (recursive) Languages and their closure properties, Variants of Turing machines, Nondeterministic TMs and Equivalence with Deterministic TMs, Unrestricted Grammars and Equivalence with Turing machines, TM as Enumerators.

UNIT-IV	Undecidability	8 Hours

Church-Turing thesis, Universal Turing machine, Universal and diagonalization languages, Reduction between languages and Rice s theorem, Undecidable problems about languages.

UNIT-V	Basic Introduction to Complexity	8 Hours

Introductory ideas on Time complexity of deterministic and nondeterministic Turing machines, P and NP, NP- completeness, Cook's Theorem, other NP -Complete problems.

Course outcome: After completion of this course students will be able to:

CO 1	Design and Simplify automata for formal languages and apply closure properties of formal language to construct finite automata for complex problems.	K6
CO 2	Define grammar for context free languages and proving it equivalence with PDA.	K5
CO 3	Construct Turing Machine for recursive and recursive enumerable languages.	K6
CO 4	Identify the decidable and undecidable problems.	K4
CO 5	Perform Polynomial time reduction and proving NP-Completeness of basic NP-hard Problem.	K6

Text books:

(1) Introduction to Automata Theory, Languages, and Computation John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman.

Reference Books:

(1) Elements of the Theory of Computation, Harry R. Lewis and Christos H. Papadimitriou.
(2) Automata and Computability, Dexter C. Kozen.
(3) Introduction to the Theory of Computation, Michael Sipser.
(4) Introduction to Languages and the Theory of Computation, John Martin.
(5) Computers and Intractability: A Guide to the Theory of NP Completeness, M. R. Garey and D. S. Johnson.

Laboratory:

YACC, the parser-generating tool (Chapter 5 of Introduction to Automata Theory, Languages, and Computation John E. Hopcroft, Rajeev Motwani and Jeffrey D. Ullman.)

Links:

Unit I	https://nptel.ac.in/courses/106/104/106104028/Lecture 1 -10, Lecture 16, 17 18, 19 https://nptel.ac.in/courses/113/11111/1003016/ https://www.youtube.com/results?search_query=%23AutomataTheory
Unit II	https://nptel.ac.in/courses/106/104/106104028/Lecture 11 -15 https://nptel.ac.in/courses/113/11111/1003016/ https://www.youtube.com/results?search_query=%23AutomataTheory
Unit III	https://nptel.ac.in/courses/106/104/106104028/Lecture 20 -30 https://nptel.ac.in/courses/106/106/106106049/ https://www.youtube.com/results?search_query=%23AutomataTheory
Unit IV	https://nptel.ac.in/courses/106/104/106104028/Lecture 31 -33 https://nptel.ac.in/courses/113/11111/1003016/ https://www.youtube.com/results?search_query=%23AutomataTheory
Unit V	https://nptel.ac.in/courses/106/104/106104028/Lecture 34-42 https://nptel.ac.in/courses/113/11111/1003016/ https://www.youtube.com/results?search_query=%23AutomataTheory

B. TECH. SECOND YEAR			
Course Code	**ACSBS0303**	**L T P**	**Credit**
Course Title	**Computer Organization & Architecture**	**3 0 0**	**3**

Course objective:

Student will learn different types of organization, structures and functions of computer, to understand the data representation and computer arithmetic. They will understand the concept of control unit, memory organization, peripheral devices and pipelining.

Pre-requisites:

- Basic knowledge of computer system.
- Logic gates and their operations.

Course Contents / Syllabus

UNIT-I	**Computer Basics and CPU**	**8 Hours**

Introduction of Computer Organization and Architecture, Functional blocks of a computer: CPU, memory, input-output subsystems, control unit, Instruction set architecture of a CPU: Registers, instruction execution cycle, RTL interpretation of instructions, addressing modes, instruction set. Outlining instruction sets of some common CPUs.

UNIT-II	**Arithmetic Unit**	**8 Hours**

Data representation: Signed number representation, fixed and floating-point representations, IEEE 754 format character representation.

Computer arithmetic: Integer addition and subtraction, ripple carry adder, carry look-ahead adder, etc. multiplication – shift-and-add, Booth multiplier, carry save multiplier, etc. Division restoring and non-restoring techniques, floating point arithmetic, Introduction to x86 architecture.

UNIT-III	**CPU control unit and Memory Design**	**8 Hours**

Hardwired and micro-programmed design approaches, design of a simple hypothetical CPU.

Memory organization: Semiconductor memory technologies, Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.

UNIT-IV	**Peripheral devices and their characteristics**	**8 Hours**

Input-output subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB.

UNIT-V	**Pipelining and Parallel Processors**	**8 Hours**

Basic concepts of pipelining, throughput and speedup, pipeline hazards.		
Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.		
Course outcome: After completion of this course students will be able to:		
CO 1	Understand the basic structure and operation of digital computer system, addressing modes and Instruction format.	K2
CO 2	Describe and solve the data representation techniques and solve the different arithmetic operations.	K3
CO 3	Classify and design the different types of Control Unit and Semiconductor memories.	K6
CO 4	Explain the different ways of communication with I/O devices and standard I/O Interface.	K2
CO 5	Understand the concept of pipelining and parallel processors	K2
Text books:		
(1) M. Mano, "Computer System Architecture", 3rd Edition, Pearson Publication, 2007.		
(2) John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, Third Edition, 1998.		
(3) William Stallings, Computer Organization and Architecture-Designing for Performance, Pearson Education, Seventhedition,2006.		
Reference Books:		
(1) Carl Hamacher, ZvonkoVranesic, Safwat Zaky Computer Organization, McGraw-Hill, Fifth Edition, Reprint2012		
(2) Ray A K, Bhurchandi K M, "Advanced Microprocessors and Peripherals", TM.		
Links:		
Unit 1	https://www.youtube.com/watch?v=L9X7XXfHYdU&list=PLxCzCOWd7aiHMonh3G6QNKq53C6oNXGrX	
Unit 2	https://www.youtube.com/watch?v=WLgXUPOjKEc	
Unit 3	https://www.youtube.com/watch?v=BPhWlFIU1rc	
Unit 4	https://www.youtube.com/watch?v=6R7JDkpG1Wk&list=PLrjkTql3jnm8HbdMwBYIMAd3UdstWChFH	
Unit 5	https://www.youtube.com/watch?v=nxryfWg5Hm4	

B. TECH. SECOND YEAR			
Course Code	**ACSBS0302**	**L T P**	**Credit**
Course Title	**Object Oriented Programming**	**3 0 0**	**3**

Course objective:

The objective of this course is to understand the concept of procedural programming language as C and the object-oriented language as C++ with basic object-oriented programming concepts. To understand the fundamental concepts of object-oriented programming in Java language and also implement its techniques to design and develop conceptual models using UML tools and demonstrate the standard concepts of object-oriented techniques modularity, I/O, and other standard language constructs.

Pre-requisites:

- Student must know at least the basics of how to use a computer, and should be able to start a command line shell.
- Knowledge of basic programming concepts, as covered in 'Programming Basic" course is necessary.

Course Contents / Syllabus

UNIT-I	**Procedural programming, An Overview of C**	**8 Hours**

Types Operator and Expressions, Scope and Lifetime, Constants, Pointers, Arrays, and References, Control Flow, Functions and Program Structure, Namespaces, Error handling, Input and Output (*C*-way), Library Functions (*string*, *math*, *stdlib*), Command line arguments, Pre-processor directive.

UNIT-II	**C and C++**	**8 Hours**

Single line comments, Local variable declaration within function scope, function declaration, Function overloading, Stronger type checking, Reference variable, Parameter passing – value vs reference, Passing pointer by value or reference, Operator new and delete, Typecasting operator, Inline Functions in contrast to macro, Default arguments.

UNIT-III	**The Fundamentals of Object-Oriented Programming**	**8 Hours**

Necessity for OOP, Data Hiding, Data Abstraction, Encapsulation, Procedural Abstraction, Class and Object.

More extensions to C in C++ to provide OOP Facilities: Scope of Class and Scope Resolution

Operator, Member Function of a Class, Private, Protected and Public Access Specifier, this Keyword, Constructors and Destructors, friend class, Error handling (exception).

UNIT-IV	Essentials of Object-Oriented Programming	8 Hours

Operator overloading, Inheritance – Single and Multiple, Class Hierarchy, Pointers to Objects, Assignment of an Object to another Object, Polymorphism through dynamic binding, Virtual Functions, Overloading, overriding and hiding, Error Handling

Generic Programming: Template concept, Class template, Function template, Template specialization.

UNIT-V	Input and Output	8 Hours

Streams, Files, Library functions, formatted output

Object Oriented Design and Modeling: UML concept, Use case for requirement capturing, Class diagram, Activity diagram and Sequence Diagram for design, Corresponding C++ code from design

Course outcome: After completion of this course students will be able to:

CO1	Identify the concepts of procedural programming and its features.	K2
CO2	Demonstrate the concept of procedural language and object-oriented language.	K3
CO3	Implement the fundamental concept of object-oriented programming language using classes and objects.	K5
CO4	Implement the concept of reusability and data hiding using C++ and also demonstrate the generic concept.	K3
CO5	Design and develop the object-oriented model by using UML diagrams.	K6

Text books:

1) The C++ Programming Language, Bjarne Stroustrup, Addison Wesley, 4th Edition.
2) C++ and Object-Oriented Programming Paradigm, Debasish Jana, PHI Learning Pvt. Ltd, 3rd Edition.

