UIT-RGPV (Autonomous) Bhopal

Subject code: IT501 **Subject: Theory of Computation**
Semester: V For credits & marks refer your scheme

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

CO 1	Design a finite automata for various applications and minimize it.
CO 2	Construct a regular expression, convert RE to finite automata and vice versa.
CO 3	Construct a CFG and convert grammar to normal forms.
CO 4	Design Pushdown Automata and perform conversions.
CO 5	Explain Turing machines and P/NP type problems.

UNIT I

Introduction of the theory of computation, Finite state automata – description of finite automata, properties of transition functions, Transition graph, designing finite automata, FSM, DFA, NFA, 2-way finite automata, equivalence of NFA and DFA, Mealy and Moore machines.

UNIT II

Regular grammars, regular expressions, regular sets, closure properties of regular grammars, Arden's theorem, Myhill-Nerode theorem, pumping lemma for regular languages, Application of pumping lemma, applications of finite automata, minimization of FSA.

UNIT III

Introduction of Context-Free Grammar - derivation trees, ambiguity, simplification of CFGs, normal forms of CFGs- Chomsky Normal Form and Greibach Normal forms, pumping lemma for CFLs, decision algorithms for CFGs, designing CFGs, Closure properties of CFL's.

UNIT IV

Introduction of PDA, formal definition, closure property of PDA, examples of PDA, Deterministic Pushdown Automata, NPDA, conversion PDA to CFG, conversion CFG to PDA.

UNIT V

Turing machines - basics and formal definition, language acceptability by TM, examples of TM, variants of TMs – multitape TM, NDTM, Universal Turing Machine, offline TMs, equivalence of single tape and multitape TMs. Recursive and recursively enumerable languages, decidable and undecidable problems – examples, halting problem, reducibility. Introduction of P, NP, NP complete, NP hard problems and Examples of these problems.

Reference Books:

1. Daniel I.A. Cohen,"Introduction to Computer Theory",Wiley India.
2. John E Hopcroft, Jeffrey D. Ullman and Rajeev Motwani, "Introduction to Automata Theory, Languages and Computation", Pearson Education.
3. K.L.P Mishra & N.Chandrasekaran,"Theory of Computer Science", PHI Learning.
4. Peter Linz, "Introduction to Automata Theory and Formal Languages", Narosa Publishing.
5. John C Martin, "Introduction to languages and the theory of computation", TATA McGraw Hill.

UIT-RGPV (Autonomous) Bhopal

Subject code: IT511 **Subject: Software Engineering**
Semester: V For credits & marks refer your scheme

Course Objectives

Course Outcomes:

CO 1	Classify the software engineering lifecycle model with open source software and its appilication
CO 2	Classify the methods of software cost estimation.
CO 3	Explain the methods of requirement specification.
CO 4	Summarize Component based software Engineering
CO 5	Classify as software testing Strategies

UNIT I
Introduction to software engineering, Software- problem and prospects Software development process: Software life cycle models, Open source software development, the unified process, documentation, configuration management, Safety, risk assessment.

UNIT II Measures, Metrics and Indicators, Metrics in the Process and Project Domains, Software Measurement, Metrics of Software Quality, S/W reliability, Software estimation techniques, loc and FP estimation. Empirical models like COCOMO, project tracking and scheduling, reverse engineering.

UNIT III Software requirements Engineering: problem analysis, Software requirement specifications, Object – Oriented Requirements Analysis, function oriented Analysis, state oriented approach to behavioral specifications. feasibility study, pre/post conditions, algebraic specification and requirement analysis models, Specification design tools. Software design and implementation: Software design objectives, design techniques, User interface design, modularity.

UNIT IV Introduction to Component-based software engineering, Component models and components, component-based development process and Component life cycle, Architectural approaches in componentbased development.

UNIT V Software Testing Strategies: Verification and Validation, Strategic Issues, test plan, white box, blackbox testing, unit and integration testing, system testing test case design and acceptance testing, maintenance activities. Software project management standards, project management and team organization, on managing software quality: prespectives on quality, software quality assurance, CMM.

Reference Books:

1. P,S. Pressman, “Software Engineering. A Practitioner's Approach” New edition TMH.
2. Rajib Mall, “Fundamental of Software Engineering”, PHI.
3. Hans Van Vliet, “Software engineering”, third edition, wiley india edition.
4. James S. Peters, “Software Engineering”, wiley india edition.
5. Pankaj Jalote, “Software engineering: A Precise Approach”, wiley india.