Reference Books:

1) Programming – Principles and Practice Using C++, Bjarne Stroustrup, Addison Wesley, 2nd Edition.
2) The Design and Evolution of C++, Bjarne Stroustrup, Addison Wesley, 1st Edition.

NPTEL/Youtube Link:

Unit 1	https://www.youtube.com/watch?v=bIzTKJzs92w
Unit 2	https://www.youtube.com/watch?v=pRC09Tz9iVE
Unit 3	https://www.youtube.com/watch?v=A38y7OO8OK4
Unit 4	https://www.youtube.com/watch?v=rr7HVs4d1Qo
Unit 5	https://www.youtube.com/watch?v=fJW65Wo7IHI

B. TECH. SECOND YEAR			
Course Code	**ACSBS0301**	**L T P**	**Credits**
Course Title	**Computational Statistics**	**3 0 0**	**3**

Course objective:

The objective of the course is to enable the student to use modern computer intensive statistical methods as tools to investigate statistical procedures, perform inference and conduct statistical analysis using computation and simulation.

Pre-requisites: Statistics and Probability.

Course Contents / Syllabus

UNIT-I	**Multivariate Normal Distribution**	**8 Hours**

Multivariate Normal Distribution Functions, Conditional Distribution and its relation to regression model, Estimation of parameters.

UNIT-II	**Discriminant Analysis**	**8 Hours**

Statistical background, linear discriminant function analysis, Estimating linear discriminant functions and their properties.

UNIT-III	**Principal Component Analysis**	**8 Hours**

Principal components, Algorithm for conducting principal component analysis, deciding on how many principal components to retain, H-plot.

UNIT-IV	**Factor Analysis**	**8 Hours**

Factor analysis model, Extracting common factors, determining number of factors, Transformation of factor analysis solutions, Factor scores.

UNIT-V	**Clustering**	**8 Hours**

Introduction, Types of clustering, Correlations and distances, clustering by partitioning methods, hierarchical clustering, overlapping clustering, K-Means Clustering-Profiling and Interpreting Clusters

Course outcome: After completion of this course students will be able to:

CO 1	Analyze the relationship between multiple normally distributed variables.	K4
CO 2	Develop different discriminant functions.	K5

CO 3	Perform dimensionality reduction using PCA.	K4
CO4	Analyze variability among observed and correlated variables in terms of a potentially lower number of unobserved variables.	K4
CO 5	Categorize or group data items using different clustering techniques.	K4

Text books:

1) An Introduction to Multivariate Statistical Analysis, T.W. Anderson.
2) Applied Multivariate Data Analysis, Vol I & II, J.D. Jobson.
3) Statistical Tests for Multivariate Analysis, H. Kris.
4) Programming Python, Mark Lutz.
5) Python 3 for Absolute Beginners, Tim Hall and J-P Stacey. Beginning Python: From Novice to Professional, Magnus Lie Hetland. Edition, 2005.

Reference Books:

1) Regression Diagnostics, Identifying Influential Data and Sources of Collinearety, D.A. Belsey, E. Kuh and R.E. Welsch
2) Applied Linear Regression Models, J. Neter, W. Wasserman and M.H. Kutner.
3) The Foundations of Factor Analysis, A.S. Mulaik.
4) Introduction to Linear Regression Analysis, D.C. Montgomery and E.A. Peck.
5) Cluster Analysis for Applications, M.R. Anderberg.
6) Multivariate Statistical Analysis, D.F. Morrison.
7) Python for Data Analysis, Wes Mc Kinney.

Links:

Unit 1	https://www.youtube.com/watch?v=YgExEVji7xs
Unit 2	https://www.youtube.com/watch?v=ImKKekAyFls
Unit 3	https://www.youtube.com/watch?v=hkCT-6KJAK0
Unit 4	https://www.youtube.com/watch?v=n3y3xLNoPk4
Unit 5	https://www.youtube.com/watch?v=NhimXdFenrg https://www.youtube.com/watch?v=CwjLMV52tzI https://www.youtube.com/watch?v=qg_M37WGKG8

B. TECH. SECOND YEAR

Course Code	ACSBS0304	L T P	Credits
Course Title	Software Engineering	3 0 0	3

Course objective:

To enable students to develop methods and procedures for software development that can scale up for large systems and that can be used consistently to produce high-quality software at low cost and with a small cycle of time. Students will be able to understand the concepts of requirement engineering, designing and its principles, testing techniques and maintenance methods for effective software development. Students can also use object-oriented approach for software development.

Pre-requisites: Basic knowledge about software and its types.
Basic knowledge of any Object-Oriented programming language.

Course Contents / Syllabus

UNIT-I	Introduction	8 Hours

Programming in the small vs. programming in the large; software project failures and importance of software quality and timely availability; engineering approach to software development; role of software engineering towards successful execution of large software projects; emergence of software engineering as a discipline, Software Characteristics.

UNIT-II	Software Project Management	8 Hours

Basic concepts of life cycle models – different models and milestones; software project planning – identification of activities and resources; concepts of feasibility study; techniques for estimation of schedule and effort; software cost estimation models and concepts of software engineering economics; techniques of software project control and reporting; introduction to measurement of software size; introduction to the concepts of risk and its mitigation; configuration management.

UNIT-III	Software Quality and Reliability	8 Hours

Internal and external qualities; process and product quality; principles to achieve software quality; introduction to different software quality models like McCall, Boehm, FURPS / FURPS+, Dromey, ISO – 9126; introduction to Capability Maturity Models (CMM and CMMI); introduction to software reliability, reliability models and estimation.

UNIT-IV	Software Requirements Analysis, Design and Construction	8 Hours

Introduction to Software Requirements Specifications (SRS) and requirement elicitation techniques; techniques for requirement modeling – Decision tables, event tables, State transition tables, Petri nets; requirements documentation through use cases; Introduction to UML, Introduction to software metrics and metrics-based control methods; Measures of code and design quality.

UNIT-V	Object Oriented Analysis, Design and Construction	8 Hours

Concepts -- the principles of abstraction, modularity, specification, encapsulation and information hiding; concepts of abstract data type; Class Responsibility Collaborator (CRC) model; quality of design; design measurements; concepts of design patterns; Refactoring; object-oriented construction principles; object-oriented metrics.

Software Testing: Introduction to faults and failures; basic testing concepts; concepts of verification and validation; black box and white box tests; white box test coverage – code coverage, condition coverage, branch coverage; basic concepts of black-box tests – equivalence classes, boundary value tests, usage of state tables; testing use cases; transaction-based testing; testing for non-functional requirements – volume, performance and efficiency; concepts of inspection.

Course outcome: After completion of this course students will be able to

CO 1	Explain various software characteristics and quality attributes and will be able to use engineering approach on small and large projects	K3
CO 2	Analyze different software Development Models, understand various techniques of schedule and effort estimation.	K4
CO 3	Apply basic software quality assurance practices to ensure that design, development meet or exceed applicable standards	K3
CO 4	Demonstrate the contents of a SRS, Compare and contrast various methods for software design.	K4
CO 5	Understand the concepts of object-oriented system development, formulate testing strategy for software systems, employ techniques such as unit, Integration and System testing,	K2

Text books:

1) Software Engineering, Ian Sommerville, Edition 9, Pearson.

Reference Books:

1) Fundamentals of Software Engineering, Carlo Ghezzi, Jazayeri Mehdi, Mandrioli Dino.
2) Software Requirements and Specification: A Lexicon of Practice, Principles and Prejudices, Michael Jackson.
3) The Unified Development Process, Ivar Jacobson, Grady Booch, James Rumbaugh.
4) Design Patterns: Elements of Object-Oriented Reusable Software, Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides.
5) Software Metrics: A Rigorous and Practical Approach, Norman E Fenton, Shari Lawrence Pfleeger .
6) Software Engineering: Theory and Practice, Shari Lawrence Pfleeger and Joanne M. Atlee.
7) Object-Oriented Software Construction, Bertrand Meyer.
8) Object Oriented Software Engineering: A Use Case Driven Approach --Ivar Jacobson.
9) Touch of Class: Learning to Program Well with Objects and Contracts --Bertrand Meyer.
10) UML Distilled: A Brief Guide to the Standard Object Modeling Language --Martin Fowler.

NPTEL/ Youtube/ Faculty Video Link:	
Unit 1	https://youtu.be/x-jqSXYE4S4
Unit 2	https://youtu.be/mGkkZoFc-4I
Unit 3	https://youtu.be/sGxgZxwuHzc
Unit 4	https://youtu.be/BNk7vni-1Bo
Unit 5	https://youtu.be/8swQr0kckZI

B. TECH. SECOND YEAR

Course Code	ACSBS0305	L	T	P	Credits
Course Title	Financial Management	2	0	0	2

Course objective: This course is primarily intended toequip the students with the knowledge of managing funds & understand the risk and return profile of investments. Further this course also facilitates the understanding and practice of financial decisions both in long term and short term.

Pre-requisites: Good knowledge of Financial & Cost Accounting

Course Contents / Syllabus

UNIT-I	Introduction	8 HOURS

Introduction to Financial Management - Goals of the firm - Financial Environments.
Time Value of Money: Simple and Compound Interest Rates, Amortization, Computing more that once a year, Annuity Factor.

UNIT-II	Valuation of Securities	8 HOURS

Bond Valuation Preferred Stock Valuation, Common Stock Valuation, Concept of Yield and YTM.
Risk & Return: Defining Risk and Return, Using Probability Distributions to Measure Risk, Attitudes Toward Risk, Risk and Return in a Portfolio Context, Diversification, The Capital Asset Pricing Model (CAPM)

UNIT-III	Operating & Financial Leverage	6 HOURS

Operating Leverage, Financial Leverage, Total Leverage, Indifference Analysis in leverage study
Cost of Capital: Concept, Computation of Specific Cost of Capital for Equity - Preference – Debt, Weighted Average Cost of Capital – Factors affecting Cost of Capital 4L

UNIT-IV	Capital Budgeting	6 HOURS

Capital Budgeting: The Capital Budgeting Concept & Process - An Overview, Generating Investment Project Proposals, Estimating Project, After Tax Incremental Operating Cash Flows, Capital Budgeting Techniques, Project Evaluation and Selection - Alternative Methods

UNIT-V	Working Capital Management	6 HOURS

Overview, Working Capital Issues, Financing Current Assets (Short Term and Long Term- Mix), Combining Liability Structures and Current Asset Decisions, Estimation of Working Capital.
Cash Management: Motives for Holding cash, Speeding Up Cash Receipts, Slowing Down Cash Payouts, Electronic Commerce, Outsourcing, Cash Balances to maintain, and Factoring.
Accounts Receivable Management: Credit & Collection Policies, Analyzing the Credit Applicant, Credit References, Selecting optimum Credit period.

Course outcome: After completion of this course students will be able to

CO 1	Understand the fundamental concepts of financial management	Understand (K2)
CO 2	Appreciate basic concepts such as time value of money, cost of capital, risk and return, working capital management, capital budgeting etc.	Evaluate (K5)
CO 3	Leverage the concept for deciding financial angle of IT projects	Evaluate (K5)
CO4	Manage the working capital needs and maintaining liquidity of the business.	Apply (K3)

Text books

1. Chandra, Prasanna - Financial Management - Theory & Practice, Tata McGraw Hill.

References Books

1. Srivastava, Misra: Financial Management, OUP
2. Van Horne and Wachowicz: Fundamentals of Financial Management, Prentice Hall/ Pearson Education.

Home Assignment

Case study materials book will be given to students. Students are required to meet in groups before coming to class and prepare on the case for the day. Instructor may ask the student groups to present their analysis and findings to the class.

B. TECH. SECOND YEAR			
Course Code	**ACSBS0353**	**L T P**	**Credit**
Course Title	**Computer Organization &Architecture Lab**	**0 0 2**	**1**
List of Experiments:			
Sr. No.	**Name of Experiment**		**CO**
Using Circuits on breadboard or simulators			
1	Implementation of Half adder and full adder		CO1
2	Implementation of Half subtractor and full subtractor		CO1
3	Implementation of array multiplier		CO1
4	Implementation of array multiplexer and demultiplexer		CO1
5	Implementation of array encoder and decoder		CO1
6	Implementation of Synchronous and Asynchronous counter		CO2
7	Implementation of Shift registers.		CO3
8	Design of an arithmetic and logic unit		CO4
9	Design of an 8-bit input/output system with four 8-bit internal register.		CO4
10	Design the data path of a computer from its registers transfer language		CO4
11	Design the control unit of a computer using hardwiring based on its RTL description.		CO5
Lab Course Outcome: After completion of this course students will be able to:			
CO 1	Design and Implement Combinational Circuits.		K6
CO 2	Design and Implement Sequential Circuits.		K6
CO 3	Design and implement shift register and ALU.		K6
CO 4	Design and implement input/output system with internal registers.		K4
CO 5	Design and implement the control unit.		K6

B. TECH. SECOND YEAR			
Course Code	**ACSBS0352**	**L T P**	**Credit**
Course Title	**Object Oriented Programming Lab**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1	Parameter passing: passing parameter by value vs by reference, passing array as constant pointer	CO1
2	Function overloading: writing string operations like strcat and strncat, strcpy and strncpy as overloaded functions.	CO1
3	Dynamically allocating space for a pointer depending on input and doing this repeatedly, depending on different inputs and finally de-allocating the pointer.	CO1
4	Define class complex with all possible operations: constructor, destructor, copy constructor, assignment operator with the data members stored as pointer to integers.	CO2
5	Define class vector of integers with all possible operations like constructor, destructor, copy constructor and assignment operators	CO2
6	Define class matrix of integers with all possible operations like constructor, destructor, copy constructor and assignment operators	CO2
7	Define class matrix of integers using vector, with all possible operations like constructor, destructor, copy constructor and assignment operators	CO2
8	Define class stack, queue, linked-list, array, set using some data-type (int) with data members kept as private and functions kept in both protected and public sections.	CO3
9	Define class complex with all possible operators: constructor, destructor, copy constructor, assignment operator and operators >, <, >=, <=, ==, ++ (pre and post), +, +=, ( ), with the data members stored as pointer to integers.	CO2
10	Define class vector of integers with all possible operations like constructor, destructor, copy constructor and assignment operators>, <, >=, <=, ==, ++ (pre and post), +, +=, ( )	CO2
11	Define class matrix of integers with all possible operations like constructor, destructor, copy constructor and assignment operators>, <, >=, <=, ==, ++ (pre and post), +, +=, ( ).	CO2
12.	Define class matrix of integers using vector, with all possible operations like constructor, destructor, copy constructor and assignment operators>, <, >=, <=, ==, ++ (pre and post), +, +=, ( ).	CO2

13	Define stack and queue inherited from array class, with standard functions and operators	CO3
14	Define a class called 'array' with data type passed as template type with constructor, destructor, copy constructor and assignment operators and index operator.	CO3
15	Define template functions for compare and use it in the algorithms like bubble sort, insertion sort, merge sort.	CO4
16	Formatted input-output examples	CO4
17	Input manipulators	CO4
18	Overriding operators <<, >>	CO4
19	Define class model for complex number, student class, book class and show it using UML diagram as well as concrete class.	CO5
20	Show behavioral modeling through sequence diagram and activity diagram for workflow in a typical log-in, log-out situation.	CO5
Lab Course Outcome: After completion of this course students will be able to:		
CO 1	To understand the concept of passing parameters & functions and also implement the functions overloading concepts.	K2
CO 2	To identify the concept of dynamic memory allocation & de-allocations and also define the class concept with all its possible operations.	K2
CO 3	To evaluate the concept of data structures in object-oriented programming.	K5
CO 4	To create the template functions by using different searching algorithm and also implement the concept of I/O operations.	K6
CO 5	To design and develop object-oriented model by using UML diagrams and relationships needed in C++.	K6

B. TECH. SECOND YEAR			
Course Code	**ACSBS0351**	**L T P**	**Credit**
Course Title	**Computational Statistics Lab**	**0 0 2**	**1**
List of Experiments:			
Sr. No.	**Name of Experiment**		**CO**
1	Print multiplication table of a given number.		CO1
2	Given a list, iterate it, and display numbers divisible by five, and if you find a number greater than 150, stop the loop iteration. list1 = [12, 15, 32, 42, 55, 75, 122, 132, 150, 180, 200]		CO1
3	Given a list, iterate it, and display numbers divisible by five, and if you find a number greater than 150, stop the loop iteration.		CO1
4	Write a program to create a class having a parameterized constructor, a class method and a static method.		CO1
5	Write a Python program to copy the contents of a file to another file.		CO1
6	Write a Python program to count number of words in a text file.		CO1
7	Write a Pandas program to split the following dataframe into groups based on all columns and calculate Groupby value counts on the dataframe. **Test Data:** Id type book 0 1 10 Math 1 2 15 English 2 1 11 Physics 3 1 20 Math 4 2 21 English 5 1 12 Physics 6 2 14 English		CO3
8	Write a Pandas program to partition each of the passengers into four categories based on their age. Note: Age categories (0, 10), (10, 30), (30, 60), (60, 80)		CO3
9	Write a Python program to check that a string contains only a certain set of characters (in this case a-z, A-Z and 0-9)		CO2
10	Write a Python program that matches a string that has an ‘a’ followed by zero or more b's.		CO2