UIT-RGPV (Autonomous) Bhopal

Subject code: IT503 **Subject: Computer Networks**

Semester: V For credits & marks refer your scheme

Course Objective:

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

CO 1	Understand OSI,TCP/IP reference model and function of each layer.
CO 2	Outline functions of data link layer, addressing, design issues and its protocols.
CO 3	Explain the significance of MAC sub-layer protocols .
CO 4	Demonstrate the logical addressing, routing techniques and protocols of network layer.
CO 5	Discuss transport layer protocols and internetworking devices .

UNIT I

Importance of computer networks, broadcast and point to point networks, Local area networks and Wide area networks, network topology, Introduction to ISO-OSI reference model, TCP/IP reference model , function of each layer, interfaces and services, Protocol data unit, connection oriented and connectionless services, service primitives, comparison of TCP/IP and ISO-OSI reference model, Novel Netware, Arpanet, X.25, RJ-45,Network interface card, rack, cable standard-Category 5,6,and 7, cross connection, straight connection cable coding standards.

UNIT II

Switching techniques- Circuit, packet and hybrid switching, Data-Link layer: - Data link layer design issues, framing, flow & error control, Error detection and correction, link layer addressing, Stop & Wait protocol ,Go back N ARQ ,selective repeat ARQ, piggybacking and pipelining, HDLC LAN Protocol stack-Logical link control and Media Access Control sublayer, IEEE 802.2 LLC Frame format.

UNIT III

MAC layer Protocols- , static and dynamic allocation , Pure and slotted ALOHA protocols, Carrier sense multiple access, Persistent and non persistent CSMA, IEEE standard 802.3 and Ethernet,802.3 cabling, IEEE 802.4, IEEE 802.5, FDDI.

UNIT IV

The Network layer- logical addressing, classfull & classless addressing, address mapping, packet delivery & forwarding. unicast routing protocols , multicast routing protocols, Routing algorithm- Least Cost, Dijkstra's, Bellman-ford, congestion control algorithms, Internetworking devices, Introduction to Internet protocol IPv4, next generation IP.

UNIT V

Transport layer-Transport services , Process to process delivery, UDP ,TCP ,congestion control , quality of service , Integrated services, Differentiated services LAN-WAN Design and implementation- Configuring TCP/IP, using Ipconfig, ping command , study of structured LAN , study of internetworking devices and their configuration– switches, hubs, Bridges, routers and Gateways

Reference Books:- 1. Tanenbaum, "Computer Networks", PHI Learning. 2 B. Forouzan, F. Moshrrof, "Computer Networks A Top Down Approach", TMH.
3. N Olifer and V Olifer ,"Computer Networks",Wiley publication.
4. Michael A. Gallo & William M. Hancock, "Computer Communications & Networking Technologies", Cengage pearsen publications.
5. Black, "Computer Networks: Protocols, Standards and Interfaces", PHI learning

List of Experiments:

1. Establishment and configuration of LAN
2. Colour coding standard of CAT 5,6,7 and crimping of cable in RJ-45
3. Study of WAN
4. Study of various network topologies.
5. Study of sliding window protocol
6. Study of IEEE 802.3 , 802.4 ,802.5
7. Study of LAN Trainer.
8. Study of basic networking commands like ping, ipconfig, etc
9. Case study of various Routing Strategies
10. Establishing & studying the various parameters of a home LAN Network
11. Study of IOS of routers
12. Configuring routers, bridges and switches and gateways

UIT-RGPV (Autonomous) Bhopal

Subject code: IT505 **Subject: Digital Communication**
Semester: V For credits & marks refer your scheme

Course Objective:

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

CO 1	Discuss generation of PCM and its types.
CO 2	Differentiate various keying techniques
CO 3	Use entropy to compute channel capacity and efficiency of communication channels.
CO 4	Compute coding efficiency for source coding techniques.
CO 5	Explain transmission techniques

UNIT I

Digital signal, Quantization, Quantization error, Pulse code modulation, signal to noise ratio, Eye pattern, Companding, Data rate and Baud rate, Bit rate, multiplexed PCM signal, Differential PCM (DPCM), Delta Modulation (DM), limitations of DM and Adaptive Delta Modulation (ADM), comparison of various systems.

UNIT II

Digital modulations techniques, Generation, detection, equation and Bandwidth of amplitude shift keying (ASK) Binary Phase Shift keying (BPSK), Differential phase shift keying (DPSK), offset and non offset quadrature phase shift keying (QPSK), M-Ary PSK, Binary frequency Shift Keying (BFSK), M-Ary FSK Quadrature Amplitude modulation (QAM), MODEM,

UNIT III

Information theory and coding- Uncertainity, Unit of Information, entropy, Rate of information,
Joint & Conditional entropy, Mutual information, channel capacity, Shannon's Theorem, Continuous channel, Capacity of a Gaussian channel: Shannon Hartley Theorem, Bandwidth S/N ratio trade off.