11	Write a Python program that matches a word at the beginning of a string.	CO2
12	Write a Python program to remove leading zeros from an IP address.	CO2
13	Write a Pandas program to create a) Datetime object for Jan 15 2012. b) Specific date and time of 9:20 pm. c) Local date and time. d) A date without time. e) Current date. f) Time from a datetime. g) Current local time.	CO4
14	Write a Pandas program to create a date from a given year, month, day and another date from a given string formats.	CO4
15	Write a Pandas program to print the day after and before a specified date. Also print the days between two given dates.	CO4
16	Write a Pandas program to create a time series using three months frequency.	CO4
17	Write a Pandas program to create a sequence of durations increasing by an hour.	CO4
18	Write a Pandas program to check if a day is a business day (weekday) or not.	CO4
19	Write a Pandas program to create a Pivot table with multiple indexes from a given excel sheet	CO3
20	Write a Pandas program to create a Pivot table and find the total sale amount region wise, manager wise.	CO3
21	Write a Pandas program to create a Pivot table and count the manager wise sale and mean value of sale amount.	CO3
22	Write a Pandas program to create a Pivot table and find the maximum sale value of the items.	CO3
23	Write a Pandas program to create a Pivot table and find the minimum sale value of the items.	CO3
24	Write a Pandas program to create a Pivot table and find the maximum and minimum sale value of the items.	CO3
25	Write a Python program to draw a line using given axis values taken from a text file, with suitable label in the x axis, y axis and	CO5

	a title. *Test Data:* test.txt 1 2 2 4 3 1	
26	Write a Python program to plot two or more lines on same plot with suitable legends of each line.	CO5
27	Write a Python program to plot two or more lines with legends, different widths and colors.	CO5
Lab Course Outcome: After completion of this course students will be able to:		
CO 1	Implement classes, methods and Text files.	K4
CO 2	Perform data manipulation on datasets and implement RE.	K4
CO 3	Implement Aggregation and Group by operations.	K4
CO 4	Implement Time series-based problems.	K4
CO 5	Represent data visualization using Matplotlib package.	K3

B. TECH. SECOND YEAR			
Course Code	**ACSBS0354**	**L T P**	**Credit**
Course Title	**Software Engineering Lab**	**0 0 2**	**1**

List of Experiments:

Sr. No.	Name of Experiment	CO
1	Development of requirements specification on any of the given topic. • Covid vaccination management system • Online grocery store • Online food delivery system • Online medical store • Doctors online OPD	CO1
2	Develop function-oriented design using SA/SD methodology	CO1
3	Develop object-oriented design using UML.	CO2, CO3, CO4
4	Designing and implementing test cases manually.	CO5
5	Designing and implementing test cases automatically using a tool.	CO5
6	Use of appropriate CASE tools and other tools (any one) such as configuration management tools, program analysis tools in the software life cycle.	CO5

Lab Course Outcome: After completion of this course students will be able to:

CO 1	Identify ambiguities, inconsistencies and incompleteness from a requirements specification and state functional and non-functional requirement	K4
CO 2	Identify different actors and use cases from a given problem statement and draw use case diagram to associate use cases with different types of relationship	K5
CO 3	Draw a class diagram after identifying classes and association among them	K5
CO 4	Graphically represent various UML diagrams, and associations among them and identify the logical sequence of activities undergoing in a system, and represent them pictorially	K5
CO5	Able to use modern engineering tools for specification, design, implementation and testing	K4

B. TECH. SECOND YEAR					
Course Code	**ANC0303**	**L**	**T**	**P**	**Credit**
Course Title	**Indian Constitution**	**2**	**0**	**0**	**0**

Course objective:

This course is intended to equip the students with the knowledge of Indian Constitution and develop the understanding about institutions and their functions at the union and state level. Further this course would also facilitate the students to have knowledge of prevalent laws and E-Governance.

Pre-requisites:

Course Contents / Syllabus

UNIT-I	Introduction and Basic Information about Indian Constitution	8 Hours

Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947,Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Federal System, Centre-State Relations, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India, Emergency Provisions: National Emergency, President Rule, Financial Emergency, and Local Self Government – Constitutional Scheme in India.

UNIT-II	Union Executive and State Executive	8 Hours

Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism, Lok Pal, Lok Ayukta, The Lokpal and Lok ayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.

UNIT -III	Introduction and Basic Information about Legal System	8 Hours

The Legal System: Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court). Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration. Contract law, Tort, Law at workplace.

UNIT -IV	Intellectual Property Laws and Regulation to Information	8 Hours

Intellectual Property Laws: Introduction, Legal Aspects of Patents, Filing of Patent Applications, Rights from Patents, Infringement of Patents, Copyright and its Ownership, Infringement of Copyright, Civil

Remedies for Infringement, Regulation to Information Introduction, Right to Information Act, 2005, Information Technology Act, 2000, Electronic Governance, Secure Electronic Records and Digital Signatures, Digital Signature Certificates, Cyber Regulations Appellate Tribunal, Offences, Limitations of the Information Technology Act.

UNIT -V	**Business Organizations and E-Governance**	**8 Hours**

Sole Traders, Partnerships: Companies: The Company's Act: Introduction, Formation of a Company, Memorandum of Association, Articles of Association, Prospectus, Shares, Directors, General Meetings and Proceedings, Auditor, Winding up. E-Governance and role of engineers in E-Governance, Need for reformed engineering serving at the Union and State level, Role of I.T. professionals in Judiciary, Problem of Alienation and Secessionism in few states creating hurdles in Industrial development.

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

CO 1	Identify and explore the basic features and modalities about Indian constitution.	K1
CO 2	Differentiate and relate the functioning of Indian parliamentary system at the center and state level.	K2
CO 3	Differentiate different aspects of Indian Legal System and its related bodies.	K4
CO 4	Discover and apply different laws and regulations related to engineering practices.	K4
CO 5	Correlate role of engineers with different organizations and governance models.	K4

Text books:

1. S.G Subramanian: Indian Constitution and Indian Polity, 2nd Edition, Pearson Education 2020.
2. Subhash C. Kashyap: Our Constitution: An Introduction to India's Constitution and constitutional Law, NBT, 2018
3. Granville Austin: The Indian Constitution: Cornerstone of a Nation (Classic Reissue), Oxford University Press.

Reference Books:

1. Brij Kishore Sharma: Introduction to the Indian Constitution, 8th Edition, PHI Learning Pvt. Ltd.
2. P. Narayan: Intellectual Property Law, Eastern Law House, New Delhi

B. TECH. SECOND YEAR

Course Code	ACSBS0403	L T P	Credits
Course Title	Operating Systems	3 0 0	3

Course objective:

The objective of the course is to present student will be able to understand the basic components of a computer operating system, and the interactions among the various components. The course will cover an introduction on the policies for scheduling, deadlocks, memory management, synchronization, system calls and file systems.

Pre-requisites:

1. Basic knowledge of computer fundamentals.
2. Basic knowledge of computer organization.

Course Contents / Syllabus

UNIT-I	Introduction	8 Hours

Concept of Operating Systems (OS), Generations of OS, Types of OS, OS Services, Functions of OS Interrupt handling and System Calls, Basic architectural concepts of an OS, Concept of Virtual Machine, Resource Manager view, process view and hierarchical view of an OS.

Processes: Definition, Process Relationship, Different states of a Process, Process State transitions, Process Control Block (PCB), Context switching.

UNIT-II	Process Scheduling	8 Hours

Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads.

Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time.

Scheduling algorithms: Pre-emptive and non-pre-emptive: FCFS, SJF, RR, Priority, Round Robin, Multilevel queue scheduling and multilevel feedback queue scheduling. Multiprocessor scheduling: Real Time scheduling: RM and EDF.

UNIT-III	Inter-process Communication and Deadlock	8 Hours

Concurrent processes, precedence graphs, Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution, Semaphores, Strict Alternation, Peterson's Solution, The Producer / Consumer Problem, Peterson's solution, Lamport Bakery solution, Semaphores, Test and Set operation Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem, Barber's shop problem, Inter Process Communication models and Schemes, Process generation.

Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.

Concurrent Programming: Critical region, conditional Critical region, Monitors, Concurrent languages, Communicating Sequential Process (CSP); Deadlocks - prevention, avoidance, detection and recovery.

UNIT-IV	Memory Management	8 Hours

Basic concept, Logical and Physical address maps, Memory allocation: Contiguous Memory allocation – Fixed and variable partition–Internal and External fragmentation and Compaction.

Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page allocation, Partitioning, Paging, Page fault, Working Set, Segmentation, Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

UNIT-V	**I/O Hardware**	**8 Hours**

I/O devices, Device controllers, Direct Memory Access, Principles of I/O.

File Management: Concept of File, Access methods, File types, File operation, Directory structure, File System structure, RAID File structure, Allocation methods (contiguous, linked, indexed), Free-space management (bit vector, linked list, grouping), directory implementation (linear list, hash table), efficiency and performance.

Disk Management: Disk structure, Disk scheduling - FCFS, SSTF, SCAN, C-SCAN, LOOK, C-LOOK, Disk reliability, Disk formatting, Boot-block, Bad blocks.

Case study: UNIX OS file system, shell, filters, shell programming, programming with the standard I/O, UNIX system calls.

Course outcome: After completion of this course students will be able to:

CO 1	Understand the fundamentals of operating systems, functions and their structure of operating systems	K2
CO 2	Implement concept of process management policies, CPU Scheduling and thread management.	K5
CO 3	Understand the requirement of process synchronization and apply deadlock handling algorithms.	K3
CO 4	Evaluate the memory management and its allocation policies.	K5
CO 5	Understand and analyze the I/O management and File systems	K4

Text books:

(1) *Operating System Concepts Essentials.* Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, Edition 8.

Reference Books:

(1) Operating Systems: Internals and Design Principles. William Stallings, Edition 9.
(2) Operating System: A Design-oriented Approach. Charles Patrick Crowley.
(3) Operating Systems: A Modern Perspective. Gary J. Nutt.
(4) Design of the Unix Operating Systems. Maurice J. Bach.
(5) Understanding the Linux Kernel, Daniel Pierre Bovet, Marco Cesati.

Link:

Unit 1	https://www.youtube.com/watch?v=783KAB-tuE4 https://www.youtube.com/watch?v=Bxx2_aQVeeg https://www.youtube.com/watch?v=ZaGGKFCLNc0

	https://nptel.ac.in/courses/106/105/106105214/
Unit 2	https://www.youtube.com/watch?v=NShBeqTkXnQ https://www.youtube.com/watch?v=4hCih9eLc7M https://www.youtube.com/watch?v=9YRxhlvt9Zo
Unit 3	https://www.youtube.com/watch?v=UczJ7misUEk https://www.youtube.com/watch?v=_IxqinTs2Yo
Unit 4	https://www.youtube.com/watch?v=IwESijQs9sM https://www.youtube.com/watch?v=-orfFhvNBzY https://www.youtube.com/watch?v=2OobPx246zg&list=PL3-wYxbt4yCjpcfUDz-TgD_ainZ2K3MUZ&index=10
Unit 5	https://www.youtube.com/watch?v=AnGOeYJCv6s https://www.youtube.com/watch?v=U1Jpvni0Aak

B. TECH. SECOND YEAR

Course Code	ACSBS0404	L T P	Credits
Course Title	Database Management Systems	3 0 0	3

Course objective: The objective of the course is to present an introduction to database management systems, with an emphasis on how to organize, maintain and retrieve - efficiently, and effectively - information in different databases.

Pre-requisites: The student should have basic knowledge of discrete mathematics and data structures.

Course Contents / Syllabus

UNIT-I	Introduction	8 Hours

Introduction to Database. Hierarchical, Network and Relational Models.

Database system architecture: Data Abstraction, Data Independence, Data Definition Language (DDL), Data Manipulation Language (DML).

Data models: Entity-relationship model, Keys, Mapping constraints, network model, relational and object-oriented data models, integrity constraints, data manipulation operations.

UNIT-II	Relational query languages	8 Hours

Relational query languages: Relational algebra, Tuple and domain relational calculus, SQL3, DDL and DML constructs, Open source and Commercial DBMS - MYSQL, ORACLE, DB2, SQL server.

Relational database design: Domain and data dependency, Armstrong's axioms, Functional Dependencies, Normalization, Normal forms, Normal Forms based on Functional Dependencies (1 NF, 2 NF, 3 NF, BCNF), Multivalued Dependencies (MVDs) and 4NF, Join Dependencies (JDs) and 5NF and Domain Key, Normal Form (DKNF or 6NF), Inclusion Dependencies, Loss-Less Join Decompositions,Dependency preservation, Lossless design, Closure of an attribute set and FD sets, Canonical Cover of FD Sets.

UNIT-III	Query processing and optimization	8 Hours

Query processing and optimization: Evaluation of relational algebra expressions, Query equivalence, Join strategies, Query optimization algorithms, Introduction on SQL: Characteristics of SQL, advantage of SQL. SQL data type and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors, Triggers, Procedures in SQL/PL SQL.

Storage strategies: Indices, B-trees, Hashing.

UNIT-IV	Transaction processing	8 Hours

Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp-based schedulers, Multi-version and optimistic, Concurrency Control schemes, Database recovery.

Transaction system, Testing of serializability, serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log-based recovery, checkpoints, deadlock handling, Locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation-based protocol, multiplegranularity, Multi version schemes, Recovery with concurrent transaction, case study of Oracle.

UNIT-V	Database Security	8 Hours
Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection. **Advanced topics**: Object oriented and object relational databases, Distributed database Logical databases, Web databases, Distributed databases, Data warehousing and data mining.		
Course outcome: After completion of this course students will be able to:		
CO 1	Analyze database used to solve real world and complex problem and design the ER, EER Model.	K6
CO 2	Analyze and apply Structured Query Language (SQL) or Procedural Query Language (PL/SQL) to solve the complex queries. Implement relational model, integrity constraints.	K3
CO 3	Design and implement database for storing, managing data efficiently by applying the Normalization process on the database.	K6
CO 4	Synthesize the concepts of transaction management, concurrency control and recovery.	K5
CO 5	Understand and implement the concepts of Database security and various types of databases.	K4

Text books:

1.Korth, Silbertz, Sudarshan," Database System Concepts", Seventh Edition, McGraw – Hill.

2.Elmasri, Navathe, "Fundamentals of Database Systems", Seventh Edition, Addision Wesley.

3. Ivan Bayross "SQL,PL/SQL The programming language Oracle, Fourth Edition,BPB Publication

Reference Books:

1.Thomas Cannolly and Carolyn Begg, "Database Systems: A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education, 2007.

2.Raghu Ramakrishan and Johannes Gehrke "Database Management Systems" ThirdEdition, McGraw-Hill.

3. Ron Ben Natan "Implementing Database Security and Auditing" Digital Presss.

4. Brad Dayley "NoSQL with MongoDB in 24 Hours" First Edition, Sams Publisher.

Unit 1	https://www.youtube.com/watch?v=TlbJk78TqYY http://www.nptelvideos.com/lecture.php?id=6472 http://www.nptelvideos.com/lecture.php?id=6473
Unit 2	http://www.nptelvideos.com/lecture.php?id=6484 http://www.nptelvideos.com/lecture.php?id=6485 http://www.nptelvideos.com/lecture.php?id=6486 http://www.nptelvideos.com/lecture.php?id=6487 http://www.nptelvideos.com/lecture.php?id=6493 http://www.nptelvideos.com/lecture.php?id=6495 http://www.nptelvideos.com/lecture.php?id=6496 http://www.nptelvideos.com/lecture.php?id=6497
Unit 3	http://www.nptelvideos.com/lecture.php?id=6474 http://www.nptelvideos.com/lecture.php?id=6475

	http://www.nptelvideos.com/lecture.php?id=6476 http://www.nptelvideos.com/lecture.php?id=6477 http://www.nptelvideos.com/lecture.php?id=6478 http://www.nptelvideos.com/lecture.php?id=6479 http://www.nptelvideos.com/lecture.php?id=6480 http://www.nptelvideos.com/lecture.php?id=6481 https://www.youtube.com/watch?v=NUFXNU51uJY https://www.youtube.com/watch?v=aZjYr87r1b8
Unit 4	http://www.nptelvideos.com/lecture.php?id=6499 http://www.nptelvideos.com/lecture.php?id=6500 http://www.nptelvideos.com/lecture.php?id=6501 http://www.nptelvideos.com/lecture.php?id=6502 http://www.nptelvideos.com/lecture.php?id=6503 http://www.nptelvideos.com/lecture.php?id=6504 http://www.nptelvideos.com/lecture.php?id=6505 http://www.nptelvideos.com/lecture.php?id=6506 http://www.nptelvideos.com/lecture.php?id=6508 http://www.nptelvideos.com/lecture.php?id=6509 http://www.nptelvideos.com/lecture.php?id=6514
Unit 5	https://www.youtube.com/watch?v=n8anyniHbvI https://www.youtube.com/watch?v=meWQLWq7QSE http://www.nptelvideos.com/lecture.php?id=6519

B. TECH. SECOND YEAR			
Course Code	**ACSBS0402N**	**L T P**	**Credits**
Course Title	**Software Design with UML**	**2 0 0**	**2**

Course objective: Students will understand the importance of modeling in the software development life cycle. They can apply the object-oriented approach to analyze and design systems and software solutions. They will understand how to employ the UML notation to create effective and efficient system designs.

Pre-requisites: Basic knowledge about software and its types. Basic knowledge of any programming language.

Course Contents / Syllabus

UNIT-I	**Introduction to Object-Oriented Technologies and the UML Method**	**8 HOURS**

Software development process: The Waterfall Model vs. The Spiral Model, The Software Crisis, description of the real world using the Objects Model, Classes, inheritance and multiple configurations, Quality software characteristics, Description of the Object-Oriented Analysis process vs. the Structure Analysis Model. Study of approaches Cord&Yordon, Graddy Booch, James Raumbaugh.

UNIT-II	**Introduction to the UML Language**	**8 HOURS**

Introduction to the UML Language: Standards, Elements of the language, General description of various models, The process of Object-Oriented software development, Design Patterns, and its types.