UNIT IV

Coding efficiency, Shanon,Fano and Huffman coding, Error control coding-Block codes, parity check codes, linear block codes, cyclic codes, Convolutional codes.

UNIT V

Data communication concepts – Data transmission – Parallel and serial transmission, synchronous, and Asynchronous transmission, Simplex,half duplex and fullduplex , unipolar and polar line codes, Nonreturn to zero codes, return to zero codes, bipolar line codes, bauds, modem, Line configurations-Point to point and point to multipoint configuration.

Reference Books:

1. Singh & Sapre, "Communication System", TMH
2. Taub & shilling, "Communication System", TMH
3. Simon Haykins, "Communication System", Willy
4. Hsu, "Analog and digital communication (Schaum)", TMH
5. B.P. Lathi, "Modern Digital and analog communication system",
6. Wayne Tomasi, "Electronic Communication system'.
7. Forouzan, "Data communication and networking", TMH 4th edition
8. Prakash C Gupta, "Data communication and Computer Networks",PHI Learning.
9. 0Analog & Digital Communication System; Discovery Press.
10. Frank R. Dungan, "Electronic Communication System", Thomson/Vikas.

List of Experiments (Expandable)

1. Study of PCM transmitter and receiver.
2. Study of ASK PSK and FSK transmitter and receiver.
3. Case Study of digital interface RS-232.
4. Case Study of Synchronous and asynchronous transmission.
5. Case Study of various multiplexing techniques.
6. Case Study of Parallel and serial transmission.
7. Study of NRZ and RZ Codes.

UIT-RGPV (Autonomous) Bhopal

Subject Code:IT512 Subject: Computer Programming-III (PYTHON ROGRAMMING)
Semester: V For credits & marks refer your scheme

Course Objective:

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

CO 1	Describe various data types used in python
CO 2	Express different Decision Making statements and Functions
CO 3	Create and apply function, module and packages.
CO 4	Apply file handling in python.
CO 5	Apply Object oriented programming concept such as encapsulation, inheritance and polymorphism as used in Python

Unit I:
Introduction To Python, Installation and Working with Python, Understanding Python variables, Python basic Operators, Understanding python blocks Python Data Types, Declaring and using Numeric data types: int, float, complex; Using string data type and string operations, Defining list and list slicing Use of Tuple data type

Unit II:
Python Program Flow Control, Conditional blocks using if, else and elif, Simple for loops in python, For loop using ranges, string, list and dictionaries, Use of while loops in python, Loop manipulation using pass, continue, break and else, Programming using Python conditional and loops block

Unit III:
Python Functions, Modules And Packages, Organizing python codes using functions, Organizing python projects into modules, Importing own module as well as external modules, Understanding Packages, Powerful Lamda function in python, Programming using functions, modules and external packages, Python String, List
And Dictionary Manipulations

Unit IV:
Python File Operation, Reading config files in python, Writing log files in python, Understanding read functions, read(), readline() and readlines(), Understanding write functions, write() and writelines(), Manipulating file pointer using seek, Programming using file operations

Unit V:
Python Object Oriented Programming – Oops, Concept of class, object and instances, Constructor, class attributes and destructors, Real time use of class in live projects, Inheritance , overlapping and overloading operators, Adding and retrieving dynamic attributes of classes, Programming using Oops support

Reference Books:

1. Mark Lutz, "Powerful Object-Oriented Programming", O′Reilly; 4th edition.
2. Martin C. Brown, "Python: The Complete Reference", McGraw Hill Education; Forth edition.

List of experiments:

1. Write a program to demonstrate basic data type in python.
2. Installation of new packages.
3. Write a program to demonstrate simple calculator.
4. Write a program to demonstrate basic calculator using function.
5. Write a program to demonstrate file handling.
6. Write a program to demonstrate class and object.
7. Write a program to illustrate inheritance.
8. Write a program to illustrate polymorphism.

UIT- RGPV (Autonomous) Bhopal

Subject code: IT507 **Subject: GD/Seminar**

Semester: V For credits & marks refer your scheme

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

CO 1	Choose the topic and carry out literature survey.
CO 2	Build PowerPoint presentation and Practice soft skills and interpersonal communication
CO 3	Discuss pros and cons of subject under consideration effectively
CO 4	Defend himself /herself & also counter the allegations firmly during group discussion

UIT-RGPV (Autonomous) Bhopal

Subject code: IT508 **Subject: Operating System**

Semester: V **For credits & marks refer your scheme**

COURSE OBJECTIVES This course provides a comprehensive introduction to understand the fundamental principles, techniques and approaches related to CPU, memory and files which requires the complete knowledge of operating systems. The course will highlight the various functionality of CPU scheduling, memory management, disk management and security of operating system.

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

CO 1	Analyze the structure of Operating System and basic architectural components.
CO 2	Analyze CPU scheduling, process synchronization issues and remedies
CO 3	Illustrate deadlock handling strategies & memory management.
CO 4	Demonstrate paging and segmentation.
CO 5	Discuss file system and disk management .

Course Contents

Unit-I: Software, type of software, introduction to Operating Systems, function, services, types of operating systems, kernel, system call, process concept, process states, process control block, type of scheduler, context switching, threads, type of threads, multithreading model.

Unit-II: Process management, concepts of CPU scheduling, scheduling criteria, scheduling algorithms, algorithm evaluation, multiple processors scheduling, cooperating process, Interprocess communication, process synchronization, critical section problem, semaphores, classical problems of synchronization.

Unit-III: Deadlock, necessary conditions, resource allocation graph, deadlock prevention, deadlock avoidance, deadlock detection, deadlock recovery, introduction to memory management, address binding, logical and physical addressing, MMU, contiguous memory allocation, memory management techniques, single partition, multipartition, best fit, worst fit, first fit.

Unit-IV: Paging, paging issues, TLB, page fault, segmentation, segmentation with paging, effective access time, concepts of virtual memory, demand paging, demand segmentation, page replacement algorithms, allocation of frames, thrashing, security in operating system, security techniques.

Unit-V: File system, file and directory concepts, attributes, operation, file type, directory structure, LINUX file system, FAT, I-node, file access methods, allocation methods, free space managements, disk management, disk access time, disk scheduling algorithm.

.**Reference Books**

1. Silberschatz,"Operating system", Willey Pub.

2. S.Haldar and Alex A. Arvind " Operating Systems" 2nd Edition Pearson.

3. D. M. Dhamdhere, "Operating System- A concept- Based Approach", TMH.

4. Pabitra Pal Choudhury, "Operating System-Principle and Design", PHI Learning.

UIT-RGPV (Autonomous) Bhopal

Subject code: IT509 **Subject: Internship-II**
Semester: V

For credits & marks refer your scheme

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

CO 1	Integrate theory and practice.
CO 2	Develop communication, interpersonal and other soft skills.
CO 3	Develop work ethics and etiquette.

Students are required to undergo 90 hours of internship during winter and summer vacations of 2nd year in any Industry/Research Organization/Laboratory/Engineering Organization/Government Training Institutes/Public Sector Undertaking / Academic Institutions of repute. They may also attend Industry/Job Oriented Courses / Online courses.

The students are required to submit a detailed internship report. Evaluation will be done in V semester and is based on report,presentation and subsequent viva voce. Three credits are allotted for this Internship.

UIT-RGPV (Autonomous) Bhopal

Subject code: IT510 **Subject: Essence of Indian Traditional Knowledge**
Semester: V For credits & marks refer your scheme

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

CO 1	Explain the importance of Vedas in life
CO 2	Illustrate the philosphical traditions
CO 3	Understand the significance of Yoga
CO 4	Discuss the importance of Indian artistic tradition.

Course Content:

Basic structure of

Basic structure of Indian Knowledge System: अ'ा दशिवf ा -४वेद,४उपवेद (आयुवőद, धनुवőद, गzवाेवेद, थ पr शआद) ६वेद ाांग (शाि◌ा , कB, शानŜb, fjा करण, Üा शातष, छांद) ४ उप ङ्ग (धमाेि ◌ , मीम ाांस , पुर ण, तकाेि ◌ - Modern Science and Indian Knowledge System

-Yoga and Holistic Health care

- Case studies
- References

- V. Sivaramakrishnan (Ed.), Cultural Heritage of India-course material, Bharatiya Vidya Bhavan, Mumbai. 5th Edition, 2014
- Swami Jitatmanand, Modern Physics and Vedant, Bharatiya Vidya Bhavan
- Swami Jitatmanand, Holistic Science and Vedant, Bharatiya Vidya Bhavan
- Fritzof Capra, Tao of Physics
- Fritzof Capra, The Wave of life
- VN Jha (Eng. Trans.), Tarkasangraha of Annam Bhatta, International Chinmay Foundation, Velliarnad, Arnakulam
- Yoga Sutra of Patanjali, Ramakrishna Mission, Kolkata
- GN Jha (Eng. Trans.), Ed. RN Jha, Yoga-darshanam with Vyasa Bhashya, Vidyanidhi Prakashan, Delhi 2016
- RN Jha, Science of Consciousness Psychotherapyand Yoga Practices, Vidyanidhi Prakashan, Delhi 2016
- P B Sharma (English translation), Shodashang Hridayan

Pedagogy: Problem based learning, group discussions, collaborative mini projects. Outcome: Ability to understand, connect up and explain basics of Indian traditional knowledge in modern scientific perspective