UNIT-III	**Requirements Analysis Using Case Modeling**	**8 HOURS**

Requirements Analysis Using Case Modeling: Analysis of system requirements, Actor definitions. Writing a case goal, Use Case Diagrams, Use Case Relationships,
Interaction Diagrams: Description of goal, Defining UML Method, Operation, Object Interface, Class, Sequence Diagram, Collaboration Diagram.

UNIT-IV	**The Logical View Design Stage**	**8 HOURS**

The Static Structure Diagrams: The Class Diagram Model, Attributes descriptions, Operations descriptions, Connections descriptions in the Static Model, Association, Generalization, Aggregation, Dependency, Interfacing, and Multiplicity.
Package Diagram Model: Description of the model: White box, black box, Connections between packagers. Interfaces. Create a Package Diagram.

UNIT-V	**Models**	**8 HOURS**

Dynamic Model: State Diagram / Activity Diagram, Description of the State Diagram, Events Handling, Description of the Activity Diagram, Exercise in State Machines.

Component Diagram Model: Physical Aspect. Logical Aspect, Connections and Dependencies, User face.
Deployment Model: Processors, Connections, Components, Tasks, Threads, Signals and Events.

Course outcome: After completion of this course students will be able to

CO 1	Understand the object-oriented approach to analysing and designing systems and software solutions.	K2
CO 2	Understand and become familiar with the Unified modelling Language	K2
CO 3	Identify, analyse, and model structural and behavioural concepts of the system.Analyse, design, document the requirements through use case driven approach.	K4
CO 4	Demonstrate the logical view of system using class diagram model.	K3

CO 5	Develop, explore the conceptual model into various scenarios and applications.	K6
Textbooks:		
1) The Unified Modelling Language User Guide. Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education, 2nd Edition.		
2) Object-Oriented Software Engineering: using UML, Patterns, and Java. Bernd Bruegge and Allen H. Dutoit.		
Reference Books:		
1) Design Patterns: Elements of Reusable Object-Oriented Software. Erich Gamma, Richard Helm, Ralph Johnson, and John M. Vlissides.		
NPTEL/ Youtube/ Faculty Video Link:		
Unit 1	https://nptel.ac.in/courses/106/105/106105224/	
Unit 2	https://nptel.ac.in/courses/106/105/106105224/	
Unit 3	https://www.youtube.com/watch?v=azTLDkiqGVk&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=37 https://www.youtube.com/watch?v=l9XFipXoJb0&list=PLbRMhDVUMngf8oZR3DpKMv YhZKga90JVt&index=15	
Unit 4	https://www.youtube.com/watch?v=9KokDbcr6cM&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=36 https://www.youtube.com/watch?v=7Pc5-birfmk&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=35	
Unit 5	https://www.youtube.com/watch?v=sPORiupW4mw	

B. TECH. SECOND YEAR

Course Code	ACSBS0405	L T P	Credits
Course Title	Introduction To Innovation, IP Management & Entrepreneurship	2 0 0	2

Course objective: Thiscourse is intended to inculcate the knowledge and application of innovation in business processes. This course would also make the students capable of identifying the opportunities and setting up entrepreneurial venture complying with prevailing intellectual property rights.

Pre-requisites: Good knowledge of Fundamentals of Management (Covered in Year 2, Semester 1)

Course Contents / Syllabus

UNIT-I	Innovation	8 Hours

Innovation: What and Why?

Innovation as a core business process, Sources of innovation, Knowledge push vs. need pull innovations.

Class Discussion- Is innovation manageable or just a random gambling activity?

UNIT-II	Building an Innovative Organization	8 Hours

Creating new products and services, Exploiting open innovation and collaboration, Use of innovation for starting a new venture

Class Discussion- Innovation: Co-operating across networks vs. ‘go-it-alone’ approach.

UNIT-III	Entrepreneurship	8 Hours

Opportunity recognition and entry strategies, Entrepreneurship as a Style of Management, Maintaining Competitive Advantage- Use of IPR to protect Innovation.

UNIT-IV	Entrepreneurship- Financial Planning	8 Hours

Financial Projections and Valuation, Stages of financing, Debt, Venture Capital and other forms of Financing.

UNIT-V	Intellectual Property Rights (IPR)	8 Hours

Introduction and the economics behind development of IPR: Business Perspective, IPR in India – Genesis and Development, International Context, Concept of IP Management, Use in marketing.

Types of Intellectual Property

Patent- Procedure, Licensing and Assignment, Infringement and Penalty, Trademark- Use in marketing, example of trademarks- Domain name, Geographical Indications- What is GI, Why protect them? Copyright- What is copyright? Industrial Designs- What is design? How to protect?

Class Discussion- Major Court battles regarding violation of patents between corporate companies.

Course outcome: After completion of this course students will be able to

CO 1	Understand the concept and importance of innovation in business.	K2
CO 2	Apply the concepts of innovation in real world issues in order to create new	K3

	ventures.	
CO 3	Identify the entrepreneurial opportunities in order to secure competitive advantage of business.	K4
CO 4	To analyze the available funding sources for financing the projects.	K5
CO 5	To understand and apply the knowledge of IPRs in business.	K4

Home Assignment

Case study materials book will be given to students. Students are required to meet in groups before coming to class and prepare on the case for the day. Instructor may ask the student groups to present their analysis and findings to the class.

Further, the topic for class discussion will be mentioned beforehand and students should be ready to discuss these topics (in groups) in class. Students are required to meet in groups before coming to class and prepare on the topic. Few topics are mentioned below as examples. Instructor can add or change any topic as per requirement.

Topic 1- Is innovation manageable or just a random gambling activity?

Topic 2- Innovation: Co-operating across networks vs. 'go-it-alone' approach

Topic 3- Major Court battles regarding violation of patents between corporate companies

Text books:

1. Joe Tidd, John Bessant. Managing Innovation: Integrating Technological, Market and Organizational Change

2. Case Study Materials: To be distributed for class discussion

Course Code	ACSBS0407	L	T	P	Credit
Course Title	Business Communication & Value Science – III	2	0	0	2

Course objective:

1 Develop technical writing skills
2 Introduce students to Self-analysis techniques like SWOT & TOWS
3 Introduce students to key concepts of:
   a) Pluralism & cultural spaces
   b) Cross-cultural communication
   c) Science of Nation building

Pre-requisites:

1. Basic Knowledge of English (verbal and written)
2. Completion of all units from Semesters 1, 2 and 3

Course Contents / Syllabus

Unit 1	Self Analysis Techniques	8 Hours

- Summarize the basic principles of SWOT and life positions.
- Apply SWOT in real life scenarios.
- Recognize how motivation helps real life.
- Leverage motivation in real-life scenarios.

Unit 2	Pluralism, Cultural spaces and Cross-cultural communication	8 Hours

- Identify pluralism in cultural spaces.
- Respect pluralism in cultural spaces.
- Differentiate between the different cultures of India.
- Define the terms global, glocal and translocational.
- Differentiate between global, glocal and translocational culture.
- Recognize the implications of cross-cultural communication.
- Identify the common mistakes made in cross-cultural communication.
- Apply cross-cultural communication.
- Differentiate between the roles and relations of different genders.

Unit 3	Introduction to science of nation building	8 Hours

- Summarize the role of science in nation building.

Unit 4	Technical writing skills and importance of AI	8 Hours

- Define AI (Artificial Intelligence).
- Recognize the importance of AI.
- Identify the best practices of technical writing.
  Apply technical writing in real-life scenarios.

Unit 5	Project	8 Hours

Project

Course Outcomes: Upon completion of the course, students shall have ability to

CO 1	Apply and analyze the basic principles of SWOT & leverage the power of motivation in life	K3
CO 2	Understand and apply the concepts of cultural and gender communication.	K3
CO 3	Apply the concept of science in nation building	K3

CO 4	Understand Artificial Intelligence & recognize its impact in daily life	K3
CO 5	Identify the best practices of technical writing	K3

Textbooks:

There are no prescribed texts for Semester 2 – there will be handouts and reference links shared.

Reference Books:

1 Examples of Technical Writing for Students https://freelance-writing.lovetoknow.com/kinds-technical-writing

2 11 Skills of a Good Technical Writer https://clickhelp.com/clickhelp-technical-writing-blog/11-skills-of-a-good-technicalwriter/

3 13 benefits and challenges of cultural diversity in the workplace https://www.hult.edu/blog/benefits-challenges-cultural-diversity-workplace/

NPTEL/Youtube :

Unit 1	https://youtu.be/CsaTslhSDI
Unit 2	https://m.youtube.com/watch?feature=youtu.be&v=IIKvV8_T95M
Unit 3	https://m.youtube.com/watch?feature=youtu.be&v=e80BbX05D7Y
Unit 4	https://m.youtube.com/watch?v=dT_D68RJ5T8&feature=youtu.be
Unit 5	https://m.youtube.com/watch?v=7sLLEdBgYYY&feature=youtu.be

B. TECH. SECOND YEAR

Course Code	ACSBS0401	L T P	Credits
Course Title	Operations Research	2 0 0	2

Course objective:

The objective of this course is to familiarize the engineers with concept of Linear Programming, Transportation, Assignment problems, PERT – CPM, Inventory Control, Queuing Theory and Simulation Methodology. It aims to show case the students with standard concepts and tools from B. Tech to deal with advanced level of Operations Research and applications that would be essential for their disciplines.

Pre-requisites:

Course Contents / Syllabus

UNIT-I | Introduction to Operations Research | 8 Hours

Origin of Operations Researchand its definition. Concept of optimizing performance measure, Types of OR problems, Deterministic vs. Stochastic optimization, Phases of OR problem approach – problem formulation, building mathematical model, deriving solutions, validating model, controlling and implementing solution.

UNIT-II | Linear Programming | 8 Hours

Linear programming – Examples from industrial cases, formulation & definitions, Matrix form. Implicit assumptions of LPP.

Some basic concepts and results of linear algebra –Hyperplane, Convex set, Convex polyhedron, Extreme points, Basic feasible solutions.

Geometric method: 2-variable case, Special cases – Infeasibility, Unboundedness, Redundancy & degeneracy, Sensitivity analysis.

Simplex Algorithm – Slack, Surplus & Artificial variables, Computational details, Big-M method, identification and resolution of special cases through simplex iterations. Duality – formulation, results, Fundamental theorem of duality, Dual-simplex and primal-dual algorithms.

UNIT-III | Transportation and Assignment problems | 8 Hours

TP - Examples, Definitions – decision variables, supply & demand constraints, formulation, Balanced & unbalanced situations, Solution methods – NWCR, minimum cost and VAM, test for optimality (MODI method), degeneracy and its resolution.

AP - Examples, Definitions – decision variables, constraints, formulation, Balanced & unbalanced situations, Solution method – Hungarian, test for optimality (MODI method), degeneracy & its resolution.

UNIT-IV | PERT – CPM and Inventory Control | 8 Hours

Project definition, Project scheduling techniques – Gantt chart, PERT & CPM, Determination of critical paths, Estimation of Project time and its variance in PERT using statistical principles, Concept of project crashing/time-cost trade-off.

Inventory Control: Functions of inventory and its disadvantages, ABC analysis, Concept of inventory costs, Basics of inventory policy (order, lead time, types), Fixed order-quantity models – EOQ, Special cases of EOQ models for safety stock with known / unknown stock out situations, models under prescribed policy only Deterministic models.

UNIT-V	Queuing Theory and Simulation Methodology	8 Hours

Definitions – queue (waiting line), waiting costs, characteristics (arrival, queue, service discipline) of queuing system, queue types (channel vs. phase). Kendall's notation, Little's law, steady state behaviour, Poisson's Process & queue, Models with examples - M/M/1 and its performance measures; M/M/m and its performance measures; brief description about some special models.

Simulation Methodology: Definition and steps of simulation, random number, random number generator, Discrete Event System Simulation – clock, event list, Application in Scheduling, Queuing systems and Inventory systems.

Course outcome: After completion of this course students will be able to

CO 1	Understand the characteristics of different types of decision-making environments and the appropriate decision-making approaches and tools to be used in each type.	K1
CO 2	Formulate linear programming problem and to find optimal solution by graphical simplex method.	K3
CO 3	Solve Transportation Models and Assignment Models.	K3
CO 4	Apply project management concepts like CPM, PERT and inventory Control to reduce cost and time.	K3
CO 5	Understand the concept of Queuing Theory and Simulation Methodology.	K1

Text books:

1. Operations Research: An Introduction. H.A. Taha.

Reference Books:

1. Linear Programming. K.G. Murthy.
2. Linear Programming. G. Hadley.
3. Principles of OR with Application to Managerial Decisions. H.M. Wagner.
4. Introduction to Operations Research. F.S. Hiller and G.J. Lieberman.
5. Elements of Queuing Theory. Thomas L. Saaty.
6. Operations Research and Management Science, Hand Book: Edited By A. Ravi Ravindran.
7. Management Guide to PERT/CPM. Wiest & Levy.
8. Modern Inventory Management. J.W. Prichard and R.H. Eagle.

NPTEL/ YoutubeLink:

UNIT 1	https://www.youtube.com/watch?v=Q2dewZweAtU https://www.youtube.com/watch?v=cyGxWC4mjtE https://www.youtube.com/watch?v=IXN-wIpSTlk https://www.youtube.com/watch?v=dAhiPu3mY9c
UNIT 2	https://youtu.be/M8POtpPtQZc https://youtu.be/8IRrgDoV8Eo https://youtu.be/YrsbJG8XqU0 https://www.youtube.com/watch?v=aPZ1B7DAXPw https://www.youtube.com/watch?v=eDXztJ6fgqY

UNIT 3	https://youtu.be/oE2nJTXC8OM https://youtu.be/82s6vjg-vhg https://youtu.be/j58TUy0d9R4 https://www.youtube.com/watch?v=Bt9IG9TTXZI https://www.youtube.com/watch?v=zN4AE1YjE2I https://www.youtube.com/watch?v=KarLMGILAjc
UNIT 4	https://www.youtube.com/watch?v=WrAf6zdteXI https://www.youtube.com/watch?v=JxnPBrNccqY https://www.youtube.com/watch?v=J1WwNKDdDC0 https://www.youtube.com/watch?v=v2FT9PoFJ9Y https://www.youtube.com/watch?v=9qnLpjpnsuQ
UNIT 5	https://www.youtube.com/watch?v=v5ZfvATEoDY https://www.youtube.com/watch?v=KG-SxYrMr4Y https://www.youtube.com/watch?v=Co4wzABsny8 https://www.youtube.com/watch?v=6uBb_eOmta8 https://www.youtube.com/watch?v=oJyf8Q0KLRY

B. TECH. SECOND YEAR

Course Code	ACSBS0406	L T P	Credits
Course Title	Marketing Research & Marketing Management	2 0 0	2

Course objective:

This course will develop the orientation of applying research tools in marketing management concepts.This would further facilitate the understanding and application of modern marketing principles and practices in real world issues.

Pre-requisites: Marketing Management

Course Contents / Syllabus

UNIT-I	Marketing Concepts and Applications	8 Hours

Introduction to Marketing & Core Concepts, Marketing of Services, Importance of marketing in service sector.

Marketing Planning & Environment: Elements of Marketing Mix, Analyzing needs & trends in Environment - Macro, Economic, Political, Technical & Social Understanding the consumer: Determinants of consumer behavior, Factors influencing consumer behavior Market Segmentation: Meaning & Concept, Basis of segmentation, selection of segments.

Market Segmentation strategies, Target Marketing, Product Positioning

UNIT-II	Product Management	8 Hours

Product Life cycle concept, New Product development & strategy, Stages in New Product development, Product decision and strategies, Branding & packaging

UNIT-III	Pricing, Promotion and Distribution Strategy	8 Hours

Policies & Practices – Pricing Methods & Price determination Policies. Marketing Communication – The promotion mix, Advertising & Publicity, 5 M's of Advertising Management. Marketing Channels, Retailing, Marketing Communication, Advertising

UNIT-IV	Marketing Research	8 Hours

Introduction, Type of Market Research, Scope, Objectives & Limitations Marketing Research Techniques, Survey Questionnaire design & drafting, Pricing Research, Media Research, Qualitative Research Data Analysis: Use of various statistical tools – Descriptive & Inference Statistics, Statistical Hypothesis Testing, Multivariate Analysis - Discriminant Analysis, Cluster Analysis, Segmenting and Positioning, Factor Analysis

UNIT-V	Internet Marketing	8 Hours

Internet Marketing: Introduction to Internet Marketing. Mapping fundamental concepts of Marketing (7Ps, STP); Strategy and Planning for Internet Marketing

Business to Business Marketing: Fundamental of business markets. Organizational buying process. Business buyer needs. Market and sales potential. Product in business markets. Price in business markets. Place in business markets. Promotion in business markets. Relationship, networks and customer relationship management. Business to Business marketing strategy.

Home Assignments:

1. Written Analyses of Cases – Students are expected to report on their analysis and recommendations of what to do in specific business situations by applying concepts and principles learned in class (Case Studies to be shared by Faculty) e.g., "Marketing Myopia".
2. Field visit & live project covering steps involved in formulating Market Research Project.
3. Measuring Internet Marketing Effectiveness: Metrics and Website Analytics.

Course outcome: After completion of this course students will be able to

CO 1	Understand basic marketing concepts	K1
CO 2	Comprehend the dynamics of marketing and analyze how its various components interact with each other in the real world	K4
CO 3	Leverage marketing concepts for effective decision making	K3
CO 4	Understand basic concepts and application of statistical tools in Marketing research	K3
CO 5	Understand and apply the Internet and B2B marketing for promoting the business.	K3

Text Books:

1. Marketing Management (Analysis, Planning, Implementation & Control) – Philip Kotler
2. Fundamentals of Marketing – William J. Stanton & Others
3. Marketing Management – V.S. Ramaswamy and S. Namakumari
4. Marketing Research – Rajendra Nargundkar
5. Market Research – G.C. Beri 6. Market Research, Concepts, & Cases – Cooper Schindler

Reference Books:

1. Marketing Management – Rajan Saxena
2. Marketing Management – S.A. Sherlekar
3. Service Marketing – S.M. Zha
4. Journals – The IUP Journal of Marketing Management, Harvard Business Review
5. Research for Marketing Decisions by Paul Green, Donald, Tull
6. Business Statistics, A First Course, David M Levine at al, Pearson Publication

B. TECH. SECOND YEAR			
Course Code	**ACSBS0453**	**L T P**	**Credit**
Course Title	**Operating Systems Lab (Unix)**	**0 0 2**	**1**
List of Experiments:			
S.No.	**Name of Experiment**		**CO**
1	Unix commands (files directory, data manipulation, network communication etc), shell programming and vi editor		CO1
2	C program implementation of the following: a. Scheduling Algorithms b. Shared memory c. Thread and Multi Thread d. Inter Process Communication e. Deadlock Avoidance and Deadlock Detection f. Semaphore g. Memory Management h. Indexing and Hashing		CO3
3	Case Study of Linux OS open-source code to understand the functionality of CPU Scheduling, Process Synchronization, Memory management, Deadlock handling and disk scheduling		CO2, CO3, CO4, CO5
Lab Course Outcome: After completion of this course students will be able to			
CO1	Gain all round knowledge of various Linux Commands		K4
CO2	Analyze and implement Process Synchronization technique		K4
CO3	Analyze and implement CPU scheduling algorithms		K4
CO4	Analyze and implement Memory allocation and Memory management techniques		K4
CO5	Analyze and implement Disk Scheduling Policies		K4

Course Code	ACSBS0454	L T P	Credit
Course Title	Database Management Systems Lab	0 0 2	1

List of Experiments:

Sr. No.	Name of Experiment	CO
1.	Installing ORACLE/ MYSQL/NOSQL.	CO1
2.	Creating Entity-Relationship Diagram using case tools with Identifying (entities, attributes, keys and relationships between entities, cardinalities, generalization, specialization etc.)	CO1
3.	I. Implement DDL commands –Create, Alter, Drop etc. II. Implement DML commands- Insert, Select, Update, Delete	CO2
4.	I. Implement DCL commands-Grant and Revoke II. Implement TCL commands- Rollback, Commit, Save point III. Implement different type key:-Primary Key, Foreign Key and Unique etc.	CO2
5.	Converting ER Model to Relational Model (Represent entities and relationships in Tabular form, represent attributes as columns, identifying keys).	CO1,CO2
6.	Practice Queries using COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING, VIEWS Creation and Dropping.	CO2
7.	Practicing Queries using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSECT, CONSTRAINTS etc	CO2
8.	Practicing Sub queries (Nested, Correlated) and Joins (Inner, Outer and Equi).	CO2
9.	**Practicing on Triggers** - creation of trigger, Insertion using trigger, Deletion using trigger, Updating using trigger	CO4
10.	**Procedures-** Creation of Stored Procedures, Execution of Procedure, and Modification of Procedure	CO4
11.	**Cursors**- Declaring Cursor, Opening Cursor, Fetching the data, closing the cursor.	CO4

Lab Course Outcome:

CO 1	Design and implement the ER, EER model to solve the real-world problem and Transform an information model into a relational database schema and to use a data.	K6
CO 2	Formulate and evaluate query using SQL solutions to a broad range of query and data update problems.	K6
CO 3	Apply and create PL/SQL blocks, procedure functions, packages and triggers, cursors.	K6

CO 4	Analyze entity integrity, referential integrity, key constraints, and domain constraints on database.	K4
CO5	Design, implement and develop solutions using database concepts for real time requirements.	K6

B. TECH. SECOND YEAR			
Course Code	**ACSBS0452**	**L T P**	**Credit**

Course Title	**Software Design with UML Lab**	**0 0 2**	**1**
List of Experiment:			
Sr. No.	**Name of Experiment**		**CO**
1	UML include the following 9 diagrams: 1. Class Diagram 2. Object Diagram 3. Use Case Diagram 4. Sequence Diagram 5. Collaboration Diagram 6. State Chart Diagram 7. Activity Diagram 8. Component Diagram 9. Deployment Diagram For the following Applications: • ATM Systems • Stock Maintenance System • Remote Procedure Call Implementation Draw the UML diagrams.		CO1, CO2, CO3, CO4, CO5
Lab Course Outcome: After completion of this course students will be able to			
CO 1	Identify ambiguities, inconsistencies and incompleteness from a requirements specification and state functional and non-functional requirement		K4
CO 2	Identify different actors and use cases from a given problem statement and draw use case diagram to associate use cases with different types of relationship		K5
CO 3	Draw a class diagram after identifying classes and association among them		K5
CO 4	Graphically represent various UML diagrams, and associations among them and identify the logical sequence of activities undergoing in a system, and represent them pictorially		K5
CO5	Able to use modern engineering tools for specification, design, implementation and testing		K4

B. TECH. SECOND YEAR			
Course Code	**ACSBS0451**	**L T P**	**Credit**
Course Title	**Operations Research Lab**	**0 0 2**	**1**
List of Experiments:			
Sr. No.	**Name of Experiment**		**CO**
1	Formulation of linear programming problems.		CO1, CO2
2	Solution of linear programming problem using graphical method with: Multiple constraints Unbounded solution Infeasible solution Alternative or multiple solution		CO1, CO2
3	Enumeration of all basic solutions for linear programming problem.		CO1, CO2
4	Solution of linear programming problem with simplex method.		CO1, CO2
5	Problem solving using Big M method.		CO1, CO2
6	Problem solving using two phase method.		CO1, CO2
7	Solution on primal problem as well as dual problem.		CO1, CO2
8	Solution based on dual simplex method.		CO1, CO2
9	Solution of transportation problem.		CO3
10	Solution of assignment problem.		CO3
Lab Course Outcome:			
CO 1	Understand the characteristics of different types of decision-making environments and the appropriate decision-making approaches and tools to be used in each type.		K1
CO 2	Formulate linear programming problem and to find optimal solution by graphical simplex method.		K3
CO 3	Solve Transportation Models and Assignment Models.		K3

B. TECH. SECOND YEAR					
Course Code	**ANC0404**	**L**	**T**	**P**	**Credit**
Course Title	**Essence of Indian Traditional Knowledge**	**2**	**0**	**0**	**0**

Course objective:

This course aims to provide basic knowledge about different theories of society, state and polity in India, Indian literature, culture, Indian religion, philosophy, science, management, cultural heritage, and different arts in India.

Pre-requisites:

Course Contents / Syllabus

UNIT I	**Society State and Polity in India**	**6 Hours**

State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship , Council of Ministers Administration Political Ideals in Ancient India Conditions' of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage, Understanding Gender as a social category, The representation of Women in Historical traditions, Challenges faced by Women. Four-class Classification, Slavery.

UNIT II	**Indian Literature, Culture, Tradition, and Practices**	**10 Hours**

Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist And Jain Literature in Pali,Prakrit And Sanskrit, Kautilya's Arthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature,Malayalam Literature,Sangama Literature Northern Indian Languages & Literature, Persian And Urdu ,Hindi Literature.

UNIT – III	**Indian Religion, Philosophy, and Practices**	**8 Hours**

Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines, Other Heterodox Sects, Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.

UNIT IV	**Science, Management and Indian Knowledge System**	**8 Hours**

Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India,Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Textile Technology in India,Writing Technology in India Pyrotechnics in India Trade in Ancient India/India's Dominance up to Pre-colonial Times.

UNIT V	**Cultural Heritage and Performing Arts**	**4 Hours**

Indian Architect, Engineering and Architecture in Ancient India, Sculptures, Seals, coins, Pottery, Puppetry, Dance, Music, Theatre, drama, Painting, Martial Arts Traditions, Fairs and Festivals, Current developments in Arts and Cultural, Indian's Cultural Contribution to the World. Indian Cinema

Course outcome: After completion of this course students will be able to

CO 1	Understand the basics of past Indian politics and state polity.	K2

CO 2	Understand the Vedas, Upanishads, languages & literature of Indian society.	K2
CO 3	Know the different religions and religious movements in India.	K4
CO 4	Identify and explore the basic knowledge about the ancient history of Indian agriculture, science & technology, and ayurveda.	K4
CO 5	Identify Indian dances, fairs & festivals, and cinema.	K1

Text books:

1. Sivaramakrishna (Ed.), Cultural Heritage of India-Course Material, Bharatiya Vidya Bhavan, Mumbai, 5th Edition, 2014.
2. S. Baliyan, Indian Art and Culture, Oxford University Press, India
3. Sharma, R.S., Aspects of Political Ideas and Institutions in Ancient India(fourth edition), Delhi, Motilal Banarsidass,

Reference Books:

1. Romila Thapar, Readings In Early Indian History Oxford University Press , India
2. Basham, A.L., The Wonder that was India (34th impression), New Delhi, Rupa & co.